Master

Pump Two-Phase Performance Program
Volume 8: Data Processing Methods

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EPRI PERSPECTIVE

PROJECT DESCRIPTION

This final report under RP301 documents the findings of an experimental research effort to develop a data base on reactor coolant pump single- and two-phase performance behavior. Tests were performed on a geometrically scaled model of an actual reactor coolant pump. Both steady-state and transient blowdown tests were performed over sufficiently large ranges of thermal-hydraulic operating conditions and typical pump performance parameters to cover calculated hypothetical loss-of-coolant accident (LOCA) conditions.

PROJECT OBJECTIVES

Current analytic pump models used in LOCA analyses are based on a limited amount of experimental data. The goals of this project were (1) to establish a sufficiently large data base of steady-state and transient pump performance data to substantiate, and ultimately improve, analytic pump models currently used for reactor coolant pump LOCA analysis; and (2) to obtain data on pump characteristics under two-phase transient blowdown conditions to aid the evaluation of reactor coolant pump overspeed.

PROJECT RESULTS

The pump data base collected in this project is considered sufficiently large and diverse to cover a significant range of pump performance of primary importance to LOCA analysis. Initial evaluation of the test results indicates that pump rated head and torque degrade significantly under two-phase flow conditions. Pump free-wheeling speed (pump motor power off) is closely coupled to the volumetric flow rate through the pump during a blowdown transient. The maximum free-wheeling speed observed was near twice the rated speed for a discharge break equal to the flow area of the pump. For smaller size discharge breaks, the peak speed observed was less than twice the rated speed. With electric power to the pump drive motor on throughout the blowdown, however, the pump speed was maintained at an almost constant value.

Additional reduction and analysis of this data base is required before it can be used to support the development of an improved analytic model for pump two-phase performance.

This final report consists of eight volumes, as presented in the table of contents in the first volume. Volumes 1, 2, 3, 4, and 7 present the results and conclusions, as well as substantial discussion and description, of the entire project and the test data. Volumes 5 and 6 present the tabulated test data in computer printout and graphic format, which will be useful for further analyses. Volume 8 contains a description of the data processing methods. Volumes 2 through 8 are available from the Research Reports Center* upon request.

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ABSTRACT

The primary objective of the C-E/EPRI Pump Two-Phase Performance Program was to obtain sufficient steady-state and transient two-phase empirical data to substantiate and ultimately improve the reactor coolant pump analytical model currently used for LOCA analysis. A one-fifth scale pump, which geometrically models a reactor coolant pump, was tested in steady-state runs with single- and two-phase mixtures of water and steam over ranges of operating conditions representative of postulated loss-of-coolant accidents. Transient tests were also run to evaluate the applicability of the steady-state-based calculational models to transient conditions.

This project has produced test data which can appropriately be utilized for reactor coolant pump modeling in LOCA analyses. The steady-state test data show general coherence of the test results and overall pump performance trends for a model pump that should be representative of a reactor coolant pump to the extent that scaling laws apply. Both head and torque data correlate well in the form of homologous curves. Two-phase head degradation curves are approximately comparable to head degradation curves obtained in other test programs. Two-phase torque degradation curves have also been developed. The collected data should be useful for analytical model development.

Volume VIII: DATA PROCESSING METHODS

CONTENTS

Section 1

INTRODUCTION

This volume describes the data processing methods used to convert the raw test data to engineering units and plots for both the steady-state and transient tests conducted during the CE/EPRI pump project. The material presented is intended to be sufficiently complete so that the reader can understand the methods used by C-E to process the data. The material contained in this document is not, however, sufficiently complete to permit the reader to conduct a thorough audit of the data processing. In many cases, the material has been condensed to the extent that the reader is expected to be capable of reading computer programs in order to completely understand the presentation. By applying the methods presented in this volume and by employing the calibration constant histories and channel arrangement records also provided in this volume, the reader can independently process test data if desired.

The flow diagram given in Figure 1-1 is an overview of the total data processing approach. Analogue transient data were provided using an FM multiplex system. The analog data were converted to digital data which were, in turn, converted to engineering units using appropriate calibration data and then plotted. Discrete steady-state data and supplementary transient data were obtained using a data channel scanner. For each steady-state test point, five discrete readings of each channel were recorded 1/2 minute apart, and for the supplementary transient data, each channel was sampled every five seconds during the transient. The steady-state scanner data were converted to engineering units and several forms of hard copy output were produced. The output also included a variety of derived parameters calculated from the measured data. The transient scanner data were converted to engineering units and plotted directly. As indicated in the flow chart, extensive use was made of computer files and computer programs to accomplish management of the data and computations using the data. These methods are described in the sections to follow.

As additional background, three numbering systems were utilized to identify the data as they were processed through the calibration and reduction steps. These numbering systems were the Instrument Location Numbers (ILN's), the Data Scanner Channel Numbers (SCN's), and the FM Channel Numbers (FM's). The ILN specified the physical location of a measuring point as schematically portrayed on the P&I Diagram, Figure 1-2. The SCN specified the data scanner channel number on which the data were recorded. An instrumentation history was maintained for each data scanner channel to record scanner channel and FM Channel assignments during the steady-state test series. The FM number primarily pertained to transient data, and it specified the FM channel number on which the data were recorded. These three numbering systems, plus the description of the measuring instrument, related the output data to the location and type of instrument producing those data and were documented for each test series.

Because of the complexity of the various processing methods and the significant detail required to adequately describe them, a format different from that used in previous volumes has been used in this volume. The summary table of contents provided at the front of this volume provides the reader with a path to the specific information he or she desires. This table of contents itemizes the methods presented in this volume and indicates the location (section) in this volume where the specific information is described in detail. In addition to this summary table of contents, a detailed table of contents is included at the front of each section which follows to provide a further breakdown of the material described in that section.

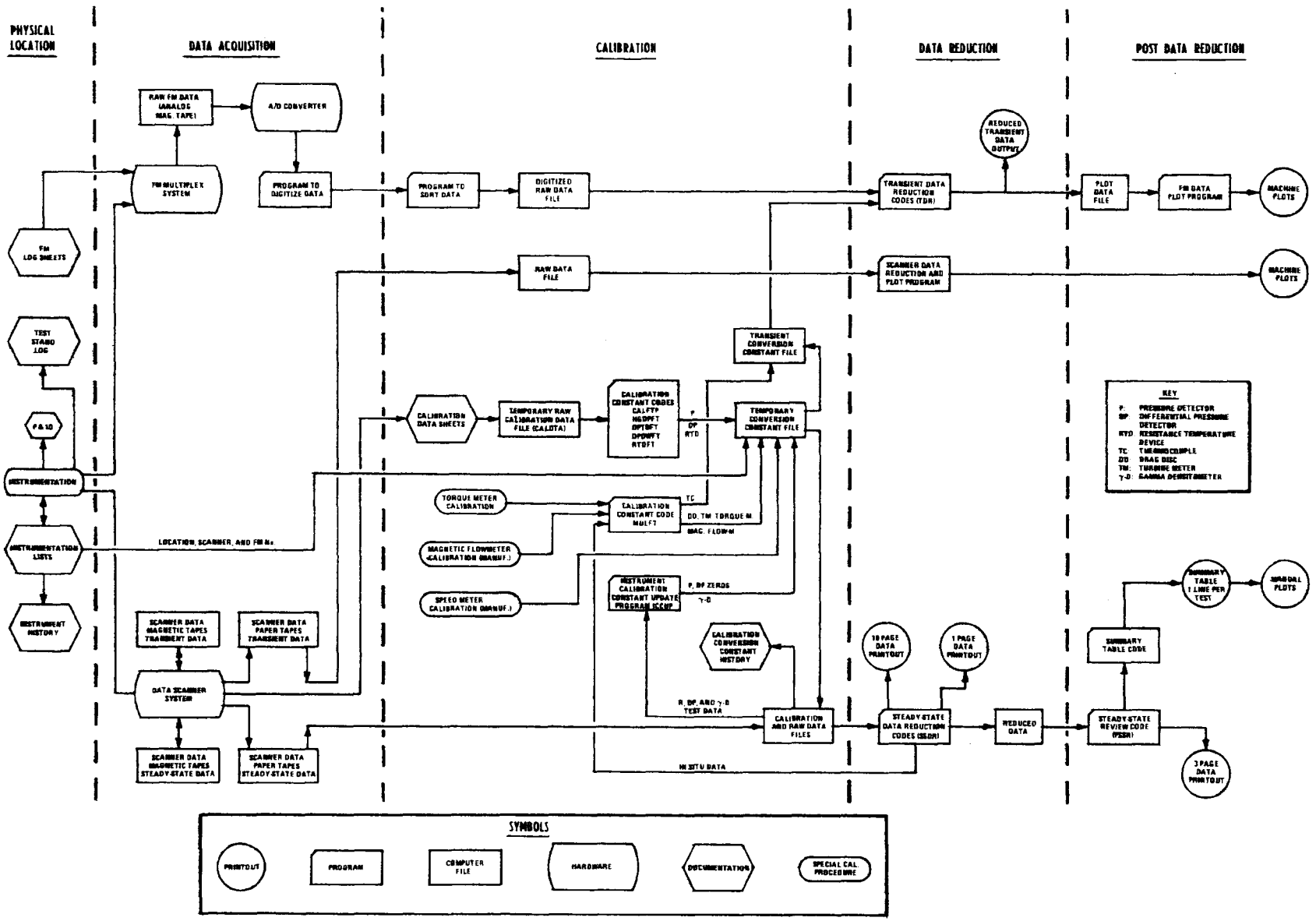

Figure 1-1. Data Processing Methods

Section 2

INSTRUMENTATION CALIBRATION METHODS AND HISTORY

Section 2

CONTENTS

ILLUSTRATIONS

TABLES

2.1 INTRODUCTION

This section briefly describes (1) how each instrument type was calibrated, (2) how the results of the calibrations were used to update the conversion constant files and (3) how changes in instrumentation were documented. Descriptions of each instrument type can be found in Section 4 of Volume VII, Test Facility Description.

Each instrument type was calibrated using a standard laboratory procedure. These procedures are considered briefly in this section. Each calibration resulted in a set of calibration data which was processed by a computer program to produce a group of conversion constants. These programs used a regression analysis by the method of least squares. During the course of the test program at least three full calibrations were performed on each instrument with the exception of the magnetic flow meter. Results from each new calibration were compared with all previous calibrations. Significant deviations in calibration data usually led to the replacement of the instrument.

The conversion constants produced by the calibrations performed on each instrument were used to update two different types of conversion constant files: (1) steady-state conversion constant files and (2) transient conversion constant files. The steady-state conversion constant or "zero" files were utilized by the Steady-State Data Reduction (SSDR) Code which reduced data from steady-state tests to output in engineering units. Zero files were also utilized by the program TP4TPT which reduced data obtained by the data scanner from transient tests to plots in engineering units versus time. The transient conversion constant or "CAL" files were utilized by the Transient Data Reduction (TDR) Code which reduced data obtained by the FM multiplex system from transient tests to plots of measured and calculated parameters versus time.

After each change to the steady-state or transient conversion constant file the new file was assigned a unique number and stored permanently. The data from these conversion constant files were used to compile a conversion constant history which shows the correct conversion constants for any instrument for any test.

In order to keep track of the many changes in instrumentation which occurred during the testing phases an Instrumentation History was compiled. This history

shows which instrument was connected to any given data scanner channel (SCN) at any given time. It also shows which channel from the FM multiplex system (FM) was connected to that data scanner channel.

Using the information presented in this section and the appropriate data reduction code, it is possible to take any raw, digital data value from a steady-state or transient test, find the correct conversion constants, and calculate the output from that instrument in engineering units.

Detailed calibration procedures, calibration results, calibration reduction program listings, and printouts from these programs are not included in this report but are available in EPRI files.

2.2 INSTRUMENT CALIBRATION METHODS

2.2.1 Pressure Cell Calibration

All pressure cells utilized in the pump test loop were calibrated with a dead weight calibration tester. Each calibration consisted of fifteen or more points which covered the entire range of the transducer. Cell output was manually recorded for each point. Readout was from the data scanner digital voltmeter. Electrical connections and equipment were identical to that used during testing. That is, the same lead wires, power supply, amplifier, and data scanner were utilized for both calibration and test data acquisition. Figure 2.2-1 is an example of calibration data.

The calibration data was analyzed by the program CALFTP which used a least squares method to fit the data to a quadratic curve. The output of the program for a set of calibration data consisted of a set of three conversion constants and the standard error or scatter around the average difference between the measured and calculated pressures.

Conversion constants generated for each set of calibration data were compared with previous constants for that cell. If the calibration was judged satisfactory the constants were used to update the steady-state and transient conversion constant files.

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INSTRUMENTATION CALIBRATION REPORT

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INSTRUMENT BEING CALIBRATED				LOCATION	TEST-SCANNER NO.
ROSEMOUNT PRESSURE CELL				MAIN WATER	S-42
MANUFACTURER	SERIAL NO.	MODEL NO.	KDL NO.	SPAN	OUTPUT
ROSEMOUNT	BOX #6 18386	1106	—	0-1500	16-80MV
CALIBRATION STANDARD USED				CALIBRATED BY	CHECKED BY
DEAD WEIGHT TESTER				OG+RW	O. Gamm
MANUFACTURER	SERIAL NO.	MODEL NO.	KDL NO.	PROCEDURE USED	
MANSFIELD + GREEN	5796	R-30	E-380		
DANA DVM MOD. 5900 MOD. 275 SCANNER				PROJECT NO. 900145	REQUESTED BY J. FISHBURN
				ENVIRONMENTAL CONDITIONS 18 °C, %RH, ATM.	

CALIBRATION STANDARD Rd		INSTRUMENT BEING CALIBRATED Rd	REMARKS
PSIG		M.V.	D.V.M. ZERO -.002
0	1	15.525	RE-CALIBRATION OF 6-1-77
212	2	24.716	
200	3	24.191	
412	4	33.382	
400	5	32.874	
612	6	42.041	
600	7	41.523	
812	8	50.673	
800	9	50.158	
1012	10	59.288	
1000	11	58.772	
1212	12	67.872	
1200	13	67.361	
1412	14	76.449	
1400	15	75.941	
1512	16	80.738	
1500	17	80.223	
0	18	15.518	
	19		
	20		

Figure 2.2-1. Sample Pressure Cell Calibration

2.2.2 Differential Pressure Cell Calibration

Differential pressure cells were calibrated with one of three available standards depending on the cell range. Low range (0-4.5 psi) cells were calibrated with a 60-inch manometer using an organic manometer fluid, tetrabromoethane. Intermediate range (0-25 psi) cells were calibrated with a 60-inch manometer using mercury. High range (0-250 psi) cells were calibrated with two dead weight test gages.

Previous experience indicated that the type of differential pressure cells used were sensitive to static (casing) pressure. Therefore, each cell was calibrated at three different static pressures which covered the range of static pressures over which they were expected to operate. At each static pressure ten or more calibration points were taken to cover the differential pressure range of that cell.

As with pressure cells, the same electronics were used for both calibration and test data acquisition. Manually recorded calibration data such as the example in Figure 2.2-2 were reduced by one of three computer programs depending on the type of tester used to produce the data. The three programs are:

(1) HGDPFT, for the mecury manometer,

(2) DPTBFT, for the tetrabromoethane manometer, and

(3) DPDWFT for the dead weight testers.

These programs were similar except for the conversion of the calibration tester's output to psid. All three programs produced an output of four conversion constants for each cell's calibration data and the standard error for that calibration. The conversion constants represented the best fit of the calibration data to the equation,

$$\Delta P = C_1 + C_2(V-V_o) + C_3P + C_4P(V-V_o), \text{ where}$$

ΔP = output of cell (psid)
V = cell electrical output (volts)
V_o = cell electrical output when $\Delta P=0$ (volts)
P = static pressure (psia)
C_1, C_2, C_3, C_4 = conversion constants

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INSTRUMENTATION CALIBRATION REPORT

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INSTRUMENT BEING CALIBRATED				LOCATION	TEST-SCANNER NO.
DIFFERENTIAL PRESSURE CELL				PUMP SUCTION	S-33
MANUFACTURER	SERIAL NO.	MODEL NO.	KDL NO.	SPAN	OUTPUT
BLH	45077	1500 HLD		0-500" H_2O	10-90 MV
CALIBRATION STANDARD USED				CALIBRATED BY	CHECKED BY
MERCURY MANOMETER TYPE W 60"				Lal + R.D.	D. Gaarner
MANUFACTURER	SERIAL NO.	MODEL NO.	KDL NO.	PROCEDURE USED	
MERIAM	B47611	30FA350			
DANA DVM 5900 275 SCANNER				PROJECT NO. 900145	REQUESTED BY J. FISHMAN
				ENVIRONMENTAL CONDITIONS 16 °C, %RH, ATM.	

CALIBRATION STANDARD Rd		INSTRUMENT BEING CALIBRATED Rd		REMARKS
in Hg		MV	PRESS.	DVM ZERO
0	1	50.342	500	-.003
18	2	69.793		
37	3	90.546		
28	4	80.773		
9	5	60.053		
0	6	50.333	500	
-0	7	50.245	500	
-18	8	30.881		
-37	9	10.989		
-28	10	20.307		
-9	11	40.450		
-0	12	50.249	500	
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

Figure 2.2-2. Sample Differential Pressure Cell Calibration Data

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INSTRUMENTATION CALIBRATION REPORT

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INSTRUMENT BEING CALIBRATED				LOCATION Pump Suct. Inlet Across Pipe	TEST-SCANNER NO.
DIFFERENTIAL PRESSURE CELL					S-33
MANUFACTURER	SERIAL NO.	MODEL NO.	KDL NO.	SPAN	OUTPUT
DLH	45077			0-500" H_2O	10-90 MV

CALIBRATION STANDARD Rd		INSTRUMENT BEING CALIBRATED Rd		REMARKS
IN Hg		MV	PASSES	DUM ZERO
0	1	50.392	1000	-.002
18	2	69.765		TEMP. -16°C
37	3	90.362		
28	4	80.587		
9	5	60.029		
0	6	50.368	1000	
-0	7	50.293	1000	
-18	8	31.046		
-37	9	11.237	1030	
-28	10	20.506		
-9	11	40.596		
-0	12	50.318		
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

Figure 2.2-2. Sample Differential Pressure Cell Calibration Data (Cont'd)

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INSTRUMENTATION CALIBRATION REPORT

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INSTRUMENT BEING CALIBRATED				LOCATION	TEST-SCANNER NO.
DIFFERENTIAL PRESSURE CELL					S-33
MANUFACTURER	SERIAL NO.	MODEL NO.	KDL NO.	SPAN	OUTPUT
B&H	45077			0-500" H_2O	10-90 MV

CALIBRATION STANDARD Rd		INSTRUMENT BEING CALIBRATED Rd		REMARKS
in Hg		MV	PRESS	DVM ZERO -.003
0	1	50.434	1500	
18	2	69.697		TEMP. 16°C
37	3	90.109	1510	
28	4	80.440		
9	5	60.005		
0	6	50.387	1510	
-0	7	50.336	1510	
-18	8	31.206		
-37	9	11.496	1520	
-28	10	20.694		
-9	11	40.670		
-0	12	50.365		
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

Figure 2.2-2. Sample Differential Pressure Cell Calibration Data (Cont'd)

The conversion constants produced from a calibration were compared with previous constants for that cell. If satisfactory, they were used to update the conversion constant files.

2.2.3 Resistance Temperature Device Calibration

All resistance temperature devices (RTD) were initially calibrated against four temperature standards; the boiling point of water and the freezing points of lead, tin, and water. In each case the RTD was allowed to stabilize in the temperature standard before output was recorded.

The calibration obtained was analyzed by the program RTDFT which used a linear regression technique to achieve a least squares fit of the calibration data to a quadratic equation. Output from this program consisted of a set of three conversion constants and the standard error of the calibration data.

The conversion constants generated by the initial calibration were used in all conversion constant files. Calibration checks were made during the test program using water, lead, and tin freezing point standards.

2.2.4 Torque Meter Calibration

Both high and low range torque meters were calibrated by applying known forces (weights) at a known position on a specially constructed lever arm attached to the pump end of the torque meter shaft. The motor end was held fixed. To cover the entire range for both types of torque meters approximately 60 points were taken for each high range torque meter calibration and 17 points were taken for each low range torque meter calibration. Torque meter output was manually recorded from the data scanner digital voltmeter.

Calibration data was analyzed by the linear regression program MULFT which calculated the two conversion constants which best fit the calibration data to a linear equation. These constants were used to update the conversion constant files.

2.2.5 Magnetic Flowmeter Calibration

The magnetic flowmeter was calibrated before the start of testing by its manufacturer, Foxboro Company. Because the range of the transducer unit was changed during testing, it was returned to Foxboro at the conclusion of testing for

recalibration. This revised calibration data was then used for all tests conducted after making the range change. Each calibration consisted of 12 points which covered the range of the flowmeter.

Data from the calibration was analyzed by the linear regression program MULFT which calculated the two conversion constants which best fit the calibration data to a linear equation. These constants were used to update the conversion constant files.

2.2.6 Thermocouple Calibration

Because of the relatively slow response time of the resistance temperature devices (RTD's), thermocouples (TC's) were used as the primary temperature measurement devices for transient tests. Their inferior accuracy was recognized, however, and a procedure was devised to calibrate them against the RTD's. Only two thermocouples were calibrated, the suction TC(L-13) and discharge TC(L-14).

Calibration test points were performed as part of the blowdown procedure described in Section 5 of Volume VII, Test Facility Description, prior to each transient. The calibration was performed by obtaining stable single-phase water conditions at a series of temperatures. Data was taken and consisted of five scans of all test instruments. Data from the test points were then analyzed with a linear regression program (MULFT) which produced constants for an equation of actual (RTD) versus measured (TC) temperature. These constants were entered into the appropriate transient conversion constant file for use by the Transient Data Reduction Program.

2.2.7 Drag Disc Calibration

In situ calibration tests were performed to determine (1) the relation between single-phase flow and output signal at 525°F and (2) the sensitivity of each drag disc to temperature. The latter tests were necessary because each device showed a unique linear relation between output and temperature.

The first type of calibration tests were performed with subcooled water at 525°F $\pm$ 5°F. Temperature was measured at one suction and one discharge drag disc by thermocouples (L-30 and L-31). The reference temperature (525°F) was chosen because it was an intermediate value for the test sequences run. Calibration tests were performed in the same manner as single-phase water points (see

Section 5 of Volume VII, Test Facility Description). Flow was varied in steps. At each step the loop was allowed to stabilize and a test point was acquired by taking five scans of all test instruments. Data was reduced with the Steady-State Data Reduction Code to obtain drag disc voltage output and water orifice flow. The results were used in a linear regression analysis program (MULFT) to arrive at the slope and intercept of the best fit linear equation for each drag disc at 525°F.

Temperature sensitivity tests were performed by bringing the loop to a stable single-phase water condition at the specified temperature. Zero flow conditions were then obtained by stopping all circulating pumps and closing a loop flow control valve (either HPW-6 or HPSW-1). A test point was acquired by taking five scans. The data was then reduced with the Steady State Data Reduction Program and used with a linear regression analysis (MULFT) to determine the slope of the best fit between drag disc output at zero flow and temperature.

The above calibration tests and data analysis resulted in three conversion constants for each drag disc. The calibration procedure was performed as often as necessary to account for changes in drag discs including target changes. The resulting constants were used to update the conversion constant files.

2.2.8 Turbine Meter Calibration

Turbine meters were calibrated in situ using the steam flow orifice as a standard. Single-phase steam was used in order to achieve velocities high enough to cover the entire range of the turbine meter.

Calibration tests were performed by setting the loop up for single phase steam operation (see Section 5 of Volume VII, Test Facility Description). Flow was varied in steps and data taken after the loop stabilized. The data was then reduced with the Steady State Data Reduction Program to obtain turbine meter voltage output and steam orifice flow. A linear regression analysis program (MULFT) was used to determine the best fit conversion constants. These two constants were used to update the conversion constant files.

2.2.9 Gamma Densitometer Calibration

Two types of gamma densitometers were used in this project. One system manufactured by Measurements Incorporated, was mounted on each of the instrumented test

sections. This type of system contained tungsten shims which could be inserted into the gamma beam between the source and the detector for use during calibration. The second system, manufactured by Atomic Energy of Canada Limited (AECL), was mounted on the pump suction immediately adjacent to the pump housing. This system did not contain any shims and, as a result, the calibration process was different for each system.

Both densitometer systems were calibrated in situ using known loop fluid density based on local temperature and pressure measurements. Both systems were calibrated using the following equation:

$$\rho = C1 - \ln(V - C3)/C2 \qquad (1)$$

Where ρ = density of the fluid in the pipe
V = the output voltage
C1, C2 & C3 = constants.

This equation is derived from its expanded form:

$$\rho = \frac{\ln(V_1 - V_{off}) - \alpha_o \rho_o t_o - \ln(V - V_{off})}{\alpha\, t} \qquad (2)$$

in which

t	=	the length of the beam path within the pipe I. D.
t_o	=	the length of the beam path excluding that within the pipe I. D.
V	=	the measured output voltage corresponding to density ρ
V_1	=	the theoretical voltage if there were no material in the beam path
V_{off}	=	the offset voltage when the source is stored
α	=	the mass attenuation coefficient of the material in the pipe
α_o	=	the mean mass attenuation coefficient of the material in the the path excluding that within the pipe I. D.
ρ	=	the mean density of the material along the length of the beam path within the pipe I. D.
ρ_o	=	the mean density of the material along the beam path excluding that section within the pipe I. D.

From this, the definitions of the coefficients in equation 1 are as follows:

$$C1 = \ln(V_1 - V_{off}) - \alpha_o \rho_o t_o \quad (3)$$

$$C2 = \alpha\ t \quad (4)$$

$$C3 = V_{off} \quad (5)$$

2.2.9.1 Measurements Incorporated System. For this system a "cold" calibration was performed using air and water and inserting the tungsten shims in each case. This gave a total of four data points. These data points were defined by using the subscripts 1 through 4 as follows.

Subscript 1 refers to air data

Subscript 2 refers to air & shim data

Subscript 3 refers to cold water data

Subscript 4 refers to cold water & shim data

The response equation (1) for each of these cases is given below:

$$\rho_1 = (C1 - \ln(V_1 - C3))/C2 \quad (6)$$

$$\rho_2 = (C1 - \ln(V_2 - C3))/C2 \quad = \rho_1 + C4 \quad (7)$$

$$\rho_3 = (C1 - \ln(V_3 - C3))/C2 \quad (8)$$

$$\rho_4 = (C1 - \ln(V_4 - C3))/C2 \quad = \rho_3 + C4 \quad (9)$$

Where the shim density is defined as a constant C4. Therefore, assuming stable conditions, it can be shown that

$$C3 = \frac{V_1 V_4 - V_2 V_3}{V_1 - V_2 - V_3 + V_4} \quad (10)$$

$$C2 = \frac{1}{\rho_3 - \rho_1} \ln \frac{V_1 - C3}{V_3 - C3} \quad (11)$$

$$C4 = \frac{1}{C2} \ln \frac{V_3 - C3}{V_4 - C3} \quad (12)$$

$$C1 = \rho_1 C2 + \ln (V_1 - C3) \quad (13)$$

Normally it would be expected that this would be sufficient calibration. Unfortunately this approach resulted in coefficients which gave inconsistent results at test conditions. As a result some kind of updating process had to be developed. In the process developed for updating prior to a blowdown the only value used from the cold calibration was the current value of the shim density, C4. This process used data at two different fluid densities plus data with the shims inserted at one of those two densities. The response equation is then written as follows:

$$\rho_5 = (C1_1 - \ln(V_5 - C3_1))/C2_1 \tag{14}$$

$$\rho_6 = (C1_1 - \ln(V_6 - C3_1))/C2_1 \tag{15}$$

$$\rho_7 = (C1_1 - \ln(V_7 - C3_1))/C2_1 \tag{16}$$

where conditions 5 and 7 are the two fluid densities and:

$$\rho_6 = \rho_5 + C4 \tag{17}$$

From 14, 15, 16 and 17

$$\frac{1}{C4} \ln \frac{V_5 - C3_1}{V_6 - C3_1} = \frac{1}{\rho_5 - \rho_7} \ln \frac{V_7 - C3_1}{V_5 - C3_1} \tag{18}$$

$C3_1$ is obtained by solving (17) iteratively.

Then, from 14 and 15

$$C2_1 = \frac{1}{C4} \ln \frac{V_5 - C3_1}{V_6 - C3_1} \tag{19}$$

and from 14

$$C1_1 = C2_1 \rho_5 + \ln (V_5 - C3_1) \tag{20}$$

This gives the solution for the coefficients in the hot condition. The two fluid conditions used were at the approximately 525°F calibration point prior to the blowdown (equation 14) and at a superheated steam point towards the end of the blowdown (equation 16).

A second process had to be developed for daily updating. In this case only two single phase data points were available. These were single phase water and single phase water plus shim points.

For this case both C2 and C4 were assumed to remain constant. C2 involves only geometric and physical properties and is therefore the most likely of the constants to remain constant. The equations for this condition are

$$\rho_8 = (Cl_2 - \ln(V_8 - C3_2))/C2 \tag{21}$$

$$\rho_9 = (Cl_2 \ \ln(V_9 - C3_2))/C2 \tag{22}$$

where $\rho_9 = \rho_8 + C4$

From these

$$C3_2 = \frac{V_9 e^{C2C4} - V_8}{e^{C2C4} - 1} \tag{23}$$

and

$$Cl_2 = C2\ \rho_8 + \ln\ [V_8 - C3_2] \tag{24}$$

AECL System

The system provided by AECL did not have the capability of inserting calibration shims into the beam path. As a result, a different process had to be used to obtain calibration coefficients. The process used was based on four calibration points, the equations for which are:

$$\rho_1 = \frac{Cl_h - \ln(V_1 - C3)}{C2} \tag{25}$$

$$\rho_2 = \frac{Cl_h - \ln(V_2 - C3)}{C2} \tag{26}$$

$$\rho_3 = \frac{Cl_c - \ln(V_3 - C3)}{C2} \tag{27}$$

$$\rho_4 = \frac{Cl_c - \ln(V_4 - C3)}{C2} \tag{28}$$

Where the subscripts 1, 2, 3 and 4 refer to steam, hot water, air and cold water respectively, and h and c refer to hot and cold conditions. Using these equations.

$$\frac{1}{\rho_2 - \rho_1} \ln \frac{V_1 - C3}{V_2 - C3} = \frac{1}{\rho_4 - \rho_3} \ln \frac{V_3 - C3}{V_4 - C3} \tag{29}$$

This is solved iteratively for C3.

From 25 and 26

$$C2 = \frac{1}{\rho_2 - \rho_1} \ln \frac{V_1 - C3}{V_2 - C3} \tag{30}$$

And $$Cl_h = C2\ \rho_2 + \ln(V_2 - C3) \tag{31}$$

This gives a full calibration for the AECL and also takes account of the possible variability of the most sensitive coefficient, Cl, with temperature.

This type of calibration was performed to provide the coefficients prior to each phase and at each blowdown.

An update procedure was used whenever a set of air and cold water data were available.

This update used equations 27 and 28 and assumed C2 to be constant. Thus:

$$C3 = \frac{(V_4 e^{C2(\rho_4 - \rho_3)} - V_3)}{e^{C2(\rho_4 - \rho_3)} - 1} \tag{32}$$

$$Cl_c = C2\ \rho_4 + \ln(V_4 - C3) \tag{33}$$

Finally a daily update was used. In this case, the only variable assumed was C1. The hot water data point was used and C1 was evaluated from equation 26 as:

$$C1_h = C2\ \rho_2 + \ln(V_2 - C3) \qquad (34)$$

The calibration data analysis just described was performed by the Instrument Calibration Constant Update Program (ICCUP) which is discussed further in Section 2.3. Conversion constants generated by this program were used to update steady-state conversion constant files. Conversion constants were also generated for the transient constant files using a slightly different formulation of equation 1 (see Section 4.2).

2.3 INSTRUMENT CONVERSION CONSTANT UPDATES

The conversion constants generated by the calibration methods described in the previous section were used to update the steady-state and transient conversion constant files. In addition, frequent zero checks were made on the pressure and differential pressure transducers. These checks resulted in revised values for each cell's zero which were used to update the conversion constant files.

The actual updating process was done by editing the old computer constant file and inserting the new constants. The new steady-state or transient conversion constant file was then assigned a number and stored permanently. Certain constant updates, such as pressure and differential pressure zeros and gamma densitometer constants were performed by the program ICCUP, which is briefly discussed in the next section. A permanent record was made of all conversion constants tabulated by steady-state conversion constant file number (zero number). This record formed a Conversion Constant History which is described in Section 2.3.2.

2.3.1 Pressure and Differential Pressure Cell Zero Update and Gamma Densitometers Calibration

The process of updating the calibration constants for particular instruments was a repetitive procedure and as a result a computer program was written to perform this function. This program was named Instrument Conversion Constant Update Program (ICCUP). The calibration constants concerned are the zeroes for the pressure and differential pressure transducers and all of the coefficients for the gamma densitometers. The program is written so that one of four options is available.

Option 1. Update only the zero values of pressure and differential pressure transducers, and write the results into a new steady-state conversion constant file.

Option 2. Update the zero values of pressure and differential pressure transducers and the gamma densitometers calibration coefficients using hot water data. Then write the results to a new conversion constant file.

Option 3. Update the zero values of pressure and differential pressure transducers and the gamma densitometers calibration coefficients using air and cold ($\approx$ 170°F) water data. Then write the results into a new conversion constant file.

Option 4. This is the pre-blowdown option. It performs Option 2 above and then using high temperature data and the current values of effective shim density from Option 2, it repeats the updating of the pressure and differential pressure transducers zeroes and the gamma densitometer calibration coefficients. This second updating is written to a second new conversion constant file.

Option 2 was used to generate gamma densitometer conversion constants for all steady-state conversion constant files. Constants from Option 4 were manually input into the appropriate transient conversion constant file. In this case, if the constants showed significant inconsistancy, constants from Option 2 were used.

A listing of ICCUP appears in Appendix 2.3A.

2.3.2 Conversion Constant History

Table 2.3-1 is a sample of the Conversion Constant History compiled for all test instruments with variable calibration constants (e.g., thermocouples were not included). "Instrument No." refers to the scanner number of the instrument in question. Steady-State Conversion constant files, or "Zero Files", were used by the Steady-State Data Reduction (SSDR) Program to reduce the raw voltage signal from each transducer. These zero files are numbered and correspond to a definite group of tests. Table 2.3-2 shows the correspondence between Zero File number and test numbers applicable to that conversion constant file. The date column of Table 2.3-1 gives the day on which the original calibration file was set up. The remaining columns give the values for the instrument zero (if any) and each conversion constant. These constants are used by the program to calculate the instrument output, in engineering units, for that instrument. Equations used for this conversion may be found in the discussion of the SSDR Program. C(7,N) in every case is the standard error of the instrument calibration data.

This standard error is used in the accuracy analysis sections of the data reduction program.

The complete Steady-State Conversion Constant History appears in Appendix 2.3B.

Table 2.3-1

SAMPLE CONVERSION CONSTANT HISTORY

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 1: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	-.266371E+05	.520254E+04	0.	0.	0.	0.	.133162E+05
892	09/22/77	0.000	-.266371E+05	.520254E+04	0.	0.	0.	0.	.133162E+05
895	09/29/77	0.000	-.266371E+05	.520254E+04	0.	0.	0.	0.	.133162E+05
927	10/03/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
955	10/04/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
968	10/05/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
1000	10/11/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
1103	10/14/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
1109	10/20/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
1131	10/21/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
1144	10/22/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
1161	10/25/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
1176	10/25/77	0.000	.559088E+04	.609773E+04	.919017E-03	0.	0.	0.	.555221E+04
1182	10/27/77	0.000	.328044E+04	.588815E+04	.111561E-02	0.	0.	0.	.470938E+04
1189	10/27/77	0.000	.328044E+04	.588815E+04	.111561E-02	0.	0.	0.	.470938E+04
1209	10/28/77	0.000	.328044E+04	.588815E+04	.111561E-02	0.	0.	0.	.470938E+04
1212	10/28/77	0.000	.355956E+04	.740234E+04	.207143E-02	0.	0.	0.	.835047E+04
1228	10/31/77	0.000	.355956E+04	.740234E+04	.207143E-02	0.	0.	0.	.835047E+04
1241	11/02/77	0.000	.355956E+04	.740234E+04	.207143E-02	0.	0.	0.	.835047E+04
1257	11/03/77	0.000	.355956E+04	.740234E+04	.207143E-02	0.	0.	0.	.835047E+04

Table 2.3-2

STEADY-STATE TESTS ZERO FILE INDEX

Zero File Number	Applicable Tests	Zero File Number	Applicable Tests
Phase I		Phase II	
207	209-217	855	849-879
218	218-226	882	880-894
227	227-243	895	895-922
244	244-246	927	923-954
250	250-251	955	955-967
252	252-256	968	968-999
257	257-260	1000	1000-1075
261	261-271	1103	1076-1105
272	272-281	1109	1108-1126
282	282-289	1131	1127-1141
290	290-294	1144	1142-1156
295	295-297	1161	1157-1169
298	298-302	1176	1170-1179
303	303-320	1182	1180-1188
321	321-327	1189	1189-1199
328	328-339	1209	1200-1211
340	340-364	1212	1212-1223
365	365-371	1228	1224-1236
372	372-384	1241	1237-1254
385	385-390	1257	1255-1267
391	391-399	1272	1268-1288
400	400-406	1292	1289-1307
407	407-409	1308	1308-1319
410	410-428	1322	1320-1335
435	429-439	1337	1336-1351
440	440-453	1354	1352-1363
466	454-476	1364	1364-1367
490	477-500	1368	1368-1380
501	501-508	1281	1381-1397
509	509-518	1398	1398-1435

Table 2.3-2 (Cont'd.)

STEADY-STATE TESTS ZERO FILE INDEX

Zero File Number	Applicable Tests
Phase I	
519	519-535
536	536-544
545	545-558
567	559-573
574	574-598
599	599-609
614	610-619
620	620-628
634	629-644
645	645-652
658	653-663
667	664-680
685	681-690
693	691-705
714	706-732
735	733-757
758	758-773
774	774-786
792	787-822
827	823-833
838	834-847

Zero File Number	Applicable Tests
Phase II	
1440	1436-1454
1455	1455-1465
1466	1466-1480
1483	1481-1498
1502	1499-1514

2.4 INSTRUMENT HISTORY

Table 2.4-2, presented in this section, gives a detailed accounting of the history of each test instrument. The only instruments excluded from this list were thermocouples and the blowdown event sequence timer. Thermocouple conversion constants are contained in the Steady-State Data Reduction code. The constants used were the standard ASME data pack. The Transient Data Reduction code also used this data pack. This code also applied a correction factor. The procedure for obtaining the correction factor is described in Section 2.2.5, for the suction and discharge thermocouples (L-13 and L-14).

The Instrument History is organized according to scanner channel numbers (SCN's). Each SCN is the channel number on the data scanner to which the instrument was connected. (The data scanner was the primary data recording device for all steady-state tests.) The history shows, at any instant during testing, what instrument was connected to a given scanner channel. Information on instrument type, range, and serial number is presented in first column. The second column gives the date at which the recorded change was made. The third column lists the FM channel (if any) that the device was connected to. Because many tests might have been run on a single day, the fourth column shows the number of the test immediately preceding the change and the test number immediately after. That is, the change recorded in the fifth column applies to the later number in the fourth column and all tests thereafter.

In this way changes that might affect test results can be related directly to the tests involved. In some instances, the item entered in Column Five did not affect test instrument performance; in those cases no entry was made in the "Test No., Before/After" column. An example of this was calibration checks which were done only to insure no significant change in calibration had taken place.

In order to simplify references to test instruments, an Instrument Location Number (ILN) has been assigned to each physical location in the test loop. Each ILN specifies a unique pressure tap, set of differential pressure taps, RTD location, etc. More than one instrument could be connected to a single location, particularly in the case of differential pressure instruments with overlapping ranges. However, only one instrument could be connected to each data scanner channel. Table 2.4-1 is a guide to the correspondence between locater and

scanner numbers. Use of this table and the Instrument History table allows the reader to determine all pertinent information about the instrument(s) attached at any location on the test loop. A further discussion of test instrumentation may be found in Section 4 of Volume VII, Test Facility Description.

TABLE 2.4-1

INSTRUMENTATION LIST

LOCATION NUMBER (ILN)	DESCRIPTION	RANGE	SCANNER NUMBER (SCN)
L-1	Suction Leg Drag Disc (UPPER)	Varied	S-1
L-2[a]	Discharge Leg Drag Disc (UPPER)	Varied	S-2
L-3[b]	Suction Leg Turbine Meter (LOWER)	Varied	S-3 or S-28
L-4	Discharge Leg Turbine Meter (LOWER)	Varied	S-4 or S-29
L-5	Suction Leg Pressure Cell	0-1500 PSI	S-5
L-6	Discharge Leg Pressure Cell	0-1500 PSI	S-6
L-7H	Pump Leg-To-Leg ΔP Cell (BLH)-Transient	± 500 PSID	S-7
L-7H	Pump Leg-To-Leg ΔP Cell - Steady-State	Varied	S-7A
L-7L	Pump Leg-To-Leg ΔP Cell (BLH) - Transient	± 200 PSID	S-8
L-7L	Pump Leg-To-Leg ΔP Cell - Steady-State	Varied	S-8A
L-9	Pump Injection Inlet ΔP Cell	0-25 PSID	S-9
L-10	Pump Injection Inlet Pressure Cell	0-1500 PSID	S-10
L-11	Pump Torque Meter	0-200/0-1200 FT-LB	S-11
L-12	Pump Speed Meter	0-10,000 RPM	S-12
L-13	Suction Leg Thermocouple	0-600°F	S-13
L-14	Discharge Leg Thermocouple	0-600°F	S-14
L-15	Suction Leg Densitometer, Beam #1	0-62.4 LB/FT^3	S-15
L-16	Suction Leg Densitometer, Beam #2	0-62.4 LB/FT^3	S-16
L-17	Suction Leg Densitometer, Beam #3	0-62.4 LB/FT^3	S-17
L-18	Discharge Leg Densitometer, Beam #1	0-62.4 LB/FT^3	S-18
L-19	Discharge Leg Densitometer, Beam #2	0-62.4 LB/FT^3	S-19
L-20	Discharge Leg Densitometer, Beam #3	0-62.4 LB/FT^3	S-20
L-21	Pump Injection Inlet Thermocouple	0-600°F	S-21
L-22	Pump Injection Outlet Thermocouple	0-600°F	S-22
L-23	High Pressure Drum ID Thermocouple	0-800°F	S-23
L-24	High Pressure Drum OD Thermocouple	0-800°F	S-24
L-25	High Pressure Drum Level ΔP Cell	0-2.5 PSID	S-25
L-26	Suction Leg Drag Disc (LOWER)	Varied	S-26
L-27[a]	Discharge Leg Drag Disc (LOWER)	Varied	S-27
L-28[b]	Suction Leg Turbine Meter	Varied	S-28 or S-3
L-29	Discharge Leg Turbine Meter	Varied	S-29 or S-4
L-30	Suction Leg Drag Disc Thermocouple	0-600°F	S-30
L-31	Discharge Leg Drag Disc Thermocouple	0-600°F	S-31
L-32	Pump Injection Outlet Flow	Varied	S-32
L-33	Inlet Across Pipe ΔP	± 500 $Inches_3$	S-33
L-34	Inlet Densitometer, Beam #3	0-62.4 LB/FT^3	S-34
L-35	Inlet Densitometer, Beam #1	0-62.4 LB/FT^3	S-35
L-36	Inlet Densitometer, Beam #2	0-62.4 LB/FT^3	S-36
L-37L	Main Steam Orifice ΔP Cell	0-3.5 PSID	S-37
L-37H	Main Steam Orifice ΔP Cell	0-25 PSID	S-43
L-38L	Main Water Orifice ΔP Cell	0-3.5 PSID	S-38
L-38M	Main Water Orifice ΔP Cell	0-25 PSID	S-44

TABLE 2.4-1

INSTRUMENTATION LIST (Cont'd)

LOCATION NUMBER (ILN)	DESCRIPTION	RANGE	SCANNER NUMBER (SCN)
L-38H	Main Water Orifice ΔP Cell	Varied	S-69
L-39L	Bypass Steam Orifice ΔP Cell	0-3.5 PSID	S-39
L-39H	Bypass Steam Orifice ΔP Cell	0-25 PSID	S-45
L-40L	Bypass Water Orifice ΔP Cell	0-3.5 PSID	S-40
L-40H	Bypass Water Orifice ΔP Cell	0-25 PSID	S-46
L-41	Main Steam Orifice Pressure Cell	0-1500 PSI	S-41
L-42	Main Water Orifice Pressure Cell	0-1500 PSI	S-42
L-47	Bypass Steam Orifice Pressure Cell	0-1500 PSI	S-47
L-48	Bypass Steam Orifice Pressure Cell	0-1500 PSI	S-48
L-49	Main Steam Orifice Thermocouple	0-600°F	S-49
L-50	Main Water Orifice Thermocouple	0-600°F	S-50
L-51	Bypass Steam Orifice Thermocouple	0-600°F	S-51
L-52	Bypass Water Orifice Thermocouple	0-600°F	S-52
L-53	Bypass Water Orifice RTD	0-600°F	S-53
L-54	Bypass Steam Orifice RTD	0-600°F	S-54
L-55	Suction Leg RTD	0-600°F	S-55
L-56	Discharge Leg RTD	0-600°F	S-56
L-57	Ambient Temperature Thermocouple	0-200°F	S-57
L-58	Main Water Orifice RTD	0-600°F	S-58
L-59	Main Steam Orifice RTD	0-600°F	S-59
L-60	Loop Flow Control Valve ΔP Cell	0-200 PSID	S-60
L-61	Suction Leg to Inlet Flange ΔP Cell	0-10 PSID	S-61
L-62	PAC 16 ΔP Cell	0-200 PSID	S-62
L-64	Blowdown Leg Pressure Cell	0-1500 PSI	S-64
L-65	H. P. Drum Pressure Cell	0-1500 PSI	S-65
L-66	Test Pump Flange to Flange ΔP Cell	Varied	S-66
L-68	Pump Volute to Impeller Back ΔP Cell	0-25 PSID	S-68

[a] L-3 was read by scanner port S-28 for tests 209-243 and 298-453, L-28 was read by S-3 for the same tests. At all other times L-3 was read by S-3 and L-28 by S-28.

[b] L-4 was read by scanner port S-29 for tests 209-609. L-29 was read by S-4 for the same tests. At all other times L-4 was read by S-4 and L-29 by S-29.

Table 2.4-2

INSTRUMENT HISTORY

Scanner No. S-1

Pump Suction Drag Disc

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Ramapo	3728	0-600,000 #/ft-sec^2	1-5-77	F-2	-/209	Prephase I verification (inserted in L-1)
	"		1-24-77	F-2	217/218	Calib. check span adjust
	"		2-28-77	F-2	390/391	D.D. reversed
	"		3-24-77	F-2	558/-	D.D. returned to forward flow inst.
	"		3-25-77	F-2	-/559	Resistor network changed so that FM input to be -2.5V to +2.5V for ± full scale on the instrument
	"		4-11-77	F-2	628/-	D.D. removed
	"		4-28-77	F-2	-/629	D.D. reinstalled
	"		5-27-77	F-2	849A/-	D.D. removed, End of Phase I
Ramapo	3728	0-400,000 #/ft-sec^2	9-16-77	F-2	-/849B	Prephase II verification
	"		9-24-77	F-2	894/895	D.D. 3728 removed, inoperative
Ramapo	4160	0-600,000 #/ft-sec^2	10-2-77	F-2	922/923	D.D. 4160 installed
	"		10-7-77	F-2	999/-	D.D. 4160 removed and calibrated

Scanner No. S-1

Pump Suction Drag Disc

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Ramapo	4160	0-600,000 #/ft-sec^2	10-8-77	F-2	-/1000	D.D. 4160 reinstalled
	"		10-11-77	F-2	1024/-	D.D. 4160 removed target broke off
Ramapo	3728	0-600,000 #/ft-sec^2	10-11-77	F-2	-/1025	D.D. 3728 installed
	"		11-9-77	F-2	1319/-	D.D. 3728 removed
	"		11-9-77	F-2	-/1320	D.D. 3728 reinstalled
	"		11-12-77	F-2	1351/-	D.D. 3728 removed for range change
	"	0-200,000 #/ft-sec^2	11-13-77	F-2	-/1352	D.D. 3728 reinstalled with new target disc
	"		11-15-77	F-2	1380/-	D.D. 3728 removed, broken
Ramapo	3729	0-600,000 #/ft-sec^2	11-15-77	F-2	-/1381	3729 installed in 0-600,000 Disc
Ramapo	3729	0-600,000 #/ft-sec^2	11-21-77	F-2	1435/1436	D.D. reversed
	"		12-2-77	F-2	1480/-	D.D. 3729 removed
Ramapo	4160	0-300,000 #/ft-sec^2	12-2-77	F-2	-/1481	D.D. 4160 installed with 0-300,000 disc
	"		12-5-77	F-2	1514/-	D.D. removed, end of testing

Scanner No. S-2

Pump Discharge Drag Disc

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Ramapo	3729	0-600,000 #/ft-sec^2	1-5-77	F-3	-/209	Prephase I verification (Inserted in L-2)
	"		1-24-77	F-3	217/218	Span adjusted
	"		2-28-77	F-3	390/391	Drag disc reversed
	"		3-24-77	F-3	558/-	Drag disc returned to forward flow
	"		3-25-77	F-3	-/559	Resistor diodes network changed to allow $\pm$2.5V input to FM
	"		4-14-77	F-3	628/-	D.D. 3729 removed
	"		4-28-77	F-3	-/629	D.D. 3729 reinstalled
	"		5-27-77	F-3	849A/-	D.D. 3729 removed at end of Phase I
Ramapo	3729	0-400,000 #/ft-sec^2	9-16-77	F-3	-/849B	Prephase II verification
	"		9-24-77	F-3	894/895	D.D. 3729 removed for inspection
Ramapo	3729	0-600,000 #/ft-sec^2	10-2-77	F-3	922/923	D.D. 3729 reinstalled with 0-600,000 disc
	"		10-7-77	F-3	999/-	D.D. 3729 removed for calib. check
	"		10-8-77	F-3	-/1000	D.D. 3729 reinstalled

Scanner No. S-2

Pump Discharge Drag Disc

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Ramapo	3729	0-600,000 #/ft-sec^2	11-9-77	F-3	1319/-	D.D. 3729 removed and checked
	"		11-9-77	F-3	-/1320	D.D. 3729 reinstalled
	"		11-12-77	F-3	1351/-	D.D. 3729 removed for range change
Ramapo	3729	0-200,000 #/ft-sec^2	11-13-77	F-3	-/1352	D.D. 3729 reinstalled with 0-200,000 disc
	"		11-15-77	F-3	1380/1381	D.D. 3729 removed for use in S-1
Ramapo	4160	0-600,000 #/ft-sec^2	11-17-77	F-3	1397/1398	D.D. 4160 installed in S-2 with new range
	"		11-21-77	F-3	1435/1436	D.D. reversed for reverse flow
	"		12-2-77	F-3	1480/-	D.D. 4160 removed for range change
Ramapo	4160	0-200,000 #/ft-sec^2	12-2-77	F-3	-/1481	D.D. 4160 reinstalled with 0-200,000 disc
	"		12-5-77	F-3	1514/-	D.D. removed, end of testing

Scanner No. S-3*

Pump Suction Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950977	0-300 fps	1-5-77	F-4	-/209	Prephase I verification (inserted in L-28)
	"		1-25-77	None	223/224	S-3 preamp no good
	"		1-27-77	None	243/244	This instrument being read on S-28 (See S-28)
	"		2-4-77	F-4	297/298	This instrument wired to read on S-3 again
	"		2-19-77	F-4	364/365	TM 0950977 removed, shaft damaged
	"		3-13-77	F-4	453/454	Repaired and reinstalled for reverse flow (inserted in L-3)
	"		3-16-77	F-4	479/480	Bearings changed and reinstalled
	"		3-17-77	F-4	500/501	TM 0950977 failed (bearings seized) removed
	"		4-5-77	F-4	609/610	Reinstalled with sealed ball bearings
	"		4-7-77	F-4	628/-	0950977 Removed for checkout
	"		4-28-77	F-4	-/629	0950977 reinstalled
	"		4-29-77	F-4	652/-	0950977 removed for checkout
	"		5-5-77	F-4	-/653	Bearings changed, reinstalled 5-9-77

Scanner No. S-3

Pump Suction Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950977	0-300 fps	5-10-77	F-4	680/681	Bearings changed, reinstalled 5-10-77
	"		5-12-77	F-4	705/706	Removed and bearings changed
	"		5-21-77	F-4	786/787	Reinstalled
	"		5-24-77	F-4	822/823	Bearings changed, reinstalled 5-24-77
	"		5-26-77	F-4	849A/-	Removed - End of Phase I
	"		9-20-77	F-4	-/849B	Prephase II verification
	"		9-24-77	F-4	894/895	Removed for inspection
	"		10-8-77	F-4	999/1000	0950977 installed and checked
	"		10-12-77	F-4	1075/1076	Bearings changed, reinstalled 10-12-77
	"		10-14-77	F-4	1105/1106	Bearings changed, reinstalled 10-17-77
	"		10-21-77	F-4	1126/1127	Bearings changed, reinstalled 10-21-77

Scanner No. S-3

Pump Suction Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950977	0-300 fps	10-22-77	F-4	1156/1157	Bearings changed, reinstalled 10-24-77
	"		10-26-77	F-4	1179/1180	Bearings changed, reinstalled 10-26-77
	"		10-28-77	F-4	1211/1212	Bearings changed, reinstalled 10-30-77
	"		10-30-77	F-4	1223/1224	Reinstalled
	"		11-3-77	F-4	1267/1268	Bearings changed, reinstalled 11-3-77
	"		11-9-77	F-4	1319/1320	Bearings changed, reinstalled 11-9-77
	"		11-11-77	F-4	1351/1352	Bearings changed, reinstalled 11-13-77
	"		11-15-77	F-4	1380/1381	Bearings changed, reinstalled 11-15-77
	"		11-21-77	F-4	1435/1436	Bearings changed, reinstalled and reversed 11-21-77

Scanner No. S-3

Pump Suction Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950977	0-300 fps	12-2-77	F-4	1480/1481	Bearings changed, reinstalled 12-2-77
	"		12-5-77	F-4	1514/-	Removed, end of testing

*The turbine meter connected to scanner channel S-3 was inserted in location L-28 for tests 209-243 and 298-453 and in location L-3 for all other tests.

Scanner No. S-4*

Pump Discharge Turbine Meter

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Flow Technology	0950978	0-300 fps	1-5-77	F-5	-/209	Prephase I verification (inserted in L-29)
	"		1-28-77	F-5	243/244	Preamp bypassed
	"		2-19-77	F-5	364/365	Removed, shaft damaged
	"		3-13-77	F-5	453/454	0950978 installed for reverse flow
	"		3-16-77	F-5	479/480	Bearings changed, reinstalled 3-16-77
	"		3-17-77	F-5	500/501	Removed, bearings snug
	"		4-5-77	F-5	609/610	0950978 installed bottom hole discharge side - old type ball bearings (now inserted in L-4)
	"		4-7-77	F-5	628/-	Removed
	"		4-28-77	F-5	-/629	0950978 installed
	"		4-29-77	F-5	652/-	0950978 removed
	"		5-9-77	F-5	-/653	0950978 reinstalled
	"		5-10-77	F-5	680/681	Changed bearings, reinstalled 5-10-77

Scanner No. S-4

Pump Discharge Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950978	0-300 fps	5-12-77	F-5	705/706	Removed and bearings changed
	"		5-21-77	F-5	786/787	Reinstalled
	"		5-24-77	F-5	822/823	Bearings changed, reinstalled 5-24-77
	"		5-26-77	F-5	849A/-	Removed, end of Phase I
	"		9-20-77	F-5	-/849B	Prephase II verification. Preamp back in
	"		9-24-77	F-5	894/895	Removed for inspection
	"		10-8-77	F-5	999/1000	0950978 reinstalled
	"		10-12-77	F-5	1075/1076	Bearings changed, reinstalled 10-12-77
	"		10-14-77	F-5	1105/1106	Bearings changed, reinstalled 10-17-77
	"		10-21-77	F-5	1126/1127	Bearings changed, reinstalled 10-21-77
	"		10-22-77	F-5	1156/1157	Bearings changed, reinstalled 10-24-77
	"		10-26-77	F-5	1179/1180	Bearings changed, reinstalled 10-26-77

Scanner No. S-4

Pump Discharge Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950978	0-300 fps	10-28-77	F-5	1211/1212	Bearings changed
	"		10-30-77	F-5	1223/1224	Reinstalled
	"		11-3-77	F-5	1267/1268	Bearings changed, reinstalled 11-3-77
	"		11-9-77	F-5	1319/1320	Bearings changed, reinstalled 11-9-77
	"		11-11-77	F-5	1351/-	0950978 removed for bearing change, damaged during change
Flow Technology	03601282	0-300 fps	11-13-77	F-5	-/1352	03601282 installed as replacement
	"		11-15-77	F-5	1380/1381	Bearings changed, reinstalled 11-15-77
	"		11-21-77	F-5	1435/1436	Bearings changed, reinstalled and reversed 11-21-77
	"		12-2-77	F-5	1480/1481	Bearings changed, reinstalled 12-2-77
	"		12-5-77	F-5	1514/-	Removed, end of testing

*The turbine meter connected to scanner channel S-4 was inserted in location L-29 for tests 209-364 and 454-500, and in location L-4 for all other tests.

Scanner No. S-5

Pump Suction Pressure Cell

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1104	969	0-1500 psig	1-19-77	F-6	-	Inserted in L-5
	"		3-26-77	F-6	-	
	"		5-3-77	F-6	-	
	"		6-1-77	F-6	-	This calibration used for all tests except 1499-1514
	"		12-6-77	F-6	-	This calibration used for tests 1499-1514

Scanner No. S-6

Pump Discharge Pressure Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1104	970	0-1500 psig	8-7-77	F-7	-	This calibration used for tests 209-364 Inserted in L-6
Rosemount 1104	455	0-1500 psig	2-19-77	F-7	364/365	New cell calibrated and installed
	"		3-26-77	F-7	-	
	"		5-3-77	F-7	-	
	"		6-1-77	F-7	-	This calibration used for tests 365-1514
	"		12-6-77	F-7	-	

Scanner No. S-7*

Test Pump DP (High) BLH Bidirectional Cell

Instrument						
MFG	Serial No.	Span	Calibration Date	FM No.	Test No. Before/After	Comments
BLH 405138	45602	±500 psig	9-21-76	F-8	-	This calibration used for tests 209-463 (Inserted in L-7H)
BLH HMD 417715	48557	±500 psid	3-14-77	F-8	463/464	New cell installed
	"		3-15-77	F-8		New cell calibrated and installed
	"		6-3-77	F-8	-	This calibration used for tests 464-1514
	"		12-16-77	F-8	-	

*During the test program either the BLH cells (scanner channels S-7/S-8) or the Rosemount DP cells (scanner channels S-7A/S-8A) were connected hydraulically to the test loop. Whenever a different pair of cells was connected to the loop the electrical connections to the data scanner and FM system were changed. Only one pair of cells, Rosemount or BLH, was connected hydraulically and electrically in the loop at any given time. A key to when the different types of cells were connected is given on the following page.

Tests From → To	Cell Connected: Rosemont (S-7A/S-8A)	Cell Connected: BLH (S-7/S-8)
207-243	X	
244-251		X
252-453	X	
454-499		X
501-619	X	
620-705		X
706-822	X	
823-847		X
849-1126	X	
1127-1351		X
1352-1363	X	
1364-1380		X
1381-1435	X	
1436-1465		X
1466-1480	X	
1481-1514		X

Scanner No. S-7A*

Test Pump DP (High) Rosemount Cell

Instrument						
MFG	Serial No.	Span	Calibration Date	FM No.	Test No. Before/After	Comments
Rosemount 1151HP	68853	0-200 psid	1-19-77	F-8	-	This calibration used for tests 209-297 (Inserted in L-7H)
	"		2-5-77	F-8	297/-	Cell calibration prior to range change
	"	(-100 to 200 psid)	2-5-77	F-8	-/298A	Range change to (-100 to 200 psid)
	"		3-26-77	F-8	-	
	"		6-4-77	F-8	-	This calibration used for test 298A-1514
	"		12-13-77	F-8	-	

*See footnote for S-7

Scanner No. S-8*

Test Pump DP (Low), BLH DP Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
BLH 405138	44081	±200 psid	9-22-76	F-9	-	Inserted in L-7L
	"		6-4-77	F-9	-	This calibration used for all tests
	"		12-16-77	F-9	-	

*See footnote for S-7

Scanner No. S-8A*

Test Pump DP (Low) Rosemount DP Cell

Instrument						
MFG	Serial No.	Span	Calibration Date	FM No.	Test No. Before/After	Comments
Rosemount 1151DP	12795	0-25 psid	8-4-76	F-9	-	This calibration used for tests 209-297 (Inserted in L-7L)
	"		2-5-77	F-9	297/-	Cell calibration prior to range change
	"	(-8 to +16 psid)	2-5-77	F-9	-/298A	Range change
	"		3-26-77	F-9	-	
	"		5-20-77	F-9	770/771	Module from channel F-11 substituting for defective F-9 module
	"		6-2-77	F-9	-	This calibration used for tests 298A-1514

*See footnote for S-7

Scanner No. S-9

Test Pump Inlet Injection DP Cell

Instrument						
MFG	Serial No.	Span	Calibration Date	FM No.	Test No. Before/After	Comments
Rosemount 1151DP	12792	0-25 psid	8-4-76	F-10	-	Inserted in L-9
	"		4-5-77	None	609/610	F-10 removed from S-9, no replacement
	"		6-2-77	None	-	This calibration used for tests 209-849A
	"		9-13-77	F-22	849A/849B	F-22 added to S-9
	"		11-9-77	F-21	1317/1318	F-22 is replaced by F-21 on S-9
	"		12-15-77	F-21	-	This calibration used for tests 949B-1514

Scanner No. S-10

Pump Inlet Injection Pressure Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Barton 753	402	0-1500 psig	12-13-76	F-11	-	Inserted in L-10
	"		3-16-77	None	488/489	Removed from F-11
	"		Prior to 5-10-77	F-11	Prior to 676	Returned to F-11
	"		5-20-77	None	770/771	F-11 amplifier module removed
	"		6-2-77	None	-	This calibration used for tests 209-849A
Rosemount 1151GP9E	68872	0-1500 psig	6-8-77	F-11	849A/849B	New cell installed, this calibration used for tests 849B-1514, F-11 connected
	"		10-20-77	None	1118/1119	FM-11 removed from S-10
	"		12-6-77	None	-	

Scanner No. 11

Pump Torque Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
1605-10K Lebow Assoc.	83	1200 ft. lb.	1-19-77	F-12	-/209	Calibration - Used throughout Phase I (Inserted in L-11)
1605-2K Lebow Assoc.	94	2000 in. lb.	1-22-77	F-12	217/218	Installed
"			1-22-77	F-12	-	Calibration - Used throughout Phase I
1605-10K			1-27-77	F-12	243/244	Installed
1605-2K			1-30-77	F-12	256/257	Installed
1605-10K			2-11-77	F-12	320/321	Installed
1605-2K			2-16-77	F-12	339/340	Installed
1605-10K			3-5-77	F-12	428/429	Installed
1605-10K, 1605-2K			3-14-77	F-12	465/466	Changed polarity on FM
"			3-16-77	F-12	479/480	FM wiring change to allow ±2.5V input
"			3-16-77	F-12	488/489	Leads reversed
1605-2K			3-19-77	F-12	508/509	Installed
"			3-24-77	F-12	-	Calibration Check

Scanner No. 11

Pump Torque Meter

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
1605-10K	83	1200 ft. lb.	3-24-77	F-12	-	Calibration Check
"			3-25-77	F-12	558/559	Installed
1605-2K	94	2000 in. lb.	4-1-77	F-12	590/591	Installed
1605-10K			4-5-77	F-12	609/610	Installed
"			4-5-77	F-12	-	Calibration Check
"			4-27-77	F-12	-	Calibration Check
"			5-9-77	F-12	-	Calibration Check
1605-10K			5-10-77	F-12	-	Calibration Check
"			5-16-77	F-12	-	Calibration Check
"			5-24-77	F-12	-	Calibration Check
"			9-26-77	F-12	-	Calibration Check
1605-2K			9-27-77	F-12	894/895	Installed
"			9-27-77	F-12	-	Calibration Check
1605-10K			10-10-77	F-12	1002/1003	Installed
"			10-11-77	F-12	-	Calibration Check
1605-2K			10-17-77	F-12	1105/1107	Installed
"			10-17-77	F-12	-	Calibration Check

Scanner No. 11

Pump Torque Meter

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
1605-10K	83	1200 ft. lb.	10-21-77	F-12	1126/1127	Installed
"			10-21-77	F-12	-	Calibration Check
"			10-22-77	F-12	-	Calibration Check
"			10-26-77	F-12	-	Calibration Check
"			10-31-77	F-12	-	Calibration Check
"			11-3-77	F-12	-	Calibration Check
"			11-9-77	F-12	-	Calibration Check
1605-2K	94	2000 in. lb.	11-12-77	F-12	1351/1352	Installed
"			11-12-77	F-12	-	Calibration Check
1605-10K			11-23-77	F-12	1435/1436	Installed
"			12-1-77	F-12	-	Calibration Check
"			1-4-78	F-12	-	Calibration, used for all Phase II data
1605-2K			1-5-78	F-12	-	Installed and calibrated, calibration used for all Phase II data

Scanner No. 12

Pump Speed Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
1605-10K Lebow Assoc.	83	10,000 RPM	1-19-77	F-13	-1209	Installed (Inserted in L-12)
1605-2K Lebow Assoc.	94	10,000 RPM	1-22-77	F-13	217/218	"
1605-10K			1-27-77	F-13	243/244	"
1605-2K			1-30-77	F-13	256/257	"
1605-10K			2-11-77	F-13	320/321	"
1605-2K			2-16-77	F-13	339/340	"
1605-10K			3-5-77	F-13	428/429	"
1605-2K			3-19-77	F-13	508/509	"
1605-10K			3-25-77	F-13	558/559	"
1605-2K			4-1-77	F-13	590/591	"
1605-10K			4-5-77	F-13	609/610	"
1605-2K			9-27-77	F-13	894/895	"
1605-10K			10-10-77	F-13	1002/1003	"
1605-2K			10-17-77	F-13	1105/1107	"

Scanner No. 12

Pump Speed Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
1605-10K			10-21-77	F-13	1126/1127	Installed (Inserted in L-12)
1605-2K			11-12-77	F-13	1351/1352	"
1605-10K			11-23-77	F-13	1435/1436	"

Scanner No. S-15

MI Pump Suction γ-Densitometer, Beam 1 (Lower Beam)

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Measurements Inc.	A-566 Q-438	0-62.4 lb/ft^3	1-6-77	F-16	-/209	Prephase I verification, power supply voltage adjusted (Inserted in L-15)
	"		3-9-77	F-16	429/430	Power Supply voltage adjusted
	"		3-28-77	F-16	558/559	"
	"		9-19-77	F-16	849A/849B	Prephase II verification, power supply voltage adjusted
	"		10-26-77	F-16	1179/1180	Power supply voltage adjusted

Scanner No. S-16

MI Pump Suction γ-Densitometer, Beam 2, (Center Beam)

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Measurements Inc.	Q-365 A-102	0-62.4 lb/ft^3	1-6-77	F-17	-/209	Prephase I verification, power supply voltage adjusted (Inserted in L-16)
	"		3-9-77	F-17	429/430	Power supply voltage adjusted
	"		3-28-77	F-17	558/559	"
	"		5-24-77	F-17	822/823	"
	"		9-19-77	F-17	849A/849B	Prephase II verification, power supply voltage adjusted
	"		10-26-77	F-17	1179/1180	Power supply voltage adjusted
	"		11-12-77	F-17	1351/1352	"

Scanner No. S-17

MI Pump Suction γ-Densitometer, Beam 3, (Upper Beam)

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Measurements Inc.	Q-441 A-111	0-62.4 lb/ft^3	1-6-77	F-18	-/209	Prephase I verification, power supply voltage adjusted (Inserted in L-17)
	"		3-9-77	F-18	429/430	Power supply voltage adjusted
	"		3-28-77	F-18	558/559	"
	"		9-19-77	F-18	849A/849B	Prephase II verification, power supply voltage adjusted
	"		10-28-77	F-18	1179/1180	Power Supply voltage adjusted
	"		11-12-77	F-18	1351/1352	"

Scanner No. S-18

MI Pump Discharge γ-Densitometer, Beam 1 (Lower Beam)

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Measurements Inc.	Q-443 A-569	0-62.4 lb/ft^3	1-6-77	F-19	-/209	Prephase I verification, power supply voltage adjusted (Inserted in L-18)
	"		3-9-77	F-19	429/430	Power supply voltage adjusted
	"		3-28-77	F-19	558/559	"
	"		5-24-77	F-19	822/823	"
	"		9-19-77	F-19	849A/849B	Prephase II verification, power supply voltage adjusted
	"		10-26-77	F-19	1179/1180	Power supply voltage adjusted

Scanner No. S-19

MI Pump Discharge γ-Densitometer, Beam 2, (Center Beam)

Instrument						
MFG	Serial No.	Span	Calibration Date	FM No.	Test No. Before/After	Comments
Measurements Inc.	Q-437 A-567	0-62.4 lb/ft^3	1-6-77	F-20	-/209	Prephase I verificqtion, power supply voltage adjusted (Inserted in L-19)
"	"	"	3-9-77	F-20	429/430	Power supply voltage adjusted
Measurements Inc.	Q-439 A-103	0-62.4 lb/ft^3	3-24-77	F-20	558/559	Preamp & detector replaced
"	"	"	3-28-77	F-20	558/559	Power supply voltage adjusted
Measurements Inc.	BE-138 A-101	0-62.4 lb/ft^3	9-19-77	F-20	849A/-	Prephase II verification (actual replacement occurred 9-16-77)
"	"	"	9-19-77	F-20	-/849B	Power supply voltage adjusted
"	"	"	10-27-77	F-20	1179/1180	"
"	"	"	11-12-77	F-20	1351/1352	"

Scanner No. S-20

MI Pump Discharge γ-Densitometer, Beam 3, (Upper Beam)

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Measurements Inc.	Q-442 A-101	0-62.4 lb/ft^3	1-6-77	F-21	-/209	Prephase I verification, power supply voltage adjusted (Inserted in L-20)
"	"	"	3-9-77	F-21	429/430	Power supply voltage adjusted
"	"	"	3-28-77	F-21	558/559	"
Measurements Inc.	Q-437 A-567	0-62.4 lb/ft^3	5-13-77	F-21	705/706	Preamp and detector replaced
"	"	"	9-19-77	F-21	849A/849B	Prephase II verification, power supply voltage adjusted
"	"	"	10-26-77	F-21	1179/1180	Power supply voltage adjusted
"	"	"	11-4-77	F-11	1280/1281	F-21 replaced by F-11

Scanner No. S-25

HP Drum Water Level DP Cell

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1151DP	29066	0-2.5 psid	12-10-76	F-24	-	Inserted in L-25
	"		3-10-77	F-24	436/437	FM wires reversed
	"		6-6-77	F-24	-	This calibration used for tests 209-1335
	"		12-8-77	F-24	-	This calibration used for tests 1336-1514

Scanner No. S-26

Pump Suction Drag Disc

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Ramapo	4160	0-600,000 #/ft-sec^2	1-5-77	F-27	-/209	Prephase I verification (Inserted in L-26)
	"		1-24-77	F-27	217/218	Span adjusted
	"		2-28-77	F-27	390/391	D.D. reversed for reverse flow
	"		3-24-77	F-27	558/-	D.D. returned to forward flow
	"		3-25-77	F-27	-/559	Resistor networked changes to allow $\pm$2.5V input to FM
	"		4-11-77	F-27	628/-	D.D. 4160 removed
	"		4-28-77	F-27	-/692	D.D. 4160 reinstalled
	"		5-27-77	F-27	849A/-	D.D. 4160 removed at end of Phase I
Ramapo	4160	0-400,000 #/ft-sec^2	9-17-77	F-27	-/849B	Prephase II verification
	"		9-24-77	F-27	894/895	D.D. 4160 removed broken off
Ramapo	4987	0-1,000,000 #ft-sec^2	10-2-77	F-27	922/923	New D.D. 4987 installed, range change
	"		10-7-77	F-27	999/-	D.D. 4987 removed for calib. check

Scanner No. S-26

Pump Suction Drag Disc

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Ramapo	4987	0-1,000,000 #/ft-sec^2	10-8-77	F-27	-/1000	D.D. 4987 reinstalled
	"		10-27-77	F-27	1188/-	D.D. 4987 removed, target and stem broken off
Ramapo	4159	0-600,000 #/ft-sec^2	10-27-77	F-27	-/1189	D.D. 4159 installed with 484 target
	"		11-9-77	F-27	1319/-	D.D. 4159 removed & checked
	"		11-9-77	F-27	-/1320	D.D. 4159 reinstalled
	"		11-12-77	F-27	1351/-	D.D. 4159 removed for range change
Ramapo	3730	0-120,000 #/ft-sec^2	11-13-77	F-27	-/1352	New D.D. 3730 installed
	"		11-15-77	F-27	1380/-	D.D. 3730 removed
Ramapo	4159	0-600,000 #/ft-sec^2	11-15-77	F-27	-/1381	D.D. 4159 installed with 0-600,000 target
	"		11-21-77	F-27	1435/1436	D.D. 4159 reversed for reverse flow
	"		12-2-77	F-27	1480/-	D.D. 4159 removed
Ramapo	3730	0-120,000 #/ft-sec^2	12-2-77	F-27	-/1481	D.D. 3703 installed
	"		12-5-77	F-27	1514/-	D.D. removed, end of testing

Scanner No. S-27

Pump Discharge Drag Disc

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Ramapo	4159	0-600,000 #/ft-sec^2	1-5-77	F-30	-/209	Prephase I verification (Inserted in L-27)
	"		1-24-77	F-30	217/218	Span adjusted
	"		2-10-77	F-30	314/315	D.D. 4159 inoper. broken off in pipe
	"		2-11-77	F-30	320/321	D.D. 4159 removed
	"		4-28-77	F-28	628/629	D.D. 4159 repaired, reinstalled. Now read on F-28 ±25V input
	"		5-13-77	F-28	705/706	F-28 input tied across 52052 on terminal strip
	"		5-27-77	F-28	849A/-	D.D. 4159 removed, end of Phase I
Ramapo	4159	0-400,000 #/ft-sec^2	9-17-77	F-28	-/849B	Prephase II verification
	"		9-20-77	F-28	863/864	D.D. 4159 removed defective, S-27 capped
Ramapo	4986	0-1,000,000 #/ft-sec^2	10-2-77	F-28	922/923	D.D. 4986 installed with 0-1,000,000 target
	"		10-7-77	F-28	999/-	D.D. 4986 removed for calib. check
	"		10-8-77	F-28	-/1000	D.D. 4986 reinstalled

Scanner No. S-27

Pump Discharge Drag Disc

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Ramapo	4986	0-1,000,000 #/ft-sec^2	10-22-77	F-28	1148/1149	Ramapo electronics module noise, replaced
	"		11-9-77	F-28	1319/-	D.D. 4986 removed & oper. checked
	"		11-9-77	F-28	-/1320	D.D. 4986 reinstalled
	"		11-12-77	F-28	1351/-	D.D. 4986 removed for range change
Ramapo	3731	0-120,000 #/ft-sec^2	11-13-77	F-28	-/1352	D.D. 3731 installed with 0-120,000 target
	"		11-15-77	F-28	1380/-	D.D. 3731 removed
Ramapo	4986	0-1,000,000 #/ft-sec^2	11-15-77	F-28	-/1381	D.D. 4986 installed with 0-1,000,000 target
	"		11-21-77	F-28	1435/1436	D.D. reversed for reverse flow
	"		12-2-77	F-28	1480/-	D.D. 4986 removed
Ramapo	3731	0-120,000 #/ft-sec^2	12-2-77	F-28	-/1481	D.D. 3731 installed
	"		12-5-77	F-28	1514/-	D.D. removed, end of testing

Scanner No. S-28*

Pump Suction Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950979	0-90 fps	1-5-77	None	-/209	Prephase I verification (Inserted in L-3) open ball bearings
	"		1-27-77	"	243/-	0950979 removed
Flow Technology	0950977	0-300 fps	1-27-77	"	-/-	0950977, which was reading on S-3 (L-28), switched to this channel
	"		1-28-77	F-4	-/244	S-28 wired to F-4
	"		2-4-77	F-4	297/-	0950977 wired to read on S-3 again
Flow Technology	0950979	0-90 fps	2-4-77	None	-/298	0950979 reinstalled at L-3
	"		2-19-77	"	364/365	0950979 removed shaft damaged
Flow Technology	0950979	0-300 fps	4-5-77	F-10	609/610	0950979 reinstalled with 0-300 fps turbine and Roulon-A journal bearing. F-10 added. Also it was installed at the center of pipe at L-28.
	"		4-6-77	F-10	619/620	Preamp bypassed
	"		4-7-77	F-10	628/-	0950979 Roulon-A TM removed, bearing frozen
	"		4-7-77	F-10	-/-	Preamp modified for noise attenuation

Scanner No.S-28*

Pump Suction Turbine Meter

MFG	Serial No.	Span	Calibration Date	FM No.	Test No. Before/After	Comments
Flow Technology	0950979	0-300 fps	4-28-77	F-10	-/629	0950979 reinstalled w/Roulon bearings
	"		4-29-77	F-10	652/-	TM 0950979 removed
	"		5-9-77	F-10	-/653	TM 0950979 reinstalled
	"		5-10-77	F-10	680/681	Removed & reinstalled
	"		5-12-77	F-10	705/706	TM 0950979 removed
	"		5-21-77	F-10	786/787	TM 0950979 installed
	"		5-24-77	F-10	822/823	0950979 Roulon-A replaced with sealed ball bearings & installed
	"		5-26-77	F-10	849A/-	Removed, end of Phase I
	"		9-20-77	F-10	-/849B	Prephase II verification
	"		9-24-77	F-10	894/895	Removal for inspection
	"		10-8-77	F-10	999/1000	Reinstalled
	"		10-12-77	F-10	1075/1076	Bearings changed, reinstalled 10-12-77
	"		10-14-77	F-10	1105/1106	Bearings changed, reinstalled 10-17-77
	"		10-21-77	F-10	1126/1127	Bearings changed, reinstalled 10-21-77

Scanner No. S-28

Pump Suction Turbine Meter

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Flow Technology	0950979	0-300 fps	10-22-77	F-10	1156/1157	Bearings changed, reinstalled 10-24-77
	"		10-26-77	F-10	1179/1180	Bearings changed, reinstalled 10-26-77
	"		10-28-77	F-10	1211/1212	Removed and checked
	"		10-30-77	F-10	1223/-	Reinstalled
	"		10-31-77	F-10	-/1224	TM 0950979 removed and reinstalled at 1/3 R instead of centerline.
	"		11-3-77	F-10	1267/1268	Bearings changed, reinstalled 11-3-77
	"		11-9-77	F-10	1319/1320	Bearings changed, reinstalled 11-9-77
	"		11-11-77	F-10	1351/1352	Bearings changed, reinstalled 11-13-77
	"		11-15-77	F-10	1380/1381	Bearings changed, reinstalled 11-15-77
	"		11-21-77	F-10	1435/1436	Bearings changed, reinstalled for reverse flow 11-21-77

Scanner No. S-28

Pump Suction Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950979	0-300 fps	12-2-77	F-10	1480/1481	Bearings changed, reinstalled 12-2-77
	"		12-5-77	F-10	1514/-	Removed, end of testing

*The turbine meter connected to scanner channel S-28 was inserted in L-3 for tests 209-243 and 298-364 and in L-28 for all other tests.

Scanner No. S-29*

Pump Discharge Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950980	0-90 fps	1-5-77	None	-/209	Prephase I verification (Inserted in L-4) Open ball bearings
	"		1-25-77	None	223/224	TM Inoperative, bearing frozen
	"		1-27-77	"	243/244	TM 0950980 removed
	"		2-4-77	"	297/298	TM 0950980 bearings changed & reinstalled at L-4
	"		2-19-77	"	364/365	TM 0950980 removed shaft damaged
Flow Technology	0950980	0-300 fps	4-5-77	F-23	609/610	0950980 installed with 0-300 fps turbine and Roulon-A bearing, F-23 added, installed at center line of pipe at L-29
	"		4-6-77	F-23	619/620	Preamp bypassed
	"		4-7-77	F-23	628/-	TM 0950980 removed Roulon Bearing frozen
	"		4-7-77	F-23	-/-	Preamp modified for noise attenuation
	"		4-28-77	F-23	-/629	TM 0950980 reinstalled
	"		4-29-77	F-23	652/-	TM removed for checkout
	"		5-9-77	F-23	-/653	TM 0950980 installed
	"		5-10-77	F-23	680/681	TM removed, defective

Scanner No. S-29

Pump Discharge Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950980	0-300 fps	5-24-77	F-23	822/823	TM 0950980 installed Roulon bearing replaced by sealtd ball bearings
	"		5-25-77	F-23	831/832	Bypassed preamp again
	"		5-26-77	F-23	849A/-	TM removed, End of Phase I
	"		9-20-77	F-23	-/859B	Prephase II verification
	"		9-24-77	F-23	894/895	TM removed for inspection
	"		10-8-77	F-23	999/1000	0950980 reinstalled
	"		10-12-77	F-23	1075/1076	Bearings changed, reinstalled 10-12-77
	"		10-14-77	F-23	1105/1106	Bearings changed, reinstalled 10-17-77
	"		10-21-77	F-23	1126/1127	Bearings changed, reinstalled 10-21-77
	"		10-22-77	F-23	1156/1157	Bearings changed, reinstalled 10-24-77
	"		10-26-77	F-23	1179/1180	Bearings changed, reinstalled 10-26-77

Scanner No. S-29

Pump Discharge Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950980	0-300 fps	10-28-77	F-23	1211/1212	Bearings changed
	"		10-30-77	F-23	1223/1224	Reinstalled
	"		11-3-77	F-23	1267/1268	Bearings changed, reinstalled
	"		11-4-77	F-23	1280/1281	Changed preamp
	"		11-9-77	F-23	1319/1320	Bearings changed, reinstalled 11-9-77
	"		11-11-77	F-23	1351/1352	Bearings changed, reinstalled 11-13-77
	"		11-15-77	F-23	1380/1381	Bearings changed, reinstalled 11-15-77
	"		11-21-77	F-23	1435/-	0950980 removed, pick up coil open
Flow Technology	03601283	0-300 fps	11-21-77	F-23	-/1436	New TM installed 03601283, set for reverse flow, sealed ball bearings
	"		12-2-77	F-23	1480/-	Bearings changed, reinstalled 12-2-77
Flow Technology	0950978	0-300 fps	12-2-77	F-23	-/1481	Replaced TM 03601283 (Bad coil) with 0950978

Scanner No. S-29

Pump Discharge Turbine Meter

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Flow Technology	0950978	0-300 fps	12-2-77	F-23	1493/1494	Replaced Anadex module with PI-608
	"		12-3-77	F-23	1508/1509	Changed back to old Anadex module
	"		12-5-77	F-23	1514/-	Removed, end of testing

*The turbine meter connected to scanner channel S-29 was inserted in location L-4 for tests 209-243 and 298-364 and in location L-29 for all other tests.

Scanner No. S-32

Pump Injection Outlet Flow (Magnetic Flowmeter)

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Foxboro	3246257	0-50 gpm	1-5-77	F-33	-/209	Prephase I verification (Inserted in L-32)
	3194359		3-19-77	F-33	508/-	Electrical calibration
Foxboro	3246257	0-100 gpm	3-19-77	F-33	-/509	Range change & electrical calibration
	3194359		9-20-77	F-33	849A/849B	Prephase II verification
	"		12-21-77	F-33	1514/-	Post Phase II flow calibration check
	"		3-17-78	F-33	-	Calibration by manufacturer, this calibration used for tests 509-1514, pre-delivery calib. used for earlier tests

Scanner No. S-33

Pump Suction DP(BLH) Inlet/Across Pipe - 90°

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
BLH 1500HLD	45077	±500 in H_2O	12-9-76	F-34	-	Inserted in L-33
	"		6-8-77	F-34	-	This calibration used for all tests
	"		9-14-77	None	849A/849B	F-34 removed from S-33
	"		12-16-77	None	-	

Scanner No. S-34

AECL Pump Inlet γ-Densitometer Beam 3 (Outer)

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
AECL	6Q125	0-62.4 lb/ft^3	1-6-77	F-35	-/209	Prephase I verification (Inserted in L-34)
AECL	HJ457	0-62.4 lb/ft^3	9-16-77	F-35	849A/849B	Installed for Phase II

Scanner No. S-35

AECL Pump Inlet γ-Densitometer Beam 1 (Inner)

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
AECL	HJ459	0-62.4 lb/ft^3	1-6-77	F-36	-/209	Prephase I verification (Inserted in L-35)
	"		3-16-77	F-11	488/489	F-36 replaced by F-11 (Internal FM change)
	"		Prior to 5-10-77	F-36	Prior to 676	Returned to F-36
AECL	6Q125	0-62.4 lb/ft^3	9-16-77	F-36	849A/849B	Installed for Phase II

Scanner No. S-36

AECL Pump Inlet γ-Densitometer Beam 2 (Center)

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
AECL	HJ457	0-62.4 lb/ft^3	1-6-77	F-37	-/209	Prephase I verification (Inserted in L-36)
	"		3-16-77	F-22	488/489	F-37 replaced by F-22 (Internal FM change)
	"		Prior to 5-10-77	F-37	Prior to 676	Returned to F-37
AECL	HJ459	0-62.4 lb/ft^3	9-16-77	F-37	849A/849B	Installed for Phase II, back on FM Channel F-37
	"		10-25-77	F-30	1164/1165	F-37 replaced by F-30

Scanner No. S-37

Main Steam Orifice DP (Lo) Cell

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1151DP	49282	0-3.5 psid	7-30-76	None	-	Inserted in L-37L
	"		6-4-77	None	-	This calibration used for all tests
	"		12-8-77	None	-	

Scanner No. S-38

Main Water Orifice DP (Lo) Cell

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1151DP	49280	0-3.5 psid	8-4-76	None	-	Cell repaired & calibrated (Inserted in L-38L)
	"		6-6-77	"	-	This calibration used for all tests
	"		10-20-77	F-11	1118/1119	F-11 placed on S-38
	"		11-4-77	F-21	1280/1281	F-11 removed from S-38 and replaced by F-21
	"		11-9-77	None	1317/1318	F-21 removed, no replacement
	"		12-7-77	None	-	

Scanner No. S-39

Bypass Steam Orifice DP (Lo) Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1151DP	49283	0-3.5 psid	7-30-76	None		Inserted in L-39L
	"		6-4-77	"		This calibration used for all tests
	"		12-8-77	"		

Scanner No. S-40

Bypass Water Orifice DP (Lo) Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1151DP	49281	0-3.5 psid	7-30-76	None		Inserted in L-40L
	"		6-6-77	"		This calibration used for all tests
	"		12-7-77	"		

Scanner No. S-41

Main Steam Pressure Cell

Instrument						
MFG	Serial No.	Span	Calibration Date	FM No.	Test No. Before/After	Comments
Rosemount 1106	18385	0-1500 psig	11-20-76	None		Inserted in L-41
	"		2-15-77	"		
	"		6-1-77	"		This calibration used for all tests
	"		12-6-77	"		

Scanner No. S-42

Main Water Pressure Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1106	18386	0-1500 psig	1-5-77	None		Inserted in L-42
	"		6-1-77	"		
	"		6-10-77	"		This calibration used for all tests
	"		9-14-77	F-25		F-25 placed on S-42
	"		12-6-77	F-25		

Scanner No. S-43

Main Steam Orifice DP Cell (Hi)

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1151DP	12797	0-25 psid	8-2-76	None		Inserted in L-37H
	"		6-2-77	"		This calibration used for all tests
	"		12-9-77	"		

Scanner No. S-44

Main Water Orifice DP Cell (Hi)

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1151DP	12794	0-25 psid	8-2-76	None		Inserted in L-38M
	"		6-4-77	"		This calibration used for all tests
	"		10-10-77	"		Cal check with air calibrator @ zero static pressure
	"		11-2-77	"		"
	"		12-7-77	"		Post Test Cal showed bypass leakage
	"		12-19-77	"		Post Test Cal w/o manifold no bypass leakage

Scanner No. S-45

Bypass Steam Orifice DP Cell (Hi)

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1151DP	12793	0-25 psid	8-3-76	None		Inserted in L-39H
	"		6-3-76	"		This calibration used for all tests
	"		12-9-77	"		

Scanner No. S-46

Bypass Water Orifice DP Cell (Hi)

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1151DP	12796	0-25 psid	8-2-76	None		Inserted in L-40H
	"		3-3-77	"		Cal. done before securing wires at terminal board
	"		3-3-77	"		Cal. done after securing wires at terminal board
	"		6-3-77	"		This calibration used for all tests
	"		12-7-77	"		

Scanner No. S-47

Bypass Steam Pressure Cell

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1104	968	0-1500 psig	8-5-76	None		Inserted in L-47
	"		6-1-77	"		This calibration used for all tests
	"		12-6-77	"		

Scanner No. S-48

Bypass Water Pressure Cell

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1104	971	0-1500 psig	8-6-76	None		Inserted in L-48
	"		6-2-77	"		This calibration used for all tests
	"		12-6-77	"		

Scanner No. S-53

Bypass Water Temperature RTD

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 104	88159	0-600°F	9-27-76/ 10-9-76	None		Inserted in L-53
	"		6-6-77	"		This calibration used for all tests
	"		12-12-77	"		

Scanner No. S-54

Bypass Steam Temperature RTD

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 104	88160	0-600°F	9-29-76/ 10-9-76	None		Inserted in L-54
	"		6-10-77	"		This calibration used for all tests
	"		12-12-77	"		

Scanner No. S-55

Pump Suction Temperature RTD

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 104	88162	0-600°F	9-29-76/ 10-9-76	None	-	Inserted in L-55
	"		3-19-77	"	-	Ice point only
	"		6-9-77	"	-	This calibration used for all tests
	"		10-13-77	"	-	Ice point only
	"		10-31-77	"	1223/1224	RTD removed from Loop
	"		11-11-77	"	1351/1352	RTD reinstalled & ice point checked
	"		12-12-77	"	-	

Scanner No. S-56

Pump Discharge Temperature RTD

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 104	14374	0-600°F	10-20-76/ 10-28-76	None		Inserted in L-56
	"		3-19-77	"		Ice point only
	"		6-3-77	"		This calibration used for all tests
	"		12-13-77	"		

Scanner No. S-58

Main Water Orifice Temperature RTD

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 104	88163	0-600°F	9-29-76/ 10-9-76	None		Inserted in L-58
	"		3-19-77	"		Ice point only
	"		6-6-77	"		This calibration used for all tests
	"		12-12-77	"		

Scanner No. S-59

Main Steam Orifice RTD

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount RTD 104	88158	0-600°F	9-29-76/ 10-9-76	None		Inserted in L-59
	"		2-16-77	"		Ice point only
	"		3-19-77	"		"
	"		6-8-77	"		This calibration used for all tests
	"		12-12-77	"		

Scanner No. S-60

Loop Flow Control Valve DP Cell

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1151DP	45516	0-200 psid	7-29-76	None		Inserted in L-60
	"		6-6-77	"		This calibration used for all tests
	"		12-8-77			

Scanner No. S-61

Pump Suction Inlet Leg to Flange DP Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1151DP	47673	0-10 psid	7-29-76	F-25	-	Inserted in L-61
	"		3-26-77	F-25	-	
	"		6-3-77	F-25	-	This calibration used for all tests
	"		9-14-77	None	849A/849B	F-25 removed from S-61
	"		12-15-77	None	-	

Scanner No. S-62

Pacific-16 Pump DP Cell

Instrument			Calibration		Test No.	
MFG	Serial No.	Span	Date	FM No.	Before/After	Comments
Rosemount 1151DP	45518	0-10 psid	7-29-76	None	-	Inserted in L-62
	"		6-7-77	"	-	This calibration used for all tests
	"		10-19-77	"	1116/1117	Removed, see note

Cell removed from S-62 installation on 10-19-77 for use on S-69. There was no replacement. Post Test Phase II calibration is found with S-69 sheet. (Note, however, the range was changed to 0-100 psid when moved to S-69).

Scanner No. S-64

Blowdown Leg Pressure Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1106	18384	0-1500 psig	1-3-77	F-29	-	Inserted in L-64
	"		2-24-77	F-29	-	
	"		6-2-77	F-29	-	This calibration used for all tests
	"		11-9-77	F-39	1317/1318	F-29 removed, F-39 placed on S-64
	"		12-6-77	F-39	-	

Scanner No. S-65

High Pressure Drum Pressure Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1104	1035	0-1500 psig	12-6-76	-	-	Inserted in L-65
	"		3-14-77	F-30	462/463	S-65 placed on F-30
	"		6-2-77	F-30	-	This calibration used for all tests
	"		10-25-77	None	1164/1165	S-65 had F-30 removed
	"		12-6-77	None	-	

Scanner No. S-66

Test Pump Flange to Flange DP Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1151DP	45517	0-200 psid	7-29-76	F-38	-	This calibration used for tests 209-297 (Inserted in L-65)
	"		-	F-28	-/209	F-38 removed and replaced by F-28 sometime in Dec 76
	"		2-5-77	F-28	-	
	"	-100 to +200 psid	2-5-77	F-28	297/298A	Range changed to -100 to +200 psid
	"		3-26-77	F-28	-	
	"		5-25-77	F-28	843/844	F-28 replaced by F-39
	"		6-6-77	F-39	-	This calibration used for tests 298A-1514
	"		11-9-77	F-29	1317/1318	F-39 replaced by F-29
	"		12-9-77	F-29	-	

Scanner No. S-68

Pump Impeller DP Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Rosemount 1151DP	47674	0-25 psid	7-29-76	F-39	-	Inserted in L-68
	"		5-25-77	F-38	843/844	F-39 replaced by F-38 on S-68
	"		6-7-77	F-38	-	This calibration used for all tests
	"		9-14-77	None	849A/849B	F-38 removed from S-68 and not replaced
	"		12-14-77	None	-	

Scanner No. S-69

Main Water Orifice Hi/Hi DP Cell

Instrument			Calibration Date	FM No.	Test No. Before/After	Comments
MFG	Serial No.	Span				
Barton 752	848	0-50 psid	2-9-77	None	304/305	S-69 added to main water orifice (L-38H)
	"		6-7-77	"	-	This calibration used for Tests 305-894
	"		9-14-77	F-38	849A/849B	F-38 connected
Rosemount 1151DP	11968	0-100 psid	9-24-77	F-38	894/895	New Rosemount replaced Barton, New range 0-100 psid, this calibration used for tests 895-1116
	"		10-10-77	F-38	-	Field Cal. using air calibrator
Rosemount 1151DP	45518	0-100 psid	10-19-77	F-38	1116/1117	New cell again, this calibration used for tests 1117-1514
	"		11-2-77	F-38	-	Field Cal. using air calibrator
	"		12-19-77	F-38	1514/-	Cell showed zero shift after removal from loop

Appendix 2.3A

ICCUP PROGRAM LISTING

```
      C   INSTRUMENT CONVERSION CONSTANTS UPDATE PROGRAM (ICCUP)                000100
      C   CREATED  3/2/79                                                       000110
            PROGRAM ICCUP(TAPE3,TAPE4,OUTPUT,INPUT,TAPE6=OUTPUT,                000120
           *TAPE5,TAPE12,TAPE13,TAPE14,TAPE15,TAPE16,TAPE17,                    000130
           *TAPE18,TAPE19,TAPE20)                                               000140
            DIMENSION X(70),R(70,5),KCA(20),KP(11),KDP(20)                      000150
            DIMENSION KRTD(20),KTM(20),KDD(20),KT(20),KSM(20),KGD(20)           000160
            DIMENSION KFP(20),ZP(20),ZDP(20),ZTM(20),ZDD(20),ZT(20),ZSM(20)     000170
            DIMENSION C(7,70),ZGD(10),D(4,9)                                    000180
            DIMENSION Y(4,70),S(4,40),PAC(9)                                    000190
            CALL CONNEC(6LOUTPUT)                                               000200
            PRINT 100                                                           000210
      100   FORMAT(2X,*WHICH KIND OF UPDATE IS THIS?*,/)                        000220
            PRINT 101                                                           000230
      101   FORMAT(5X,*P AND DP ZERO*,16X,*- TYPE 1*)                           000240
            PRINT 102                                                           000250
      102   FORMAT(5X,*DAILY P, DP AND G.D. UPDATE*,2X,*- TYPE 2*)              000260
            PRINT 103                                                           000270
      103   FORMAT(5X,*GAMMA DENSITOMETER AIR/WATER - TYPE 3*)                  000280
            PRINT 104                                                           000290
      104   FORMAT(5X,*PRE-BLOWDOWN*,17X,*- TYPE 4*)                            000300
            READ *,M11                                                          000310
      105   FORMAT(7X,*OUTPUT IS TAPE19*,//)                                    000320
      107   FORMAT(7X,*OUTPUT IS TAPE20*,//)                                    000330
      C  READ TAPE3, TAPE4 - UPDATE TAPE4 WITH P AND DP ZEROS                   000340
            REWIND 3                                                            000350
            REWIND 4                                                            000360
            READ(4,171) ZDATE,NDATE                                             000370
            PRINT 218,ZDATE,NDATE                                               000380
      218   FORMAT(/,4X,*TAPE4 IS *,A4,I5,/////////)                            000390
            READ(4,*) NTCA,(KCA(I),I=1,NTCA)                                    000400
            READ(4,*) NP,(KP(I),I=1,NP)                                         000410
            READ(4,*) NDP,(KDP(I),I=1,NDP)                                      000420
            READ(4,*) NRTD,(KRTD(I),I=1,NRTD)                                   000430
            READ(4,*) NTM,(KTM(I),I=1,NTM)                                      000440
            READ(4,*) NDD,(KDD(I),I=1,NDD)                                      000450
            READ(4,*) NT,(KT(I),I=1,NT)                                         000460
            READ(4,*) NSM,(KSM(I),I=1,NSM)                                      000470
            READ(4,*) NGD,(KGD(I),I=1,NGD)                                      000480
            READ(4,*) (KFP(I),I=1,7)                                            000490
            READ(4,*) (ZP(I),I=1,NP)                                            000500
            READ(4,*) (ZDP(I),I=1,NDP)                                          000510
            READ(4,*) (ZTM(I),I=1,NTM)                                          000520
            READ(4,*) (ZDD(I),I=1,NDD)                                          000530
            READ(4,*) (ZT(I),I=1,NT)                                            000540
            READ(4,*) (ZSM(I),I=1,NSM),ZMF                                      000550
            IF(NDATE.LT.567) GOTO 50                                            000560
            READ(4,*) (ZGD(I),I=1,NGD)                                          000570
      50    CONTINUE                                                            000580
            N=68                                                                000590
            IF (NDP.EQ.19) N=69                                                 000600
            DO 220 I=1,N                                                        000610
            READ(4,*) (C(J,I),J=1,7)                                            000620
      220   CONTINUE                                                            000630
            M10=3                                                               000640
            READ(3,51) TEST                                                     000650
      51    FORMAT(A8)                                                          000660
```

```
                READ(3,*) ITEST                                          000670
                ITEST1=ITEST                                             000680
60              READ(3,*) ILAB                                           000690
                READ(3,*) IWFLC,IFLCW                                    000700
                READ(3,*) ISFLC,IFLCS                                    000710
                READ(3,*) P,VF,Q,PSC                                     000720
                READ(3,*) PABS,TBAR                                      000730
65        171   FORMAT(A4,I4)                                            000740
                DO 135 IJ=1,5                                            000750
                READ(3,117) TM,TM1                                       000760
                READ(3,116) DQ2                                          000770
                READ(3,116) DQ4                                          000780
70              READ(3,116) DQ3                                          000790
                READ(3,116) DQ5                                          000800
          116   FORMAT(A10)                                              000810
          117   FORMAT(4X,A3,A6)                                         000820
                DO 140 I=1,14                                            000830
75              IF(I.GT.1)  GO TO 130                                    000840
                READ(3,125) ZER,R(1,IJ),R(2,IJ),R(3,IJ),R(4,IJ)          000850
          125   FORMAT(5F9.6)                                            000860
                J=5                                                      000870
                MJ=J+4                                                   000880
80              GO TO 140                                                000890
          130   READ(3,125) (R(K,IJ),K=J,MJ)                             000900
                J=MJ+1                                                   000910
                MJ=J+4                                                   000920
          140   CONTINUE                                                 000930
85              ZER=ZER*1000.                                            000940
                DO 150 I=1,N                                             000950
                R(I,IJ)=R(I,IJ)*1000.-ZER                                000960
                X(I)=0.                                                  000970
          150   CONTINUE                                                 000980
90        135   CONTINUE                                                 000990
                DO 200 IJ=1,5                                            001000
                DO 210 I=1,N                                             001010
                X(I)=X(I)+R(I,IJ)                                        001020
          210   CONTINUE                                                 001030
95        200   CONTINUE                                                 001040
                DO 300 J=1,N                                             001050
                X(J)=X(J)/5.                                             001060
          300   CONTINUE                                                 001070
                ITIME=ILAB/1000000                                       001080
100             IDATE=ILAB-ITIME*1000000                                 001090
                IMO=IDATE/10000                                          001100
                IDAY=(IDATE-IMO*10000)/100                               001110
                IYR=IDATE-10000*IMO-100*IDAY                             001120
                PRINT 1002                                               001130
105             PRINT 1024,M10,ITEST,IMO,IDAY,IYR,ITIME                  001140
                IMO1=IMO                                                 001150
                IDAY1=IDAY                                               001160
                IYR1=IYR                                                 001170
                ITIME1=ITIME                                             001180
110             PRINT 1006                                               001190
                PRINT 1000                                               001200
                DO 400 I=1,NP                                            001210
                K=KP(I)                                                  001220
                ZP(I)=X(K)                                               001230
```

203002

```
      PRINT 1010,K,X(K)
  400 CONTINUE
      DO 500 I=1,NDP
      K=KDP(I)
      ZDP(I)=X(K)
      PRINT 1010,K,X(K)
  500 CONTINUE
 1000 FORMAT(10X,*SCR NO.*,10X,*CELL ZERO*,/)
 1010 FORMAT(13X,I2,13X,F7.3)
 1002 FORMAT(2X,*CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM*,/)
 1006 FORMAT(2X,*PRESSURE AND DP CELL ZERO SHIFTS*,/)
      PRINT 1599
 1599 FORMAT(////////////////)
      IF(M11.EQ.1) GOTO 1
      IF(M11.EQ.2) GOTO 2
C
C
C  CALCULATE COLD GD CONSTANTS AND UPDATE TAPE4
      PRINT 1002
      PRINT 1012
      DO 603 L1=1,4
      L=L1+14
      REWIND L
      READ(L,51) TEST
      READ(L,*) ITEST
      READ(L,*) ILAB
      READ(L,*) IWFLO,IFLOW
      READ(L,*) ISFLC,IFLCS
      READ(L,*) P,VF,C,PSD
      READ(L,*) PABS,TBAR
      P3=PABS
      PABS=(1.-.000622*(TBAR-22))*PABS
      PABS=PABS*(.9999924-1.811241E-4*TBAR+2.075103E-8*TBAR*TBAR)
      PABS=PABS-.2
      PABS=.01933676l7*PABS
      P=P+PABS
      DO 1351 IJ=1,5
      READ(L,1161) XTM
      READ(L,1161) DQ2
      READ(L,1161) DQ4
      READ(L,1161) DQ3
      READ(L,1161) DQ5
 1161 FORMAT(A10)
      DO 1401 I=1,14
      IF(I.GT.1)  GO TO 1301
      READ(L,1251) ZER,R(1,IJ),R(2,IJ),R(3,IJ),R(4,IJ)
 1251 FORMAT(5F9.6)
      J=5
      MJ=J+4
      GO TO 1401
 1301 READ(L,1251) (R(K,IJ),K=J,MJ)
      J=MJ+1
      MJ=J+4
 1401 CONTINUE
      ZER=ZER*1000.
      DO 1501 I=1,N
      R(I,IJ)=R(I,IJ)*1000.-ZER
```

```
            X(I)=0.                                                             001810
      1501  CONTINUE                                                            001820
      1351  CONTINUE                                                            001830
            DO 2001 IJ=1,5                                                      001840
            DO 2101 I=1,N                                                       001850
            X(I)=X(I)+R(I,IJ)                                                   001860
      2101  CONTINUE                                                            001870
      2001  CONTINUE                                                            001880
            DO 3001 J=1,N                                                       001890
            Y(L1,J)=X(J)/5.                                                     001900
      3001  CONTINUE                                                            001910
            DATA PAC/-1.8533063273E+1,3.8918344612E+1,1.6645154356E-2,          001920
           *-7.8702374448E-5,2.2835785557E-7,-3.5700231258E-10,                 001930
           *2.9932909136E-13,-1.2849848798E-16,2.2239574336E-20/                001940
            T3=Y(L1,13)/10.                                                     001950
            IF(T3.LT.-2.65) GOTO 192                                            001960
            IF(T3.GT.20.) GOTO 192                                              001970
            EI=1000.*(T3+2.6621)                                                001980
            T3=.0242*EI                                                         001990
       178  T=1.                                                                002000
            EL=0.                                                               002010
            DO 183 J=1,9                                                        002020
            EL=EL+PAC(J)*T                                                      002030
            T=T*T3                                                              002040
       183  CONTINUE                                                            002050
            EL=EL+125.*EXP(-.5*((((T3-127.)/65.)**2)))                          002060
            IF(ABS(EI-EL).LT.1.) GOTO 188                                       002070
            T3=T3+.0242*(EI-EL)                                                 002080
            GOTO 178                                                            002090
       188  T3=T3*9./5.+32.                                                     002100
       192  CONTINUE                                                            002110
            DO 602 I=1,NP                                                       002120
            K=KP(I)                                                             002130
            Y(L1,K)=Y(L1,K)-ZP(I)                                               002140
       602  CONTINUE                                                            002150
            M=56                                                                002160
            T2=C(2,M)+C(3,M)*(Y(L1,M)-C(1,M))+C(4,M)*((Y(L1,M)-C(1,M))**2)      002170
            T2=(T2*9./5.)+32.                                                   002180
            IF(ITEST.LT.1223.OR.ITEST.GT.1351) GOTO 4971                        002190
            T1=T3                                                               002200
            GOTO41111                                                           002210
      4971  M=55                                                                002220
            T1=C(2,M)+C(3,M)*(Y(L1,M)-C(1,M))+C(4,M)*((Y(L1,M)-C(1,M))**2)      002230
            T1=(T1*9./5.)+32.                                                   002240
     41111  T4=ABS(T1-T2)                                                       002242
            IF(T4.GT.25.) T2=T1                                                 002243
            PRINT 1606,T1,T2                                                    002245
      1606  FORMAT(/,6X,*T1 = *,F6.0,* T2 = *,F6.0,/)                           002247
            IF(L1.LT.3)GO TO 600                                                002250
            V1=1./(VPT1(P,T1)*1728)                                             002260
            V2=1./(VPT1(P,T2)*1728)                                             002270
            P1=C(1,5)*V1+C(2,5)+C(3,5)*Y(L1,5)+C(4,5)*Y(L1,5)**2                002280
            P2=C(1,6)*V2+C(2,6)+C(3,6)*Y(L1,6)+C(4,6)*Y(L1,6)**2                002290
            P1=P1+PABS                                                          002300
            P2=P2+PABS                                                          002310
            V1=1./(VPT1(P1,T1)*1728)                                            002320
            V2=1./(VPT1(P2,T2)*1728)                                            002330
```

```
      P1=C(1,5)*V1+C(2,5)+C(3,5)*Y(L1,5)+C(4,5)*Y(L1,5)**2                  002340
230   P2=C(1,6)*V1+C(2,6)+C(3,6)*Y(L1,6)+C(4,6)*Y(L1,6)**2                  002350
      P1=P1+PABS                                                            002360
      P2=P2+PABS                                                            002370
      PRINT 1605,P1,T1,P2,T2                                                002372
 1605 FORMAT(/,6X,*P1 = *,F6.0,* T1 = *,F6.0,* P2 = *,F6.0,* T2 = *,F6.0002374
     *,/)                                                                   002375
235   DO 601 J=1,3                                                          002380
      J1=14+J                                                               002390
      J2=17+J                                                               002400
      J3=33+J                                                               002410
240   S(L1,J1)=1./VPT1(P1,T1)                                               002420
      S(L1,J2)=1./VPT1(P2,T2)                                               002430
      S(L1,J3)=S(L1,J1)                                                     002440
 601  CONTINUE                                                              002450
      GO TO 606                                                             002460
245   600 CONTINUE                                                          002470
      DO 604 J=1,3                                                          002480
      J1=14+J                                                               002490
      J2=17+J                                                               002500
      J3=33+J                                                               002510
250   S(L1,J1)=.692*.0001138*P3/(1+.0022385*T1)                             002520
      S(L1,J2)=.692*.0001138*P3/(1+.0022385*T2)                             002530
      S(L1,J3)=S(L1,J1)                                                     002540
 604  CONTINUE                                                              002550
 606  CONTINUE                                                              002560
255   ITIME=ILAB/1000000                                                    002570
      IDATE=ILAB-ITIME*1000000                                              002580
      IMO=IDATE/10000                                                       002590
      IDAY=(IDATE-IMO*10000)/100                                            002600
      IYR=IDATE-10000*IMO-100*IDAY                                          002610
260   PRINT 1024,L,ITEST,IMO,IDAY,IYR,ITIME                                 002620
 603  CONTINUE                                                              002630
      PRINT 4014                                                            002640
      PRINT 3021                                                            002650
      DO 3022 I=1,NGD                                                       002660
265   K=KGD(I)                                                              002670
      PRINT 3023,K,S(1,K),S(2,K),S(3,K),S(4,K)                              002680
 3022 CONTINUE                                                              002690
      PRINT 4017                                                            002700
 3021 FORMAT(5X,*SCR*,6X,*TAPE15*,4X,*TAPE16*,4X,*TAPE17*,4X,*TAPE18*,//002710
     *)                                                                     002720
270   3023 FORMAT(5X,I3,2X,4F10.3)                                          002730
      PRINT 1014                                                            002740
      DO 2303 I=1,NGD                                                       002750
      K=KGD(I)                                                              002760
275   IF(K.GT.25)GOTO 605                                                   002770
      V=Y(1,K)*Y(4,K)-Y(2,K)*Y(3,K)                                         002780
      V2=Y(1,K)-Y(2,K)-Y(3,K)+Y(4,K)                                        002790
      C(3,K)=V/V2                                                           002800
      C(2,K)=ALOG((Y(1,K)-C(3,K))/(Y(3,K)-C(3,K)))/(S(3,K)-S(1,K))          002810
280   C(1,K)=C(2,K)*S(3,K)+ALOG(Y(3,K)-C(3,K))                              002820
      C(4,K)=ALOG((Y(3,K)-C(3,K))/(Y(4,K)-C(3,K)))/C(2,K)                   002830
      GOTO 2301                                                             002840
 605  CONTINUE                                                              002850
      V3=EXP(C(2,K)*(S(3,K)-S(1,K)))                                        002860
285   C(3,K)=(V3*Y(3,K)-Y(1,K))/(V3-1)                                      002870
```

```
      C(1,K)=C(2,K)*S(3,K)+ALOG(Y(3,K)-C(3,K))                          002880
    2301  PRINT 1016,K,C(1,K),C(2,K),C(3,K),C(4,K)                      002890
    2303  CONTINUE                                                       002900
    2302  CONTINUE                                                       002910
290 1024  FORMAT(4X,*TAPE*,I2,* IS TEST *,I4,*   DATA *,I2,*/*,I2,*/*,I2,002920
     **   TIME*,I5,//)                                                  002930
    1012  FORMAT(/,2X,*AIR-WATER CALIBRATION FOR GAMMA DENSITOMETERS*,/) 002940
    1014  FORMAT(2X,*SCR NO.*,6X,*C(1,K)*,8X,*C(2,K)*,8X,*C(3,K)*,8X,    002950
     **C(4,K)*,/)                                                       002960
295 1016  FORMAT(5X,I2,4X,E13.6,1X,E13.6,1X,E13.6,1X,E13.6)              002970
      PRINT 4017                                                        002980
    1598  FORMAT(///////////////)                                       002990
      PRINT 1511                                                        003000
    1511  FORMAT(5X,*RECALCULATED BASE DENSITIES*,/)                    003010
300   PRINT 1502                                                        003020
    1502  FORMAT(5X,*SCR*,4X,*TAPE15*,2X,*TAPE16*,2X,*TAPE17*,2X,*TAPE18*,/)003030
      DO 1503 I=1,NGD                                                   003040
      K=KGD(I)                                                          003050
      DO 1504 J=1,4                                                     003070
305   D(J,I)=(C(1,K)-ALOG(Y(J,K)-C(3,K)))/C(2,K)                        003080
    1504  CONTINUE                                                      003090
      D(2,I)=D(2,I)-C(4,K)                                              003100
      D(4,I)=D(4,I)-C(4,K)                                              003110
      PRINT 1505,K,D(1,I),D(2,I),D(3,I),D(4,I)                          003120
310   1503  CONTINUE                                                    003130
    1505  FORMAT(5X,I3,2X,4F8.3)                                        003140
    C   SETUP VOLTAGES AND DENSITIES FOR AECL BASE CAL                 003150
      DO 2310 I=34,36                                                   003160
      S(4,I)=S(3,I)                                                     003170
315   S(3,I)=S(1,I)                                                     003180
      Y(4,I)=Y(3,I)                                                     003190
      Y(3,I)=Y(1,I)                                                     003200
    2310  CONTINUE                                                      003210
      PRINT 1598                                                        003220
320   1506  FORMAT(1X,//////////)                                       003230
      IF(M11.EQ.3) GOTO 1                                               003240
      WRITE(19,6001) ITEST1,IMO1,IDAY1,IYR1,ITIME1                      003250
      WRITE(19,6002) NTCA,(KCA(I),I=1,NTCA)                             003260
      WRITE(19,6003) NP,(KP(I),I=1,NP)                                  003270
325   WRITE(19,6004) NDP,(KDP(I),I=1,NDP)                               003280
      WRITE(19,6005) NRTD,(KRTD(I),I=1,NRTD)                            003290
      WRITE(19,6006) NTM,(KTM(I),I=1,NTM)                               003300
      WRITE(19,6007) NDD,(KDD(I),I=1,NDD)                               003310
      WRITE(19,6008) NT,(KT(I),I=1,NT)                                  003320
330   WRITE(19,6009) NSM,(KSM(I),I=1,NSM)                               003330
      WRITE(19,6010) NGD,(KGD(I),I=1,NGD)                               003340
      WRITE(19,6011) (KFP(I),I=1,7)                                     003350
      WRITE(19,6012) (ZP(I),I=1,NP)                                     003360
      WRITE(19,6012) (ZDP(I),I=1,9)                                     003370
335   WRITE(19,6012) (ZDP(I),I=10,18)                                   003380
      IF (NDP.EQ.19) WRITE(19,6013) ZDP(19)                             003390
      WRITE(19,6014) (ZTM(I),I=1,NTM)                                   003400
      WRITE(19,6015) (ZDD(I),I=1,NDD)                                   003410
      WRITE(19,6015) (ZT(I),I=1,NT)                                     003420
340   WRITE(19,6016) (ZSM(I),I=1,NSM),ZMF                               003430
      IF(NDATE.LT.567) GOTO 771                                         003440
      WRITE(19,6017) (ZGD(I),I=1,6)                                     003450
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      WRITE(19,6018) (ZGD(I),I=7,9)                                    003460
  771 CONTINUE                                                         003470
345   N=68                                                             003480
      IF (NDP.EQ.19) N=69                                              003490
      DO 701 I=1,N                                                     003500
      WRITE(19,6019) (C(J,I),J=1,4)                                    003510
      WRITE(19,6020) (C(J,I),J=5,7)                                    003520
350   701 CONTINUE                                                     003530
 6001 FORMAT(*ZERO*,I4,1X,I2,*/*,I2,*/*,I2,I5)                        003540
 6002 FORMAT(7X,I2,13I3)                                              003550
 6003 FORMAT(7X,I2,9I3)                                               003560
 6004 FORMAT(7X,I2,1SI3)                                              003570
355  6005 FORMAT (7X,I2,6I3)                                          003580
 6006 FORMAT(7X,I2,1I3)                                               003590
 6007 FORMAT(7X,I2,4I3)                                               003600
 6008 FORMAT(7X,I2,4I3)                                               003610
 6009 FORMAT(7X,I2,1I3)                                               003620
360  6010 FORMAT(7X,I2,9I3)                                           003630
 6011 FORMAT(7X,I2,6I3)                                               003640
 6012 FORMAT(3X,9F7.3)                                                003650
 6013 FORMAT(3X,F7.3)                                                 003660
 6014 FORMAT(2X,F6.3)                                                 003670
365  6015 FORMAT(1X,4F7.3)                                            003680
 6016 FORMAT(1X,2F7.3)                                                003690
 6017 FORMAT(6E12.6)                                                  003700
 6018 FORMAT(3F4.1)                                                   003710
 6019 FORMAT(7X,4E13.6)                                               003720
370  6020 FORMAT(2X,3E13.6)                                           003730
      C                                                               003740
      C   PRE-BLOWDOWN P AND DP ZEROES                               003750
        M10=5                                                         003760
        REWIND 5                                                      003770
375     READ(5,51) TEST                                               003780
        READ(5,*) ITEST                                               003790
        ITEST1=ITEST                                                  003800
        READ(5,*) ILAB                                                003810
        READ(5,*) IWFLO,IFLOW                                         003820
380     READ(5,*) ISFLC,IFLOS                                         003830
        READ(5,*) P,VF,Q,PSD                                          003840
        READ(5,*) PABS,TBAR                                           003850
        DO 1135 IJ=1,5                                                003860
        READ(5,117) TM,TM1                                            003870
385     READ(5,116) DQ2                                               003880
        READ(5,116) DQ4                                               003890
        READ(5,116) DQ3                                               003900
        READ(5,116) DQ5                                               003910
        DO 1140 I=1,14                                                003920
390     IF(I.GT.1)  GO TO 1130                                        003930
        READ(5,125) ZER,R(1,IJ),R(2,IJ),R(3,IJ),R(4,IJ)               003940
        J=5                                                           003950
        MJ=J+4                                                        003960
        GO TO 1140                                                    003970
395  1130  READ(5,125) (R(K,IJ),K=J,MJ)                               003980
        J=MJ+1                                                        003990
        MJ=J+4                                                        004000
 1140 CONTINUE                                                        004010
        ZER=ZER*1000.                                                 004020
```

```
400               DO 1150 I=1,N                                          004030
                  R(I,IJ)=R(I,IJ)*1000.-ZER                              004040
                  X(I)=0.                                                004050
             1150  CONTINUE                                              004060
             1135  CONTINUE                                              004070
405               DO 1200 IJ=1,5                                         004080
                  DO 1210 I=1,N                                          004090
                  X(I)=X(I)+R(I,IJ)                                      004100
             1210  CONTINUE                                              004110
             1200  CONTINUE                                              004120
410               DO 1300 J=1,N                                          004130
                  X(J)=X(J)/5.                                           004140
             1300  CONTINUE                                              004150
                  ITIME=ILAB/1000000                                     004160
                  IDATE=ILAB-ITIME*1000000                               004170
415               IMO=IDATE/10000                                        004180
                  IDAY=(IDATE-IMO*10000)/100                             004190
                  IYR=IDATE-10000*IMO-100*IDAY                           004200
                  PRINT 1002                                             004210
                  PRINT 1024,M10,ITEST,IMO,IDAY,IYR,ITIME                004220
420               IMO1=IMO                                               004230
                  IDAY1=IDAY                                             004240
                  IYR1=IYR                                               004250
                  ITIME1=ITIME                                           004260
                  PRINT 1006                                             004270
425               PRINT 105                                              004280
                  PRINT 1000                                             004290
                  DO 1400 I=1,NP                                         004300
                  K=KP(I)                                                004310
                  ZP(I)=X(K)                                             004320
430               PRINT 1010,K,X(K)                                      004330
             1400  CONTINUE                                              004340
                  DO 1500 I=1,NDP                                        004350
                  K=KDP(I)                                               004360
                  ZDP(I)=X(K)                                            004370
435               PRINT 1010,K,X(K)                                      004380
             1500  CONTINUE                                              004390
                  PRINT 1600                                             004400
             1600  FORMAT(////////////////////////////)                   004410
                  C                                                      004420
440               C                                                      004430
                  C  UPDATE M.I. GD CONSTANTS WITH HOT PRE-BLOWDOWN GD CHECK 004440
                      REWIND 12                                          004450
                      REWIND 13                                          004460
                      REWIND 14                                          004470
445                   PRINT 1002                                         004480
                      PRINT 4012                                         004490
                      DO 4603 L1=1,3                                     004500
                      L=L1+11                                            004510
                      READ(L,51) TEST                                    004520
450                   READ(L,*) ITEST                                    004530
                      READ(L,*) ILAB                                     004540
                      READ(L,*) IWFLO,IFLOW                              004550
                      READ(L,*) ISFLO,IFLOS                              004560
                      READ(L,*) P,VF,Q,PSD                               004570
455                   READ(L,*) PABS,TBAR                                004580
                      P3=PABS                                            004590
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203008

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                PABS=(1.-.000622*(TBAR-22))*PABS                                  004600
                PABS=PABS*(.9999924-1.811241E-4*TBAR+2.075103E-8*TBAR*TBAR)       004610
                PABS=PABS-.2                                                      004620
460             PABS=.0193367617*PABS                                             004630
                P=P+PABS                                                          004640
                DO 4135 IJ=1,5                                                    004650
                READ(L,4116) XTM                                                  004660
                IF(L1.GT.1) GOTO 4650                                             004670
465             IF(IJ.GT.1) GOTO 4650                                             004680
                ITN=ITEST                                                         004690
                XTT=XTM                                                           004700
           4650 READ(L,4116) DQ2                                                  004710
                READ(L,4116) DQ4                                                  004720
470             READ(L,4116) DQ3                                                  004730
                READ(L,4116) DQ5                                                  004740
           4116 FORMAT(A10)                                                       004750
                DO 4140 I=1,14                                                    004760
                IF(I.GT.1)  GO TO 4130                                            004770
475             READ(L,4125) ZER,R(1,IJ),R(2,IJ),R(3,IJ),R(4,IJ)                  004780
           4125 FORMAT(5F9.6)                                                     004790
                J=5                                                               004800
                MJ=J+4                                                            004810
                GO TO 4140                                                        004820
480        4130 READ(L,125) (R(K,IJ),K=J,MJ)                                      004830
                J=MJ+1                                                            004840
                MJ=J+4                                                            004850
           4140 CONTINUE                                                          004860
                ZER=ZER*1000.                                                     004870
485             DO 4150 I=1,N                                                     004880
                R(I,IJ)=R(I,IJ)*1000.-ZER                                         004890
                X(I)=0.                                                           004900
           4150 CONTINUE                                                          004910
           4135 CONTINUE                                                          004920
490             DO 4200 IJ=1,5                                                    004930
                DO 4210 I=1,N                                                     004940
                X(I)=X(I)+R(I,IJ)                                                 004950
           4210 CONTINUE                                                          004960
           4200 CONTINUE                                                          004970
495             DO 4300 J=1,N                                                     004980
                IF(L1.LT.3) GOTO 4290                                             004990
                IF(J.GT.33.AND.J.LT.37) GOTO 4300                                 005000
           4290 Y(L1,J)=X(J)/5.                                                   005010
           4300 CONTINUE                                                          005020
500             T3=Y(L1,13)/10.                                                   005030
                IF(T3.LT.-2.65) GOTO 292                                          005040
                IF(T3.GT.20.) GOTO 292                                            005050
                EI=1000*(T3+2.6621)                                               005060
                T3=.0242*EI                                                       005070
505        278  T=1.                                                            005080
                EL=0.                                                             005090
                DO 283 J=1,9                                                      005100
                EL=EL+PAC(J)*T                                                    005110
                T=T*T3                                                            005120
510        283  CONTINUE                                                        005130
                EL=EL+125.*EXP(-.5*((((T3-127.)/65.)**2)))                        005140
                IF(ABS(EI-EL).LT.1.) GOTO 288                                     005150
                T3=T3+.0242*(EI-EL)                                               005160
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                GOTO 278                                                        005170
515       288   T3=T3*9./5.+32.                                                 005180
          292   CONTINUE                                                        005190
                DO 4602 I=1,NP                                                  005200
                K=KP(I)                                                         005210
                Y(L1,K)=Y(L1,K)-ZP(I)                                           005220
520       4602  CONTINUE                                                        005230
                M=56                                                            005240
                T2=C(2,M)+C(3,M)*(Y(L1,M)-C(1,M))+C(4,M)*((Y(L1,M)-C(1,M))**2)  005250
                T2=(T2*9./5.)+32.                                               005260
                IF(ITEST.LT.1223.OR.ITEST.GT.1351) GOTO 4970                    005270
525             T1=T3                                                           005280
                GOTO 41000                                                      005290
          4970  M=55                                                            005300
                T1=C(2,M)+C(3,M)*(Y(L1,M)-C(1,M))+C(4,M)*((Y(L1,M)-C(1,M))**2)  005310
                T1=(T1*9./5.)+32.                                               005320
530       41000 T4=ABS(T1-T2)                                                   005322
                IF(T4.GT.25.) T2=T1                                             005323
                PRINT 1606,T1,T2                                                005325
                V1=1./(VPT1(P,T1)*1728)                                         005330
                V2=1./(VPT1(P,T2)*1728)                                         005340
535             P1=C(1,5)*V1+C(2,5)+C(3,5)*Y(L1,5)+C(4,5)*Y(L1,5)**2            005350
                P2=C(1,6)*V2+C(2,6)+C(3,6)*Y(L1,6)+C(4,6)*Y(L1,6)**2            005360
                P1=P1+PABS                                                      005370
                P2=P2+PABS                                                      005380
                V1=1./(VPT1(P1,T1)*1728)                                        005390
540             V2=1./(VPT1(P2,T2)*1728)                                        005400
                P1=C(1,5)*V1+C(2,5)+C(3,5)*Y(L1,5)+C(4,5)*Y(L1,5)**2            005410
                P2=C(1,6)*V2+C(2,6)+C(3,6)*Y(L1,6)+C(4,6)*Y(L1,6)**2            005420
                P1=P1+PABS                                                      005430
                P2=P2+PABS                                                      005440
545             PRINT 1605,P1,T1,P2,T2                                          005442
                DO 4601 J=1,3                                                   005450
                J1=14+J                                                         005460
                J2=17+J                                                         005470
                J3=33+J                                                         005480
550             IF(L1.EQ.2) GOTO 41160                                          005490
                IF(L1.EQ.3) GOTO  41180                                         005500
                S(L1,J1)=1/VPT2(P1,T1)                                          005510
                S(L1,J2)=1/VPT2(P2,T2)                                          005520
                S(L1,J3)=S(L1,J1)                                               005530
555             GOTO 4601                                                       005540
          41160 S(L1,J1)=1./VPT1(P1,T1)                                         005550
                S(L1,J2)=1./VPT1(P2,T2)                                         005560
                S(L1,J3)=S(L1,J1)                                               005570
                GOTO 4601                                                       005580
560       41180 S(L1,J1)=1./VPT1(P1,T1)+C(4,J1)                                 005590
                S(L1,J2)=1./VPT1(P2,T2)+C(4,J2)                                 005600
          4601  CONTINUE                                                        005610
                ITIME=ILAB/1000000                                              005620
                IDATE=ILAB-ITIME*1000000                                        005630
565             IMO=IDATE/10000                                                 005640
                IDAY=(IDATE-IMO*10000)/100                                      005650
                IYR=IDATE-10000*IMO-100*IDAY                                    005660
                PRINT 1024,L,ITEST,IMO,IDAY,IYR,ITIME                           005670
          4603  CONTINUE                                                        005680
570             PRINT 4013,XTT,1TN                                              005690
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                PRINT 4019                                                      005700
                PRINT 4021                                                      005710
                DO 41400 I=1,NGD                                                005720
                K=KGD(I)                                                        005730
575             IF(K.GT.25) GOTO 41400                                          005740
                M13=0                                                           005750
                PRINT 4022,K,S(1,K),S(2,K),S(3,K),Y(1,K),Y(2,K),Y(3,K)          005760
            41400 CONTINUE                                                      005770
                PRINT 4017                                                      005780
580         4021  FORMAT(5X,*SCR*,2X,2(2X,*TAPE12*,2X,*TAPE13*,2X,*TAPE14*),/)  005790
            4022  FORMAT(5X,I3,2X,6(1X,F7.3))                                   005800
                PRINT 4015                                                      005810
                DO 4230 I=1,NGD                                                 005820
                K=KGD(I)                                                        005830
585             IF(K.GT.25) GOTO 4230                                           005840
                P1=1                                                            005850
                P2=-Y(3,K)+.00001                                               005860
                M6=1                                                            005870
                M7=1001                                                         005880
590             DO 41780 M8=1,10                                                005890
                DO 41781 M9=M6,M7                                               005900
                T=P2+(M9-1)*P1                                                  005910
                F1=(S(2,K)-S(1,K))/ALOG((Y(2,K)+T)/(Y(1,K)+T))                  005920
                F2=C(4,K)/ALOG((Y(3,K)+T)/(Y(2,K)+T))                           005930
595             F3=(S(1,K)-S(3,K))/ALOG((Y(1,K)+T)/(Y(3,K)+T))                  005940
                F4=(F1+F2+F3)/3                                                 005950
                F5=SQRT((F1-F4)**2+(F2-F4)**2+(F3-F4)**2)/3)                    005960
                IF(M9.LT.2) GOTO 41782                                          005970
                IF(F5.LT.A6) GOTO 41782                                         005980
600             M1=M9-2                                                         005990
                GOTO 41785                                                      006000
            41782 A6=F5                                                         006010
            41781 CONTINUE                                                      006020
            41785 P2=P2+M1*P1                                                   006030
605             M13=M13+M1                                                      006040
                P1=P1/10                                                        006050
                M7=20                                                           006060
                M6=1                                                            006070
            41780 CONTINUE                                                      006080
610             C(3,K)=-P2                                                      006090
                IF(M13.EQ.0.OR.M13.GT.950) C(3,K)=0.                            006100
                C(2,K)=-1./F4                                                   006110
                IF(M13.EQ.0.OR.M13.GT.950) C(2,K)=ALOG(Y(1,K)/Y(2,K))/(S(2,K)-S(1,006120
               *K))                                                             006130
615             C(1,K)=C(2,K)*S(2,K)+ALOG(Y(2,K)-C(3,K))                        006140
                PRINT 4016,K,C(1,K),C(2,K),C(3,K),C(4,K)                        006150
            4230  CONTINUE                                                      006160
            4012  FORMAT(/,2X,*PRE-BLOWDOWN UPDATE FOR M.I. GAMMA DENSITOMETERS*,/) 006170
            4013  FORMAT(5X,*START OF TAPE12 IS *,A10,* IN BLO*,I4,//)          006180
620         4014  FORMAT(5X,*BASE DENSITIES (LB/FT3)*,/)                        006190
            4015  FORMAT(3X,*SCR NO.*,5X,*C(1,K)*,8X,*C(2,K)*,8X,*C(3,K)*,      006200
                 *8X,*C(4,K)*,///)                                              006210
            4016  FORMAT(5X,I3,3X,E13.6,1X,E13.6,1X,E13.6,1X,E13.6)             006220
            4017  FORMAT(/)                                                     006230
625         4019  FORMAT(11X,*BASE DENSITIES (LB/FT3)*,10X,*MILLIVOLTS*,/)     006240
                PRINT 4017                                                      006250
                PRINT 1511                                                      006260
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                PRINT 4017                                                      006270
                PRINT 5013                                                      006280
630       5013  FORMAT(5X,*SCR*,4X,*TAPE12*,2X,*TAPE13*,2X,*TAPE14*,/)         006290
                DO 6503 I=1,NGD                                                 006300
                K=KGD(I)                                                        006310
                IF(K.GT.25) GOTO 6503                                           006320
                DO 6504 J=1,3                                                   006330
635             D(J,I)=(C(1,K)-ALOG(Y(J,K)-C(3,K)))/C(2,K)                      006340
          6504  CONTINUE                                                        006350
                PRINT 6505,K,D(1,I),D(2,I),D(3,I)                               006360
          6505  FORMAT(5X,I3,2X,3F8.3)                                          006370
          6503  CONTINUE                                                        006380
640             PRINT 1598                                                      006390
                PRINT 1601                                                      006400
          1601  FORMAT(//////////)                                              006410
                PRINT 1002                                                      006420
                PRINT 1602                                                      006430
645       1602  FORMAT(/,2X,*PRE-BLOWDOWN UPDATE FOR AECL GAMMA DENSITOMETERS*,/) 006440
                PRINT 4019                                                      006450
                PRINT 6521                                                      006460
                DO 6540  I=1,NGD                                                006470
                K=KGD(I)                                                        006480
650             IF(K.LT.25) GOTO 6540                                           006490
                PRINT 6522,K,S(1,K),S(2,K),S(3,K),S(4,K),Y(1,K),Y(2,K),Y(3,K),Y(4,006500
               *K)                                                              006510
          6540  CONTINUE                                                        006520
                PRINT 4017                                                      006530
655       6521  FORMAT(5X,*SCR*,2X,2(2X,*TAPE12*,2X,*TAPE13*,2X,*TAPE15*,2X,*TAPE1006540
               *7*),/)                                                          006550
          6522  FORMAT(5X,I3,2X,8(1X,F7.3))                                     006560
                PRINT 4015                                                      006570
                DO 6530 I=1,NGD                                                 006580
660             K=KGD(I)                                                        006590
                IF(K.LT.25) GOTO 6530                                           006600
                M13=0                                                           006610
                P1=1                                                            006620
                P2=-Y(4,K)+.00001                                               006630
665             M6=1                                                            006640
                M7=1001                                                         006650
                DO 6580  M8=1,10                                                006660
                DO 6581  M9=M6,M7                                               006670
                T=P2+(M9-1)*P1                                                  006680
670             F1=ALOG((Y(3,K)+T)/(Y(4,K)+T))/(S(4,K)-S(3,K))                  006690
                F2=ALOG((Y(1,K)+T)/(Y(2,K)+T))/(S(2,K)-S(1,K))                  006700
                F4=(F1+F2)/2.                                                   006710
                F5=SQRT((F1-F4)**2+(F2-F4)**2)                                  006720
                IF(M9.LT.2) GOTO 6582                                           006730
675             IF(F5.LT.A6) GOTO 6582                                          006740
                M1=M9-2                                                         006750
                GOTO 6585                                                       006760
          6582  A6=F5                                                           006770
          6581  CONTINUE                                                        006780
680       6585  P2=P2+M1*P1                                                     006790
                M13=M13+M1                                                      006800
                P1=P1/10                                                        006810
                M7=20                                                           006820
                M6=1                                                            006830
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203012

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                6580  CONTINUE                                                        006840
                      C(3,K)=-P2                                                      006850
                      IF(M13.EQ.0.OR.M13.GT.950) C(3,K)=0.                            006860
                      C(2,K)=F4                                                       006870
                      IF(M13.EQ.0.OR.M13.GT.950) C(2,K)=ALOG(Y(1,K)/Y(2,K))/(S(2,K)-S(1,006880
685                  *K))                                                            006890
                      C(1,K)=C(2,K)*S(2,K)+ALOG(Y(2,K)-C(3,K))                        006900
                      PRINT 4016,K,C(1,K),C(2,K),C(3,K),C(4,K)                        006910
                6530  CONTINUE                                                        006920
                      PRINT 1511                                                      006930
690                   PRINT 6502                                                      006940
                6502  FORMAT(5X,*SCR*,4X,*TAPE12*,2X,*TAPE13*,2X,*TAPE15*,2X,*TAPE17*,/)006950
                      DO 6563 I=1,NGD                                                 006960
                      K=KGD(I)                                                        006970
                      IF(K.LT.25) GOTO 6563                                           006980
695                   DO 6564 J=1,4                                                   006990
                      IF(J.LT.3) GOTO 6565                                            007000
                      D(J,I)=(C(2,K)*S(4,K)+ALOG(Y(4,K)-C(3,K))-ALOG(Y(J,K)-C(3,K)))/C(2007010
                     *,K)                                                             007020
                      GOTO 6564                                                       007030
700             6565  D(J,I)=(C(1,K)-ALOG(Y(J,K)-C(3,K)))/C(2,K)                      007040
                6564  CONTINUE                                                        007050
                      PRINT 1505,K,D(1,I),D(2,I),D(3,I),D(4,I)                        007060
                6563  CONTINUE                                                        007070
                      GOTO 1                                                          007080
705             2     CONTINUE                                                        007090
                C                                                                     007100
                C  UPDATE GD CONSTANTS WITH HOT GD CHECK                              007110
                C  USE AVG 2                                                          007120
                      REWIND 13                                                       007130
710                   REWIND 14                                                       007140
                      PRINT 1002                                                      007150
                      PRINT 5012                                                      007160
                      DO 5603 L1=1,2                                                  007170
                      L=L1+12                                                         007180
715                   READ(L,51) TEST                                                 007190
                      READ(L,*) ITEST                                                 007200
                      READ(L,*) ILAB                                                  007210
                      READ(L,*) IWFLG,IFLOW                                           007220
                      READ(L,*) ISFLG,IFLOS                                           007230
720                   READ(L,*) P,VF,G,PSD                                            007240
                      READ(L,*) PABS,TBAR                                             007250
                      P3=PABS                                                         007260
                      PABS=(1.-.000622*(TBAR-22))*PABS                                007270
                      PABS=PABS*(.9999924-1.811241E-4*TBAR+2.075103E-8*TBAR*TBAR)     007280
725                   PABS=PABS-.2                                                    007290
                      PABS=.0193367617*PABS                                           007300
                      P=P+PABS                                                        007310
                      DO 5135 IJ=1,5                                                  007320
                      READ(L,4116) XTM                                                007330
730                   IF(L1.GT.1) GOTO 5650                                           007340
                      IF(IJ.GT.1) GOTO 5650                                           007350
                      ITN=ITEST                                                       007360
                      XTT=XTM                                                         007370
                5650  READ(L,4116) DQ2                                                007380
735                   READ(L,4116) DQ4                                                007390
                      READ(L,4116) DQ3                                                007400
```

```
                READ(L,4116) DC5                                                  007410
                DO 5140 I=1,14                                                    007420
                IF(I.GT.1)  GO TO 5130                                            007430
745             READ(L,4125) ZER,R(1,IJ),R(2,IJ),R(3,IJ),R(4,IJ)                  007440
                J=5                                                               007450
                MJ=J+4                                                            007460
                GO TO 5140                                                        007470
          5130  READ(L,125) (R(K,IJ),K=J,MJ)                                      007480
750             J=MJ+1                                                            007490
                MJ=J+4                                                            007500
          5140  CONTINUE                                                          007510
                ZER=ZER*1000.                                                     007520
                DO 5150 I=1,N                                                     007530
755             R(I,IJ)=R(I,IJ)*1000.-ZER                                         007540
                X(I)=0.                                                           007550
          5150  CONTINUE                                                          007560
          5135  CONTINUE                                                          007570
                DO 5200 IJ=1,5                                                    007580
760             DO 5210 I=1,N                                                     007590
                X(I)=X(I)+R(I,IJ)                                                 007600
          5210  CONTINUE                                                          007610
          5200  CONTINUE                                                          007620
                DO 5300 J=1,N                                                     007630
765             Y(L1,J)=X(J)/5.                                                   007640
          5300  CONTINUE                                                          007650
                T3=Y(L1,13)/10.                                                   007660
                IF(T3.LT.-2.65) GOTO 592                                          007670
                IF(T3.GT.20.) GOTO 592                                            007680
770             EI=1000*(T3+2.6621)                                               007690
                T3=.0242*EI                                                       007700
          578   T=1.                                                              007710
                EL=0.                                                             007720
                DO 583 J=1,9                                                      007730
775             EL=EL+PAC(J)*T                                                    007740
                T=T*T3                                                            007750
          583   CONTINUE                                                          007760
                EL=EL+125.*EXP(-.5*((((T3-127.)/65.)**2)))                        007770
                IF(ABS(EI-EL).LT.1.) GOTO 588                                     007780
780             T3=T3+.0242*(EI-EL)                                               007790
                GOTO 578                                                          007800
          588   T3=T3*9./5.+32.                                                   007810
          592   CONTINUE                                                          007820
                DO 5602 I=1,NP                                                    007830
785             K=KP(I)                                                           007840
                Y(L1,K)=Y(L1,K)-ZP(I)                                             007850
          5602  CONTINUE                                                          007860
                M=56                                                              007870
                T2=C(2,M)+C(3,M)*(Y(L1,M)-C(1,M))+C(4,M)*((Y(L1,M)-C(1,M))**2)    007880
790             T2=(T2*9./5.)+32.                                                 007890
                IF(ITEST.LT.1223.OR.ITEST.GT.1351) GOTO 5970                      007900
                T1=T3                                                             007910
                GOTO 51000                                                        007920
          5970  M=55                                                              007930
795             T1=C(2,M)+C(3,M)*(Y(L1,M)-C(1,M))+C(4,M)*((Y(L1,M)-C(1,M))**2)    007940
                T1=(T1*9./5.)+32.                                                 007950
          51000 T4=ABS(T1-T2)                                                     007952
                IF(T4.GT.25.) T2=T1                                               007953
```

203014

```
                PRINT 1606,T1,T2                                                  007955
800             V1=1./(VPT1(P,T1)*1728)                                           007960
                V2=1./(VPT1(P,T2)*1728)                                           007970
                P1=C(1,5)*V1+C(2,5)+C(3,5)*Y(L1,5)+C(4,5)*Y(L1,5)**2              007980
                P2=C(1,6)*V2+C(2,6)+C(3,6)*Y(L1,6)+C(4,6)*Y(L1,6)**2              007990
                P1=P1+PABS                                                        008000
805             P2=P2+PABS                                                        008010
                V1=1./(VPT1(P1,T1)*1728)                                          008020
                V2=1./(VPT1(P2,T2)*1728)                                          008030
                P1=C(1,5)*V1+C(2,5)+C(3,5)*Y(L1,5)+C(4,5)*Y(L1,5)**2              008040
                P2=C(1,6)*V2+C(2,6)+C(3,6)*Y(L1,6)+C(4,6)*Y(L1,6)**2              008050
810             P1=P1+PABS                                                        008060
                P2=P2+PABS                                                        008070
                PRINT 1605,P1,T1,P2,T2                                            008072
                DO 5601 J=1,3                                                     008080
                J1=14+J                                                           008090
815             J2=17+J                                                           008100
                J3=33+J                                                           008110
                IF(L1.GT.1) GOTO 51160                                            008120
                S(L1,J1)=1/VPT1(P1,T1)                                            008130
                S(L1,J2)=1/VPT1(P2,T2)                                            008140
820             GOTO 51180                                                        008150
          51160 S(L1,J1)=1./VPT1(P1,T1)+C(4,J1)                                   008160
                S(L1,J2)=1./VPT1(P2,T2)+C(4,J2)                                   008170
          51180 S(L1,J3)=1./VPT1(P1,T1)                                           008180
           5601 CONTINUE                                                          008190
825             ITIME=ILAB/1000000                                                008200
                IDATE=ILAB-ITIME*1000000                                          008210
                IMO=IDATE/10000                                                   008220
                IDAY=(IDATE-IMO*10000)/100                                        008230
                IYR=IDATE-10000*IMO-100*IDAY                                      008240
830             PRINT 1024,L,ITEST,IMO,IDAY,IYR,ITIME                             008250
           5603 CONTINUE                                                          008260
                PRINT 4019                                                        008270
                PRINT 5021                                                        008280
                DO 51400 I=1,NGD                                                  008290
835             K=KGD(I)                                                          008300
                PRINT 5022,K,S(1,K),S(2,K),Y(1,K),Y(2,K)                          008310
          51400 CONTINUE                                                          008320
                PRINT 4017                                                        008330
           5021 FORMAT(5X,*SCR*,2X,2(2X,*TAPE13*,2X,*TAPE14*),/)                  008340
840        5022 FORMAT(5X,I3,2X,4(1X,F7.3))                                       008350
                PRINT 4015                                                        008360
                DO 5230 I=1,NGD                                                   008370
                K=KGD(I)                                                          008380
                IF(K.GT.30) GOTO 5220                                             008390
845             V4=EXP(C(2,K)*C(4,K))                                             008400
                C(3,K)=(Y(2,K)*V4-Y(1,K))/(V4-1)                                  008410
                C(1,K)=C(2,K)*S(1,K)+ALOG(Y(1,K)-C(3,K))                          008420
                GOTO 5225                                                         008430
           5220 C(1,K)=C(2,K)*S(1,K)+ALOG(Y(1,K)-C(3,K))                          008440
850        5225 PRINT 4016,K,C(1,K),C(2,K),C(3,K),C(4,K)                          008450
           5230 CONTINUE                                                          008460
           5012 FORMAT(/,2X,*HCT UPDATE FOR GAMMA CENSITOMETERS*,/)               008470
                PRINT 1511                                                        008480
                PRINT 7506                                                        008490
855             DO 7503 I=1,NGD                                                   008500
```

```
                      K=KGD(I)                                                  008510
                      DO 7504 J=1,2                                             008520
                      D(J,I)=(C(1,K)-ALOG(Y(J,K)-C(3,K)))/C(2,K)                008530
                7504  CONTINUE                                                  008540
  860                 PRINT 7507,K,D(1,1),D(2,I)                                008550
                7503  CONTINUE                                                  008560
                7506  FORMAT(5X,*SCR*,4X,*TAPE13*,2X,*TAPE14*,/)                008570
                7507  FORMAT(5X,I3,2X,2F8.3)                                    008580
                      PRINT 1506                                                008590
  865           1     CONTINUE                                                  008600
                      WRITE(20,6001) ITEST1,IMO1,IDAY1,IYR1,ITIME1              008610
                      WRITE(20,6002) NTCA,(KCA(I),I=1,NTCA)                     008620
                      WRITE(20,6003) NP,(KP(I),I=1,NP)                          008630
                      WRITE(20,6004) NDP,(KDP(I),I=1,NDP)                       008640
  870                 WRITE(20,6005) NRTD,(KRTD(I),I=1,NRTD)                    008650
                      WRITE(20,6006) NTM,(KTM(I),I=1,NTM)                       008660
                      WRITE(20,6007) NDD,(KDD(I),I=1,NDD)                       008670
                      WRITE(20,6008) NT,(KT(I),I=1,NT)                          008680
                      WRITE(20,6009) NSM,(KSM(I),I=1,NSM)                       008690
  875                 WRITE(20,6010) NGD,(KGD(I),I=1,NGD)                       008700
                      WRITE(20,6011) (KFP(I),I=1,7)                             008710
                      WRITE(20,6012) (ZP(I),I=1,NP)                             008720
                      WRITE(20,6012) (ZDP(I),I=1,9)                             008730
                      WRITE(20,6012) (ZDP(I),I=10,18)                           008740
  880                 IF (NDP.EQ.19) WRITE(20,6013) ZDP(19)                     008750
                      WRITE(20,6014) (ZTM(I),I=1,NTM)                           008760
                      WRITE(20,6015) (ZDD(I),I=1,NDD)                           008770
                      WRITE(20,6015) (ZT(I),I=1,NT)                             008780
                      WRITE(20,6016) (ZSM(I),I=1,NSM),ZMF                       008790
  885                 IF(NDATE.LT.567) GOTO 7711                                008800
                      WRITE(20,6017) (ZGD(I),I=1,6)                             008810
                      WRITE(20,6018) (ZGD(I),I=7,9)                             008820
                7711  CONTINUE                                                  008830
                      N=68                                                      008840
  890                 IF (NDP.EQ.19) N=69                                       008850
                      DO 7701 I=1,N                                             008860
                      WRITE(20,6019) (C(J,I),J=1,4)                             008870
                      WRITE(20,6020) (C(J,I),J=5,7)                             008880
                7701   CONTINUE                                                 008890
  895                 STOP                                                      008900
                      END                                                       008910
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
35174 ICCUP

VARIABLES	SN	TYPE	RELOCATION				
44321	A6	REAL		45657	C	REAL	ARRAY
46643	D	REAL	ARRAY	44240	DQ2	REAL	
44242	DQ3	REAL		44241	DQ4	REAL	
44243	DQ5	REAL		44265	EI	REAL	
44267	EL	REAL		44314	FI	REAL	

VARIABLES	SN	TYPE	RELOCATION				
44315	F2	REAL		44316	F3	REAL	
44317	F4	REAL		44320	F5	REAL	
44202	I	INTEGER		44250	IDATE	INTEGER	
44252	IDAY	INTEGER		44255	IDAY1	INTEGER	
44226	IFLOS	INTEGER		44224	IFLOW	INTEGER	
44235	IJ	INTEGER		44222	ILAB	INTEGER	
44251	IMO	INTEGER		44254	IMO1	INTEGER	
44225	ISFLO	INTEGER		44220	ITEST	INTEGER	
44221	ITEST1	INTEGER		44247	ITIME	INTEGER	
44257	ITIME1	INTEGER		44305	ITN	INTEGER	
44223	IWFLO	INTEGER		44253	IYR	INTEGER	
44256	IYR1	INTEGER		44215	J	INTEGER	
44300	J1	INTEGER		44301	J2	INTEGER	
44302	J3	INTEGER		44246	K	INTEGER	
45170	KCA	INTEGER	ARRAY	45323	KDD	INTEGER	ARRAY
45227	KDP	INTEGER	ARRAY	45443	KFP	INTEGER	ARRAY
45417	KGD	INTEGER	ARRAY	45214	KP	INTEGER	ARRAY
45253	KRTD	INTEGER	ARRAY	45373	KSM	INTEGER	ARRAY
45347	KT	INTEGER	ARRAY	45277	KTM	INTEGER	ARRAY
44261	L	INTEGER		44260	L1	INTEGER	
44270	M	INTEGER		44245	MJ	INTEGER	
44322	M1	INTEGER		44216	M10	INTEGER	
44176	M11	INTEGER		44307	M13	INTEGER	
44310	M6	INTEGER		44311	M7	INTEGER	
44312	M8	INTEGER		44313	M9	INTEGER	
44214	N	INTEGER		44200	NDATE	INTEGER	
44207	NDD	INTEGER		44204	NDP	INTEGER	
44212	NGD	INTEGER		44203	NP	INTEGER	
44205	NRTD	INTEGER		44211	NSM	INTEGER	
44210	NT	INTEGER		44201	NTCA	INTEGER	
44206	NTM	INTEGER		44227	P	REAL	
44233	PABS	REAL		47577	PAC	REAL	ARRAY
44232	PSD	REAL		44276	P1	REAL	
44277	P2	REAL		44262	P3	REAL	
44231	Q	REAL		44432	R	REAL	ARRAY
47337	S	REAL	ARRAY	44266	T	REAL	
44234	TBAR	REAL		44217	TEST	REAL	
44236	TM	REAL		44237	TM1	REAL	
44272	T1	REAL		44271	T2	REAL	
44264	T3	REAL		44273	T4	REAL	
44303	V	REAL		44230	VF	REAL	
44274	V1	REAL		44275	V2	REAL	
44304	V3	REAL		44323	V4	REAL	
44324	X	REAL	ARRAY	44263	XTM	REAL	
44306	XTT	REAL		46707	Y	REAL	ARRAY
44177	ZDATE	REAL		45563	ZDD	REAL	ARRAY
45513	ZDP	REAL	ARRAY	44244	ZER	REAL	
46631	ZGD	REAL	ARRAY	44213	ZMF	REAL	
45467	ZP	REAL	ARRAY	45633	ZSM	REAL	ARRAY
45607	ZT	REAL	ARRAY	45537	ZTM	REAL	ARRAY

FILE NAMES		MODE										
6204	INPUT	FREE	4130	OUTPUT	FMT	12334	TAPE12		14410	TAPE13		
16464	TAPE14		20540	TAPE15		22614	TAPE16		24670	TAPE17		
26744	TAPE18		31020	TAPE19	FMT	33074	TAPE20	FMT	0	TAPE3	MIXED	
2054	TAPE4	MIXED	10260	TAPE5	MIXED	4130	TAPE6					

```
EXTERNALS          TYPE    ARGS
       ALOG       REAL       1 LIBRARY                   CONNEC                     1
       EXP        REAL       1 LIBRARY                   SQRT       REAL            1 LIBRARY
       VPT1       REAL       2                           VPT2       REAL            2

INLINE FUNCTIONS   TYPE    ARGS
       ABS        REAL       1  INTRIN

STATEMENT LABELS
41172  1                        40355  2                            35371  50
41641  51       FMT             41374  100     FMT                  41404  101    FMT
41414  102      FMT             41425  103     FMT                  41436  104    FMT
41447  105      FMT             41453  107     FMT  NO REFS         41735  116    FMT
41737  117      FMT             41752  125     FMT                  35462  130
    0  135                      35475  140                              0  150
41701  171      FMT             36015  178                              0  183
36045  188                      36050  192                              0  200
    0  210                      41474  218     FMT                      0  220
37320  278                          0  283                          37350  288
37353  292                          0  300                              0  400
    0  500                      40557  578                              0  583
40607  588                      40612  592                          36232  600
    0  601                          0  602                              0  603
    0  604                      36372  605                          36265  606
    0  701                      36644  771                          42015  1000   FMT
42025  1002     FMT             42034  1006    FMT                  42022  1010   FMT
42317  1012     FMT             42326  1014    FMT                  42336  1016   FMT
42306  1024     FMT             36745  1130                             0  1135
36760  1140                         0  1150                         42153  1161   FMT
    0  1200                         0  1210                         42166  1251   FMT
    0  1300                     35722  1301                             0  1351
    0  1400                     35735  1401                             0  1500
    0  1501                     42364  1502    FMT                      0  1503
    0  1504                     42403  1505    FMT                  42411  1506   FMT
42354  1511     FMT             42346  1598    FMT                  42045  1599   FMT
43021  1600     FMT             43367  1601    FMT                  43400  1602   FMT
42216  1605     FMT             42202  1606    FMT                      0  2001
    0  2101                     36413  2301                             0  2302          INACTIVE
    0  2303                         0  2310                             0  3001
42260  3021     FMT                 0  3022                         42270  3023   FMT
43256  4012     FMT             43265  4013    FMT                  43273  4014   FMT
43300  4015     FMT             43310  4016    FMT                  43315  4017   FMT
43317  4019     FMT             43231  4021    FMT                  43240  4022   FMT
43132  4116     FMT             43145  4125    FMT                  37217  4130
    0  4135                     37232  4140                             0  4150
    0  4200                         0  4210                         40014  4230
37302  4290                     37304  4300                         37571  4601
    0  4602                         0  4603                         37167  4650
37403  4970                     36100  4971                         43723  5012   FMT
43341  5013     FMT             43677  5021    FMT                  43705  5022   FMT
40464  5130                         0  5135                         40477  5140
    0  5150                         0  5200                             0  5210
41106  5220                     41117  5225                             0  5230
    0  5300                         0  5601                             0  5602
    0  5603                     40434  5650                         40642  5970
42566  6001     FMT             42573  6002    FMT                  42576  6003   FMT
42600  6004     FMT             42603  6005    FMT                  42605  6006   FMT
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STATEMENT LABELS

42607	6007	FMT	42611	6008	FMT	42613	6009	FMT
42615	6010	FMT	42617	6011	FMT	42621	6012	FMT
42623	6013	FMT	42625	6014	FMT	42627	6015	FMT
42631	6016	FMT	42633	6017	FMT	42635	6018	FMT
42637	6019	FMT	42641	6020	FMT	43470	6502	FMT
40060	6503		0	6504		43356	6505	FMT
43434	6521	FMT	43444	6522	FMT	40264	6530	
40122	6540		40351	6563		40336	6564	
40324	6565		0	6580		0	6581	
40204	6582		40210	6585		0	7503	
0	7504		43745	7506	FMT	43752	7507	FMT
0	7701		41322	7711		37414	41000	
36111	41111		37535	41160		37553	41180	
37641	41400		0	41780		0	41781	
37733	41782		37737	41785		40653	51000	
40767	51160		41005	51180		0	51400	

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES	
35376	220	*	I	52 54	11B	EXT REFS	
35430	135	*	IJ	66 90	66B	EXT REFS	NOT INNER
35443	140	*	I	74 84	35B	EXT REFS	
35506	150		I	86 89	4B	OPT	
35517	200	*	IJ	91 95	14B	NOT INNER	
35525	210		I	92 94	3B	OPT	
35536	300		J	96 98	3B	OPT	
35572	400	*	I	112 116	12B	EXT REFS	
35605	500	*	I	117 121	12B	EXT REFS	
35631	603	*	L1	135 261	454B	EXT REFS	NOT INNER
35670	1351	*	IJ	151 174	66B	EXT REFS	NOT INNER
35703	1401	*	I	158 168	35B	EXT REFS	
35746	1501		I	170 173	4B	OPT	
35757	2001	*	IJ	175 179	14B	NOT INNER	
35765	2101		I	176 178	3B	OPT	
36000	3001		J	180 182	3B	OPT	
36022	183		J	193 196	5B	OPT	
36054	602		I	203 206	5B	OPT	
36206	601	*	J	236 243	24B	EXT REFS	
36252	604		J	246 253	12B	OPT	
36311	3022	*	I	264 267	16B	EXT REFS	
36334	2303	*	I	273 288	73B	EXT REFS	
36436	1503	*	I	302 310	37B	EXT REFS	NOT INNER
36441	1504	*	J	304 306	14B	EXT REFS	
36503	2310		I	313 318	5B	OPT	
36651	701	*	I	347 350	17B	EXT REFS	
36713	1135	*	IJ	383 404	66B	EXT REFS	NOT INNER
36726	1140	*	I	389 398	35B	EXT REFS	
36771	1150		I	400 403	4B	OPT	
37002	1200	*	IJ	405 409	14B	NOT INNER	
37010	1210		I	406 408	3B	OPT	
37021	1300		J	410 412	3B	OPT	
37057	1400	*	I	427 431	12B	EXT REFS	
37072	1500	*	I	432 436	12B	EXT REFS	
37121	4603	*	L1	447 569	472B	EXT REFS	NOT INNER
37156	4135	*	IJ	462 489	75B	EXT REFS	NOT INNER
37200	4140	*	I	473 483	35B	EXT REFS	
37243	4150		I	485 488	4B	OPT	
37254	4200	*	IJ	490 494	14B	NOT INNER	

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES		
37262	4210		I	491 493	3B	OPT		
37276	4300		J	495 499	10B	OPT		
37325	283		J	507 510	5B	OPT		
37357	4602		I	517 520	5B	OPT		
37507	4601	*	J	546 562	65B		EXT REFS	
37621	41400	*	I	573 578	23B		EXT REFS	
37651	4230	*	I	583 617	146B		EXT REFS	NOT INNER
37663	41780	*	M8	590 609	66B		EXT REFS	NOT INNER
37665	41781	*	M9	591 603	52B		EXT REFS	EXITS
40030	6503	*	I	631 639	33B		EXT REFS	NOT INNER
40035	6504	*	J	634 636	14B		EXT REFS	
40100	6540	*	I	648 653	25B		EXT REFS	
40132	6530	*	I	659 693	135B		EXT REFS	NOT INNER
40145	6580	*	M8	667 685	55B		EXT REFS	NOT INNER
40147	6581	*	M9	668 679	41B		EXT REFS	EXITS
40274	6563	*	I	697 708	60B		EXT REFS	NOT INNER
40301	6564	*	J	700 706	40B		EXT REFS	
40366	5603	*	L1	718 831	446B		EXT REFS	NOT INNER
40423	5135	*	IJ	733 758	75B		EXT REFS	NOT INNER
40445	5140	*	I	743 752	35B		EXT REFS	
40510	5150		I	754 757	4B	OPT		
40521	5200	*	IJ	759 763	14B		NOT INNER	
40527	5210		I	760 762	3B	OPT		
40542	5300		J	764 766	3B	OPT		
40564	583		J	774 777	5B	OPT		
40616	5602		I	784 787	5B	OPT		
40746	5601	*	J	813 824	47B		EXT REFS	
41040	51400	*	I	834 837	16B		EXT REFS	
41063	5230	*	I	842 851	50B		EXT REFS	
41140	7503	*	I	855 861	30B		EXT REFS	NOT INNER
41143	7504	*	J	857 859	14B		EXT REFS	
41327	7701	*	I	891 894	17B		EXT REFS	

STATISTICS

PROGRAM LENGTH	13611B	6025
BUFFER LENGTH	34001B	14337

520008 CM USED

Appendix 2.3B

STEADY-STATE CONVERSION
CONSTANT HISTORY

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 1: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
218	01/24/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
227	01/25/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
244	01/28/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
250	01/29/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
252	01/30/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
257	01/30/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
261	01/31/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
272	01/31/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
282	02/01/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
290	02/02/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
295	02/02/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
298	02/08/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
303	02/09/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
321	02/11/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
328	02/14/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
340	02/16/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
365	02/21/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
372	02/22/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
385	02/23/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
391	03/02/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
400	03/03/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
407	03/03/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
410	03/03/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
435	03/10/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
440	03/10/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
466	03/14/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
490	03/16/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
501	03/18/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 1: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
519	03/21/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
536	03/23/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
545	03/23/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
567	03/28/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
574	03/29/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
599	04/01/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
614	04/05/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
620	04/06/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
634	04/28/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
645	04/28/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
658	05/09/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
667	05/10/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
685	05/11/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
693	05/12/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
714	05/17/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
735	05/19/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
758	05/20/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
774	05/20/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
792	05/23/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
827	05/25/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04
838	05/25/77	0.000	-.112002E+05	.762538E+04	.193547E-02	0.	0.	0.	.557959E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 1: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	-.266371E+05	.520254E+04	0.	0.	0.	0.	.133162E+05
882	09/22/77	0.000	-.266371E+05	.520254E+04	0.	0.	0.	0.	.133162E+05
895	09/29/77	0.000	-.266371E+05	.520254E+04	0.	0.	0.	0.	.133162E+05
927	10/03/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
955	10/04/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
968	10/05/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
1000	10/11/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
1103	10/14/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
1109	10/20/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
1131	10/21/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
1144	10/22/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
1161	10/25/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
1176	10/25/77	0.000	.559088E+04	.609773E+04	-.919017E-03	0.	0.	0.	.555221E+04
1182	10/27/77	0.000	.328044E+04	.588815E+04	-.111561E-02	0.	0.	0.	.470938E+04
1189	10/27/77	0.000	.328044E+04	.588815E+04	-.111561E-02	0.	0.	0.	.470938E+04
1209	10/28/77	0.000	.328044E+04	.588815E+04	-.111561E-02	0.	0.	0.	.470938E+04
1212	10/28/77	0.000	.355956E+04	.740234E+04	-.207143E-02	0.	0.	0.	.835047E+04
1228	10/31/77	0.000	.355956E+04	.740234E+04	-.207143E-02	0.	0.	0.	.835047E+04
1241	11/02/77	0.000	.355956E+04	.740234E+04	-.207143E-02	0.	0.	0.	.835047E+04
1257	11/03/77	0.000	.355956E+04	.740234E+04	-.207143E-02	0.	0.	0.	.835047E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 1: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.310038E+04	.730311E+04	.161511E-02	0.	0.	0.	.341735E+04
1292	11/07/77	0.000	.310038E+04	.730311E+04	.161511E-02	0.	0.	0.	.341735E+04
1308	11/09/77	0.000	.310038E+04	.730311E+04	.161511E-02	0.	0.	0.	.341735E+04
1322	11/10/77	0.000	.313244E+04	.694728E+04	.167183E-02	0.	0.	0.	.546340E+04
1337	11/10/77	0.000	.313244E+04	.694728E+04	.167183E-02	0.	0.	0.	.546340E+04
1354	11/14/77	0.000	.163414E+04	.219069E+04	.378641E-02	0.	0.	0.	.506725E+04
1364	11/14/77	0.000	.163414E+04	.219069E+04	.378641E-02	0.	0.	0.	.506725E+04
1368	11/14/77	0.000	.163414E+04	.219069E+04	.378641E-02	0.	0.	0.	.506725E+04
1381	11/16/77	0.000	.187004E+05	.730833E+04	-.196404E-02	0.	0.	0.	.364047E+04
1398	11/17/77	0.000	.187004E+05	.730833E+04	-.196404E-02	0.	0.	0.	.364047E+04
1440	11/28/77	0.000	.187004E+05	.730833E+04	-.196404E-02	0.	0.	0.	.364047E+04
1455	11/29/77	0.000	.187004E+05	.730833E+04	-.196404E-02	0.	0.	0.	.364047E+04
1466	11/29/77	0.000	.187004E+05	.730833E+04	-.196404E-02	0.	0.	0.	.364047E+04
1483	12/02/77	0.000	.763320E+02	.382663E+04	.148547E-02	0.	0.	0.	.240664E+04
1502	12/03/77	0.000	.763320E+02	.382663E+04	.148547E-02	0.	0.	0.	.240664E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 2: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
218	01/24/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
227	01/25/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
244	01/28/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
250	01/29/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
252	01/30/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
257	01/30/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
261	01/31/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
272	01/31/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
282	02/01/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
290	02/02/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
295	02/02/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
298	02/08/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
303	02/09/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
321	02/11/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
328	02/14/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
340	02/16/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
365	02/21/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
372	02/22/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
385	02/23/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
391	03/02/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
400	03/03/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
407	03/03/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
410	03/03/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
435	03/10/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
440	03/10/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
466	03/14/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
490	03/16/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
501	03/18/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 2: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
519	03/21/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
536	03/23/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
545	03/23/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
567	03/28/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
574	03/29/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
599	04/01/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
614	04/05/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
620	04/06/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
634	04/28/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
645	04/28/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
658	05/09/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
667	05/10/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
685	05/11/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
693	05/12/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
714	05/17/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
735	05/19/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
758	05/20/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
774	05/20/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
792	05/23/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
827	05/25/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04
838	05/25/77	0.000	.110287E+05	.838199E+04	-.301785E-02	0.	0.	0.	.403710E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 2: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	-.127110E+05	.550716E+04	0.	0.	0.	0.	.257977E+05
882	09/22/77	0.000	-.127110E+05	.550716E+04	0.	0.	0.	0.	.257977E+05
895	09/29/77	0.000	-.127110E+05	.550716E+04	0.	0.	0.	0.	.257977E+05
927	10/03/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
955	10/04/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
968	10/05/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
1000	10/11/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
1103	10/14/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
1109	10/20/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
1131	10/21/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
1144	10/22/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
1161	10/25/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
1176	10/25/77	0.000	.138397E+05	.645779E+04	-.259157E-02	0.	0.	0.	.106478E+05
1182	10/27/77	0.000	.112296E+05	.679003E+04	-.251384E-02	0.	0.	0.	.109129E+05
1189	10/27/77	0.000	.112296E+05	.679003E+04	-.251384E-02	0.	0.	0.	.109129E+05
1209	10/28/77	0.000	.112296E+05	.679003E+04	-.251384E-02	0.	0.	0.	.109129E+05
1212	10/28/77	0.000	.125216E+05	.647681E+04	-.293035E-02	0.	0.	0.	.630155E+04
1228	10/31/77	0.000	.125216E+05	.647681E+04	-.293035E-02	0.	0.	0.	.630155E+04
1241	11/02/77	0.000	.125216E+05	.647681E+04	-.293035E-02	0.	0.	0.	.630155E+04
1257	11/03/77	0.000	.125216E+05	.647681E+04	-.293035E-02	0.	0.	0.	.630155E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 2: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.123512E+05	.647923E+04	-.310062E-02	0.	0.	0.	.466572E+04
1292	11/07/77	0.000	.123512E+05	.647923E+04	-.310062E-02	0.	0.	0.	.466572E+04
1308	11/09/77	0.000	.123512E+05	.647923E+04	-.310062E-02	0.	0.	0.	.466572E+04
1322	11/10/77	0.000	.123992E+02	.652651E+04	-.284863E-02	0.	0.	0.	.761717E+04
1337	11/10/77	0.000	.123992E+02	.652651E+04	-.284863E-02	0.	0.	0.	.761717E+04
1354	11/14/77	0.000	.398250E+04	.213838E+04	-.295315E-02	0.	0.	0.	.165788E+04
1364	11/14/77	0.000	.398250E+04	.213838E+04	-.295315E-02	0.	0.	0.	.165788E+04
1368	11/14/77	0.000	.398250E+04	.213838E+04	-.295315E-02	0.	0.	0.	.165788E+04
1381	11/16/77	0.000	.148658E+04	.104038E+05	.742525E-03	0.	0.	0.	.268296E+04
1398	11/17/77	0.000	.148658E+04	.104038E+05	.742525E-03	0.	0.	0.	.268296E+04
1440	11/28/77	0.000	.148658E+04	.104038E+05	.742525E-03	0.	0.	0.	.268296E+04
1455	11/29/77	0.000	.148658E+04	.104038E+05	.742525E-03	0.	0.	0.	.268296E+04
1466	11/29/77	0.000	.148658E+04	.104038E+05	.742525E-03	0.	0.	0.	.268296E+04
1483	12/02/77	0.000	.252298E+04	.256003E+04	.120459E-02	0.	0.	0.	.130069E+04
1502	12/03/77	0.000	.252298E+04	.256003E+04	.120459E-02	0.	0.	0.	.130069E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 3: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
218	01/24/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
227	01/25/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
244	01/28/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
250	01/29/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
252	01/30/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
257	01/30/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
261	01/31/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
272	01/31/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
282	02/01/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
290	02/02/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
295	02/02/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
298	02/08/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
303	02/09/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
321	02/11/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
328	02/14/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
340	02/16/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
365	02/21/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
372	02/22/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
385	02/23/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
391	03/02/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
400	03/03/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
407	03/03/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
410	03/03/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
435	03/10/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
440	03/10/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
466	03/14/77	0.000	-.210327E+00	0.	.349157E+01	0.	0.	0.	.350207E+01
490	03/16/77	0.000	.199339E+01	0.	.312088E+01	0.	0.	0.	.505801E+01
501	03/18/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 3: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
519	03/21/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
536	03/23/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
545	03/23/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
567	03/28/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
574	03/29/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
599	04/01/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
614	04/05/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
620	04/06/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
634	04/28/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
645	04/28/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
658	05/09/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
667	05/10/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
685	05/11/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
693	05/12/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
714	05/17/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
735	05/19/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
758	05/20/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
774	05/20/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
792	05/23/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
827	05/25/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
838	05/25/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 3: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
882	09/22/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
895	09/29/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
927	10/03/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
955	10/04/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
968	10/05/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1000	10/11/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1103	10/14/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1109	10/20/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1131	10/21/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1144	10/22/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1161	10/25/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1176	10/25/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1182	10/27/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1189	10/27/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1209	10/28/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1212	10/28/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1228	10/31/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1241	11/02/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1257	11/03/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 3: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1292	11/07/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1308	11/09/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1322	11/10/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1337	11/10/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1354	11/14/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1364	11/14/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1368	11/14/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1381	11/16/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1398	11/17/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1440	11/28/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1455	11/29/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1466	11/29/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1483	12/02/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01
1502	12/03/77	0.000	0.	0.	.584328E+01	0.	0.	0.	.429135E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 4: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
218	01/24/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
227	01/25/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
244	01/28/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
250	01/29/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
252	01/30/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
257	01/30/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
261	01/31/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
272	01/31/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
282	02/01/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
290	02/02/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
295	02/02/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
298	02/08/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
303	02/09/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
321	02/11/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
328	02/14/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
340	02/16/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
365	02/21/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
372	02/22/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
385	02/23/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
391	03/02/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
400	03/03/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
407	03/03/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
410	03/03/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
435	03/10/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
440	03/10/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
466	03/14/77	0.000	-.102264E+00	0.	.339740E+01	0.	0.	0.	.309651E+01
490	03/16/77	0.000	.188269E+01	0.	.315384E+01	0.	0.	0.	.515352E+01
501	03/18/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 4: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
519	03/21/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
536	03/23/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
545	03/23/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
567	03/28/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
574	03/29/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
599	04/01/77	0.000	0.	0.	.300000E+01	0.	0.	0.	0.
614	04/05/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
620	04/06/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
634	04/28/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
645	04/28/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
658	05/09/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
667	05/10/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
685	05/11/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
693	05/12/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
714	05/17/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
735	05/19/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
758	05/20/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
774	05/20/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
792	05/23/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
827	05/25/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
838	05/25/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 4: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
882	09/22/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
895	09/29/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
927	10/03/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
955	10/04/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
968	10/05/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1000	10/11/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1103	10/14/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1109	10/20/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1131	10/21/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1144	10/22/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1161	10/25/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1176	10/25/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1182	10/27/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1189	10/27/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1209	10/28/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1212	10/28/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1228	10/31/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1241	11/02/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1257	11/03/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 4: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1292	11/07/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1308	11/09/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1322	11/10/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1337	11/10/77	0.000	0.	0.	.493782E+01	0.	0.	0.	.939173E+01
1354	11/14/77	0.000	0.	0.	.606555E+01	0.	0.	0.	.186327E+01
1364	11/14/77	0.000	0.	0.	.606555E+01	0.	0.	0.	.186327E+01
1368	11/14/77	0.000	0.	0.	.606555E+01	0.	0.	0.	.186327E+01
1381	11/16/77	0.000	0.	0.	.606555E+01	0.	0.	0.	.186327E+01
1398	11/17/77	0.000	0.	0.	.606555E+01	0.	0.	0.	.186327E+01
1440	11/28/77	0.000	0.	0.	.660014E+01	0.	0.	0.	.134069E+01
1455	11/29/77	0.000	0.	0.	.660014E+01	0.	0.	0.	.134069E+01
1466	11/29/77	0.000	0.	0.	.660014E+01	0.	0.	0.	.134069E+01
1483	12/02/77	0.000	0.	0.	.660014E+01	0.	0.	0.	.134069E+01
1502	12/03/77	0.000	0.	0.	.660014E+01	0.	0.	0.	.134069E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 5: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.498	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
218	01/24/77	15.539	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
227	01/25/77	15.503	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
244	01/28/77	15.598	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
250	01/29/77	15.456	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
252	01/30/77	15.582	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
257	01/30/77	15.582	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
261	01/31/77	15.508	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
272	01/31/77	15.462	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
282	02/01/77	15.430	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
290	02/02/77	15.430	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
295	02/02/77	15.460	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
298	02/08/77	15.477	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
303	02/09/77	15.469	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
321	02/11/77	15.469	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
328	02/14/77	15.506	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
340	02/16/77	15.457	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
365	02/21/77	15.457	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
372	02/22/77	15.478	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
385	02/23/77	15.415	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
391	03/02/77	15.494	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
400	03/03/77	15.489	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
407	03/03/77	15.489	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
410	03/03/77	15.504	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
435	03/10/77	15.472	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
440	03/10/77	15.406	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
466	03/14/77	15.381	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
490	03/16/77	15.437	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
501	03/18/77	15.388	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 5: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.410	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
519	03/21/77	15.334	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
536	03/23/77	15.346	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
545	03/23/77	15.307	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
567	03/28/77	15.333	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
574	03/29/77	15.334	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
599	04/01/77	15.295	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
614	04/05/77	15.581	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
620	04/06/77	15.285	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
634	04/28/77	15.170	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
645	04/28/77	15.094	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
658	05/09/77	15.141	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
667	05/10/77	15.064	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
685	05/11/77	15.094	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
693	05/12/77	15.088	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
714	05/17/77	14.939	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
735	05/19/77	14.961	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
758	05/20/77	14.977	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
774	05/20/77	14.928	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
792	05/23/77	14.919	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
827	05/25/77	14.993	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
838	05/25/77	14.803	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 5: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	14.961	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
882	09/22/77	14.802	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
895	09/29/77	14.767	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
927	10/03/77	14.789	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
955	10/04/77	14.649	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
968	10/05/77	14.543	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1000	10/11/77	14.723	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1103	10/14/77	14.658	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1109	10/20/77	14.602	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1131	10/21/77	14.621	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1144	10/22/77	14.504	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1161	10/25/77	14.767	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1176	10/25/77	14.702	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1182	10/27/77	14.811	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1189	10/27/77	14.811	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1209	10/28/77	14.736	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1212	10/28/77	14.731	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1228	10/31/77	14.743	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1241	11/02/77	14.777	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1257	11/03/77	14.701	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 5: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	14.794	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1292	11/07/77	14.838	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1308	11/09/77	14.674	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1322	11/10/77	14.798	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1337	11/10/77	14.691	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1354	11/14/77	14.810	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1364	11/14/77	14.810	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1368	11/14/77	14.692	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1381	11/16/77	14.736	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1398	11/17/77	14.760	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1440	11/28/77	14.848	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1455	11/29/77	14.818	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1466	11/29/77	14.818	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1483	12/02/77	14.843	.600000E+01	-.288955E+00	.231508E+02	.267766E-02	0.	0.	.450000E+00
1502	12/03/77	14.360	.600000E+01	-.785804E-01	.227758E+02	.267672E-02	0.	0.	.105613E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 6: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.086	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
218	01/24/77	15.051	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
227	01/25/77	15.041	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
244	01/28/77	15.124	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
250	01/29/77	15.060	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
252	01/30/77	15.155	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
257	01/30/77	15.155	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
261	01/31/77	15.083	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
272	01/31/77	15.056	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
282	02/01/77	15.061	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
290	02/02/77	15.061	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
295	02/02/77	15.066	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
298	02/08/77	15.036	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
303	02/09/77	15.077	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
321	02/11/77	15.965	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
328	02/14/77	15.965	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
340	02/16/77	15.864	.600000E+01	.119867E+00	.233609E+02	.119918E-02	0.	0.	.211714E+00
365	02/21/77	15.864	.600000E+01	-.286752E+00	.233402E+02	.153253E-02	0.	0.	.200538E+00
372	02/22/77	15.971	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
385	02/23/77	15.976	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
391	03/02/77	15.848	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
400	03/03/77	15.975	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
407	03/03/77	15.975	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
410	03/03/77	15.848	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
435	03/10/77	16.013	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
440	03/10/77	15.978	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
466	03/14/77	16.029	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
490	03/16/77	15.976	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
501	03/18/77	15.976	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 6: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.990	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
519	03/21/77	15.907	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
536	03/23/77	16.026	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
545	03/23/77	15.954	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
567	03/28/77	16.025	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
574	03/29/77	15.967	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
599	04/01/77	16.087	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
614	04/05/77	15.845	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
620	04/06/77	16.037	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
634	04/28/77	15.884	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
645	04/28/77	15.823	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
658	05/09/77	15.881	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
667	05/10/77	15.852	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
685	05/11/77	15.984	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
693	05/12/77	15.809	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
714	05/17/77	16.101	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
735	05/19/77	15.997	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
758	05/20/77	15.936	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
774	05/20/77	15.995	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
792	05/23/77	16.131	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
827	05/25/77	16.089	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
838	05/25/77	16.427	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01

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INSTRUMENT NO. 6: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	16.131	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
882	09/22/77	15.835	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
895	09/29/77	15.878	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
927	10/03/77	15.878	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
955	10/04/77	16.010	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
968	10/05/77	15.833	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1000	10/11/77	15.826	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1103	10/14/77	15.903	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1109	10/20/77	15.836	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1131	10/21/77	15.885	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1144	10/22/77	15.966	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1161	10/25/77	15.823	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1176	10/25/77	15.843	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1182	10/27/77	15.958	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1189	10/27/77	15.958	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1209	10/28/77	15.982	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1212	10/28/77	15.979	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1228	10/31/77	15.928	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1241	11/02/77	15.943	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1257	11/03/77	16.106	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01

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INSTRUMENT NO. 6: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.973	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1292	11/07/77	15.845	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1308	11/09/77	16.047	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1322	11/10/77	15.918	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1337	11/10/77	16.225	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1354	11/14/77	15.784	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1364	11/14/77	15.784	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1368	11/14/77	15.965	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1381	11/16/77	16.077	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1398	11/17/77	16.054	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1440	11/28/77	15.842	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1455	11/29/77	16.013	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1466	11/29/77	16.013	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1483	12/02/77	15.931	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01
1502	12/03/77	15.929	.600000E+01	-.587139E-01	.233839E+02	.136798E-02	0.	0.	.900000E-01

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INSTRUMENT NO. 7: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	16.037	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
218	01/24/77	16.034	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
227	01/25/77	16.067	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
244	01/28/77	0.000	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
250	01/29/77	0.000	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
252	01/30/77	16.014	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
257	01/30/77	16.014	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
261	01/31/77	16.027	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
272	01/31/77	16.042	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
282	02/01/77	16.040	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	.100000E+01	.221557E+00
290	02/02/77	16.040	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	-.100000E+01	.221557E+00
295	02/02/77	15.966	-.975000E+01	.928953E-01	.313164E+01	-.103816E-04	.276094E-04	-.100000E+01	.221557E+00
298	02/08/77	37.212	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
303	02/09/77	37.218	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
321	02/11/77	37.218	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
328	02/14/77	37.216	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
340	02/16/77	37.226	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
365	02/21/77	37.226	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
372	02/22/77	37.234	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
385	02/23/77	37.252	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
391	03/02/77	37.236	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	-.100000E+01	.153000E+00
400	03/03/77	37.260	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	-.100000E+01	.153000E+00
407	03/03/77	37.260	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
410	03/03/77	37.250	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
435	03/10/77	37.241	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
460	03/10/77	37.247	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
466	03/14/77	50.286	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
490	03/16/77	50.259	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
501	03/18/77	37.271	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00

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INSTRUMENT NO. 7: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	37.256	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
519	03/21/77	37.350	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
536	03/23/77	37.338	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
545	03/23/77	37.347	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
567	03/28/77	37.316	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
574	03/29/77	37.326	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
599	04/01/77	37.345	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
614	04/05/77	37.326	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
620	04/06/77	50.260	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
634	04/28/77	50.285	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
645	04/28/77	50.299	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
658	05/09/77	50.304	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
667	05/10/77	50.317	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
685	05/11/77	50.300	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
693	05/12/77	50.323	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
714	05/17/77	37.345	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
735	05/19/77	37.334	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
758	05/20/77	37.350	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
774	05/20/77	37.341	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
792	05/23/77	37.323	-.975000E+01	-.789660E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.153000E+00
827	05/25/77	50.262	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
838	05/25/77	50.260	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 7: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	37.292	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
882	09/22/77	37.299	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
895	09/29/77	37.299	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
927	10/03/77	37.296	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
955	10/04/77	37.303	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
968	10/05/77	37.312	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
1000	10/11/77	37.299	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
1103	10/14/77	37.304	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
1109	10/20/77	37.298	-.975000E+01	-.789666E-03	.469920E+01	.789441E-05	.504540E-04	.100000E+01	.102000E+00
1131	10/21/77	50.291	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1144	10/22/77	50.245	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1161	10/25/77	50.343	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1176	10/25/77	50.281	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1182	10/27/77	50.307	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1189	10/27/77	50.307	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1209	10/28/77	50.268	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1212	10/28/77	50.268	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1228	10/31/77	50.357	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1241	11/02/77	50.274	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1257	11/03/77	50.240	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 7: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	50.303	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1292	11/07/77	50.308	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1308	11/09/77	50.242	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1322	11/10/77	50.313	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1337	11/10/77	50.269	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1354	11/14/77	37.284	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
1364	11/14/77	37.284	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1368	11/14/77	50.286	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1381	11/16/77	37.305	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
1398	11/17/77	37.306	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
1440	11/28/77	50.320	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1455	11/29/77	50.318	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1466	11/29/77	37.322	-.975000E+01	-.789666E-03	.469920E+01	.789441E-04	.504540E-04	.100000E+01	.102000E+00
1483	12/02/77	50.343	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00
1502	12/03/77	50.330	-.975000E+01	.301437E-01	.124863E+02	-.275905E-04	.314705E-05	.100000E+01	.307500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 8: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.874	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	.100000E+01	.192883E-01
218	01/24/77	15.829	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	.100000E+01	.192883E-01
227	01/25/77	15.918	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	.100000E+01	.192883E-01
244	01/28/77	49.856	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
250	01/29/77	49.861	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
252	01/30/77	15.815	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	.100000E+01	.192883E-01
257	01/30/77	15.815	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	.100000E+01	.192883E-01
261	01/31/77	15.811	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	.100000E+01	.192883E-01
272	01/31/77	15.873	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	.100000E+01	.192883E-01
282	02/01/77	15.895	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	.100000E+01	.192883E-01
290	02/02/77	15.895	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	-.100000E+01	.192883E-01
295	02/02/77	15.792	-.975000E+01	-.796762E-02	.396372E+00	-.383181E-05	.318202E-05	-.100000E+01	.192883E-01
298	02/08/77	36.451	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
303	02/09/77	36.451	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
321	02/11/77	36.451	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
328	02/14/77	36.443	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
340	02/16/77	36.508	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
365	02/21/77	36.508	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
372	02/22/77	36.392	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
385	02/23/77	36.508	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
391	03/02/77	36.406	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	-.100000E+01	.142500E-01
400	03/03/77	36.364	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	-.100000E+01	.142500E-01
407	03/03/77	36.364	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
410	03/03/77	36.515	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
435	03/10/77	36.512	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
440	03/10/77	36.527	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
466	03/14/77	49.805	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
490	03/16/77	49.813	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
501	03/18/77	36.510	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 8: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	36.572	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
519	03/21/77	36.599	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
536	03/23/77	36.611	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
545	03/23/77	36.614	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
567	03/28/77	36.445	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
574	03/29/77	36.549	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
599	04/01/77	36.475	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
614	04/05/77	36.426	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
620	04/06/77	49.818	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
634	04/28/77	49.849	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
645	04/28/77	49.789	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
658	05/09/77	49.818	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
667	05/10/77	49.770	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
685	05/11/77	49.821	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
693	05/12/77	49.790	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
714	05/17/77	36.470	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
735	05/19/77	36.506	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
758	05/20/77	36.493	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
774	05/20/77	36.482	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
792	05/23/77	36.490	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
827	05/25/77	49.820	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
838	05/25/77	49.800	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 8: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	36.402	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
882	09/22/77	36.472	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
895	09/29/77	36.363	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
927	10/03/77	36.417	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
955	10/04/77	36.362	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
968	10/05/77	36.404	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
1000	10/11/77	36.408	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
1103	10/14/77	36.421	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
1109	10/20/77	36.364	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
1131	10/21/77	49.828	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1144	10/22/77	49.798	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1161	10/25/77	49.857	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1176	10/25/77	49.803	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1182	10/27/77	49.832	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1189	10/27/77	49.832	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1209	10/28/77	49.785	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1212	10/28/77	49.785	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1228	10/31/77	49.841	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1241	11/02/77	49.846	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1257	11/03/77	49.785	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 8: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	49.851	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1292	11/07/77	49.850	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1308	11/09/77	49.765	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1322	11/10/77	49.836	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1337	11/10/77	49.778	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1354	11/14/77	36.357	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
1364	11/14/77	36.357	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1368	11/14/77	49.773	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1381	11/16/77	36.341	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
1398	11/17/77	36.391	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
1440	11/28/77	49.868	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1455	11/29/77	49.797	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1466	11/29/77	36.480	-.975000E+01	.731362E-02	.382893E+00	-.218366E-05	.278112E-05	.100000E+01	.142500E-01
1483	12/02/77	49.854	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01
1502	12/03/77	49.859	-.975000E+01	.257486E-01	.499235E+01	.171706E-04	.151235E-04	.100000E+01	.750000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 9: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.892	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
218	01/24/77	15.895	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
227	01/25/77	15.902	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
244	01/28/77	15.906	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
250	01/29/77	15.898	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
252	01/30/77	14.904	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
257	01/30/77	14.904	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
261	01/31/77	15.896	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
272	01/31/77	15.910	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
282	02/01/77	15.911	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
290	02/02/77	15.911	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
295	02/02/77	15.910	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
298	02/08/77	15.897	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
303	02/09/77	15.901	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
321	02/11/77	15.901	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
328	02/14/77	15.882	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
340	02/16/77	15.911	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
365	02/21/77	15.911	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
372	02/22/77	15.912	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
385	02/23/77	15.904	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
391	03/02/77	15.902	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
400	03/03/77	15.889	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
407	03/03/77	15.889	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
410	03/03/77	15.904	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
435	03/10/77	15.875	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
440	03/10/77	15.902	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
466	03/14/77	15.889	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
490	03/16/77	15.891	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
501	03/18/77	15.870	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 9: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.885	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
519	03/21/77	15.909	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
536	03/23/77	15.902	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
545	03/23/77	15.910	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
567	03/28/77	15.896	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
574	03/29/77	15.911	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
599	04/01/77	15.886	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
614	04/05/77	15.886	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
620	04/06/77	15.895	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
634	04/28/77	15.878	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
645	04/28/77	15.918	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
658	05/09/77	15.830	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
667	05/10/77	15.881	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
685	05/11/77	15.846	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
693	05/12/77	15.872	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
714	05/17/77	15.891	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
735	05/19/77	15.903	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
758	05/20/77	15.900	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
774	05/20/77	15.913	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
792	05/23/77	15.880	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
827	05/25/77	15.876	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00
838	05/25/77	15.886	0.	.108053E+00	.395959E+00	-.822648E-04	.397189E-06	.100000E+01	.135000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 9: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.953	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
882	09/22/77	15.982	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
895	09/29/77	15.976	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
927	10/03/77	15.954	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
955	10/04/77	15.983	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
968	10/05/77	16.010	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1000	10/11/77	15.981	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1103	10/14/77	15.986	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1109	10/20/77	15.975	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1131	10/21/77	15.969	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1144	10/22/77	15.961	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1161	10/25/77	15.962	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1176	10/25/77	15.958	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1182	10/27/77	15.981	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1189	10/27/77	15.981	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1209	10/28/77	15.910	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1212	10/28/77	15.910	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1228	10/31/77	15.910	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1241	11/02/77	15.909	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1257	11/03/77	15.907	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 9: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.969	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1292	11/07/77	15.979	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1308	11/09/77	15.946	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1322	11/10/77	15.972	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1337	11/10/77	15.921	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1354	11/14/77	15.984	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1364	11/14/77	15.984	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1368	11/14/77	15.983	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1381	11/16/77	15.942	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1398	11/17/77	15.971	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1440	11/28/77	15.914	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1455	11/29/77	15.957	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1466	11/29/77	15.957	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1483	12/02/77	15.956	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01
1502	12/03/77	15.958	0.	-.276842E-01	.394041E+00	.301402E-05	.327670E-05	.100000E+01	.170830E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 10: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	14.563	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
218	01/24/77	14.415	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
227	01/25/77	14.411	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
244	01/28/77	14.416	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
250	01/29/77	14.977	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
252	01/30/77	14.421	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
257	01/30/77	14.421	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
261	01/31/77	14.414	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
272	01/31/77	14.419	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
282	02/01/77	14.418	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
290	02/02/77	14.418	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
295	02/02/77	14.416	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
298	02/08/77	14.402	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
303	02/09/77	14.401	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
321	02/11/77	14.401	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
328	02/14/77	14.404	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
340	02/16/77	14.419	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
365	02/21/77	14.419	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
372	02/22/77	14.403	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
385	02/23/77	14.413	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
391	03/02/77	14.404	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
400	03/03/77	14.404	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
407	03/03/77	14.404	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
410	03/03/77	14.415	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
435	03/10/77	14.405	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
440	03/10/77	14.410	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
466	03/14/77	14.404	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
490	03/16/77	14.404	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
501	03/18/77	14.400	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 10: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	14.402	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
519	03/21/77	14.416	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
536	03/23/77	14.414	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
545	03/23/77	14.416	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
567	03/28/77	14.409	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
574	03/29/77	14.401	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
599	04/01/77	14.405	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
614	04/05/77	14.417	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
620	04/06/77	14.404	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
634	04/28/77	14.848	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
645	04/28/77	14.644	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
658	05/09/77	14.668	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
667	05/10/77	14.406	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
685	05/11/77	14.403	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
693	05/12/77	14.408	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
714	05/17/77	14.409	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
735	05/19/77	14.404	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
758	05/20/77	14.409	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
774	05/20/77	14.403	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
792	05/23/77	14.402	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
827	05/25/77	14.401	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01
838	05/25/77	14.402	0.	-.910085E+00	.238685E+02	-.596623E-02	0.	0.	.247500E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 10: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	16.009	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
882	09/22/77	16.009	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
895	09/29/77	16.002	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
927	10/03/77	15.984	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
955	10/04/77	15.977	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
968	10/05/77	16.004	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1000	10/11/77	15.998	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1103	10/14/77	15.983	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1109	10/20/77	15.992	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1131	10/21/77	15.971	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1144	10/22/77	15.962	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1161	10/25/77	16.001	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1176	10/25/77	15.969	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1182	10/27/77	16.012	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1189	10/27/77	16.012	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1209	10/28/77	16.006	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1212	10/28/77	16.006	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1228	10/31/77	16.022	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1241	11/02/77	16.007	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1257	11/03/77	15.955	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 10: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	16.005	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1292	11/07/77	16.005	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1308	11/09/77	15.948	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1322	11/10/77	15.999	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1337	11/10/77	15.942	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1354	11/14/77	16.083	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1364	11/14/77	16.083	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1368	11/14/77	16.009	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1381	11/16/77	15.984	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1398	11/17/77	15.998	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1440	11/28/77	16.044	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1455	11/29/77	16.002	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1466	11/29/77	16.002	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1483	12/02/77	15.953	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00
1502	12/03/77	15.965	0.	.260044E+00	.236247E+02	-.286250E-02	0.	0.	.273783E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 11: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	0.	.119416E+03	-.500000E+00	0.	0.	0.	.391287E+01
218	01/24/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
227	01/25/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
244	01/28/77	0.000	0.	.119416E+03	-.500000E+00	0.	0.	0.	.122500E+01
250	01/29/77	0.000	0.	.119416E+03	-.500000E+00	0.	0.	0.	.122500E+01
252	01/30/77	0.000	0.	.119416E+03	-.500000E+00	0.	0.	0.	.122500E+01
257	01/30/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
261	01/31/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
272	01/31/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
282	02/01/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
290	02/02/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
295	02/02/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
298	02/08/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
303	02/09/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
321	02/11/77	0.000	0.	.119416E+03	-.520000E+00	0.	0.	0.	.648000E+01
328	02/14/77	0.000	0.	.119416E+03	-.520000E+00	0.	0.	0.	.548000E+01
340	02/16/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
365	02/21/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
372	02/22/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
385	02/23/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
391	03/02/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
400	03/03/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
407	03/03/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
410	03/03/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
435	03/10/77	0.000	0.	.119416E+03	-.500000E+00	0.	0.	0.	.122500E+01
440	03/10/77	0.000	0.	.119416E+03	-.500000E+00	0.	0.	0.	.122500E+01
466	03/14/77	0.000	0.	.119416E+03	-.500000E+00	0.	0.	0.	.122500E+01
490	03/16/77	0.000	0.	.119416E+03	-.500000E+00	0.	0.	0.	.122500E+01
501	03/18/77	0.000	0.	.119416E+03	-.500000E+00	0.	0.	0.	.122500E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 11: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
519	03/21/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
536	03/23/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
545	03/23/77	0.000	0.	.255700E+02	-.117500E+02	0.	0.	0.	.122500E+01
567	03/28/77	0.000	0.	.119416E+03	-.860000E+00	0.	0.	0.	.144788E+01
574	03/29/77	0.000	0.	.119416E+03	-.860000E+00	0.	0.	0.	.144788E+01
599	04/01/77	0.000	0.	.255700E+02	-.118000E+02	0.	0.	0.	.144788E+01
614	04/05/77	0.000	0.	.119416E+03	-.700000E+00	0.	0.	0.	.144788E+01
620	04/06/77	0.000	0.	.119416E+03	-.700000E+00	0.	0.	0.	.144788E+01
634	04/28/77	0.000	0.	.119416E+03	-.838000E+00	0.	0.	0.	.102379E+01
645	04/28/77	0.000	0.	.119416E+03	-.838000E+00	0.	0.	0.	.102379E+01
658	05/09/77	0.000	0.	.119416E+03	-.880000E+00	0.	0.	0.	.350333E+01
667	05/10/77	0.000	0.	.119416E+03	-.880000E+00	0.	0.	0.	.350333E+01
685	05/11/77	0.000	0.	.119416E+03	-.900000E+00	0.	0.	0.	.350333E+01
693	05/12/77	0.000	0.	.119416E+03	-.900000E+00	0.	0.	0.	.350333E+01
714	05/17/77	0.000	0.	.119416E+03	-.900000E+00	0.	0.	0.	.350333E+01
735	05/19/77	0.000	0.	.119416E+03	-.900000E+00	0.	0.	0.	.350333E+01
758	05/20/77	0.000	0.	.119416E+03	-.900000E+00	0.	0.	0.	.350333E+01
774	05/20/77	0.000	0.	.119416E+03	-.900000E+00	0.	0.	0.	.350333E+01
792	05/23/77	0.000	0.	.119416E+03	-.900000E+00	0.	0.	0.	.350333E+01
827	05/25/77	0.000	0.	.119416E+03	-.870000E+00	0.	0.	0.	.819800E+00
838	05/25/77	0.000	0.	.119416E+03	-.870000E+00	0.	0.	0.	.819800E+00

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INSTRUMENT NO. 11: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	0.	.119542E+03	-.100000E+00	0.	0.	0.	.819800E+00
882	09/22/77	0.000	0.	.119542E+03	-.100000E+00	0.	0.	0.	.819800E+00
895	09/29/77	0.000	0.	.250129E+02	-.119500E+02	0.	0.	0.	.819800E+00
927	10/03/77	0.000	0.	.250129E+02	-.119500E+02	0.	0.	0.	.819800E+00
955	10/04/77	0.000	0.	.250129E+02	-.119500E+02	0.	0.	0.	.819800E+00
968	10/05/77	0.000	0.	.250129E+02	-.119500E+02	0.	0.	0.	.819800E+00
1000	10/11/77	0.000	0.	.119542E+03	.250000E+00	0.	0.	0.	.819800E+00
1103	10/14/77	0.000	0.	.119542E+03	.250000E+00	0.	0.	0.	.819800E+00
1109	10/20/77	0.000	0.	.250129E+02	-.118900E+02	0.	0.	0.	.819800E+00
1131	10/21/77	0.000	0.	.119542E+03	.452000E+00	0.	0.	0.	.819800E+00
1144	10/22/77	0.000	0.	.119542E+03	.452000E+00	0.	0.	0.	.819800E+00
1161	10/25/77	0.000	0.	.119542E+03	.500000E-01	0.	0.	0.	.819800E+00
1176	10/25/77	0.000	0.	.119542E+03	.500000E-01	0.	0.	0.	.819800E+00
1182	10/27/77	0.000	0.	.119542E+03	.272000E+00	0.	0.	0.	.819800E+00
1189	10/27/77	0.000	0.	.119542E+03	.272000E+00	0.	0.	0.	.819800E+00
1209	10/28/77	0.000	0.	.119542E+03	.272000E+00	0.	0.	0.	.819800E+00
1212	10/28/77	0.000	0.	.119542E+03	.272000E+00	0.	0.	0.	.819800E+00
1228	10/31/77	0.000	0.	.119542E+03	.200000E-01	0.	0.	0.	.819800E+00
1241	11/02/77	0.000	0.	.119542E+03	.200000E-01	0.	0.	0.	.819800E+00
1257	11/03/77	0.000	0.	.119542E+03	.200000E-01	0.	0.	0.	.819800E+00

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INSTRUMENT NO. 11: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	0.	.119542E+03	-.100000E+00	0.	0.	0.	.819800E+00
1292	11/07/77	0.000	0.	.119542E+03	-.100000E+00	0.	0.	0.	.819800E+00
1308	11/09/77	0.000	0.	.119542E+03	-.100000E+00	0.	0.	0.	.819800E+00
1322	11/10/77	0.000	0.	.119542E+03	.180000E+00	0.	0.	0.	.819800E+00
1337	11/10/77	0.000	0.	.119542E+03	.180000E+00	0.	0.	0.	.819800E+00
1354	11/14/77	0.000	0.	.250129E+02	-.119128E+02	0.	0.	0.	.197514E+00
1364	11/14/77	0.000	0.	.250129E+02	-.119128E+02	0.	0.	0.	.197514E+00
1368	11/14/77	0.000	0.	.250129E+02	-.119128E+02	0.	0.	0.	.197514E+00
1381	11/16/77	0.000	0.	.250129E+02	-.119128E+02	0.	0.	0.	.819800E+00
1398	11/17/77	0.000	0.	.250129E+02	-.119128E+02	0.	0.	0.	.819800E+00
1440	11/28/77	0.000	0.	.119542E+03	.180000E+00	0.	0.	0.	.819800E+00
1455	11/29/77	0.000	0.	.119542E+03	.180000E+00	0.	0.	0.	.819800E+00
1466	11/29/77	0.000	0.	.119542E+03	.180000E+00	0.	0.	0.	.819800E+00
1483	12/02/77	0.000	0.	.119542E+03	-.140000E+00	0.	0.	0.	.819800E+00
1502	12/03/77	0.000	0.	.119542E+03	-.140000E+00	0.	0.	0.	.819800E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 12: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
218	01/24/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
227	01/25/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
244	01/28/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
250	01/29/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
252	01/30/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
257	01/30/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
261	01/31/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
272	01/31/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
282	02/01/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
290	02/02/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
295	02/02/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
298	02/08/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
303	02/09/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
321	02/11/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
328	02/14/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
340	02/16/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
365	02/21/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
372	02/22/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
385	02/23/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
391	03/02/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
400	03/03/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
407	03/03/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
410	03/03/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
435	03/10/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
440	03/10/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
466	03/14/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
490	03/16/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
501	03/18/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 12: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
519	03/21/77	0.000	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
536	03/23/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
545	03/23/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
567	03/28/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
574	03/29/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
599	04/01/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
614	04/05/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
620	04/06/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
634	04/28/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
645	04/28/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
658	05/09/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
667	05/10/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
685	05/11/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
693	05/12/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
714	05/17/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
735	05/19/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
758	05/20/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
774	05/20/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
792	05/23/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
827	05/25/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
838	05/25/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 12: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
882	09/22/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
895	09/29/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
927	10/03/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
955	10/04/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
968	10/05/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1000	10/11/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1103	10/14/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1109	10/20/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1131	10/21/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1144	10/22/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1161	10/25/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1176	10/25/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1182	10/27/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1189	10/27/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1209	10/28/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1212	10/28/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1228	10/31/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1241	11/02/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1257	11/03/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 12: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1292	11/07/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1308	11/09/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1322	11/10/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1337	11/10/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1354	11/14/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1364	11/14/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1368	11/14/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1381	11/16/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1398	11/17/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1440	11/28/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1455	11/29/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1466	11/29/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1483	12/02/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01
1502	12/03/77	.003	0.	.100000E+03	0.	.100000E+01	0.	0.	.500000E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 15: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.467216E+01	.142947E-01	-.799598E+01	.114855E+02	0.	0.	.620000E-02
218	01/24/77	0.000	.460297E+01	.142947E-01	-.745727E+01	.114855E+02	0.	0.	.620000E-02
227	01/25/77	0.000	.460297E+01	.142947E-01	-.745727E+01	.114855E+02	0.	0.	.620000E-02
244	01/28/77	0.000	.460064E+01	.142947E-01	-.818745E+01	.114855E+02	0.	0.	.620000E-02
250	01/29/77	0.000	.452291E+01	.142947E-01	-.645880E+01	.114855E+02	0.	0.	.620000E-02
252	01/30/77	0.000	.457572E+01	.142947E-01	-.749809E+01	.114855E+02	0.	0.	.620000E-02
257	01/30/77	0.000	.457572E+01	.142947E-01	-.749809E+01	.114855E+02	0.	0.	.620000E-02
261	01/31/77	0.000	.452306E+01	.142947E-01	-.675902E+01	.114855E+02	0.	0.	.620000E-02
272	01/31/77	0.000	.456996E+01	.142947E-01	-.833681E+01	.114855E+02	0.	0.	.620000E-02
282	02/01/77	0.000	.452940E+01	.142947E-01	-.746523E+01	.114855E+02	0.	0.	.620000E-02
290	02/02/77	0.000	.452940E+01	.142947E-01	-.746523E+01	.114855E+02	0.	0.	.620000E-02
295	02/02/77	0.000	.451592E+01	.142947E-01	-.732330E+01	.114855E+02	0.	0.	.620000E-02
298	02/08/77	0.000	.444407E+01	.142947E-01	-.638348E+01	.114855E+02	0.	0.	.620000E-02
303	02/09/77	0.000	.447760E+01	.142947E-01	-.765183E+01	.114855E+02	0.	0.	.620000E-02
321	02/11/77	0.000	.447760E+01	.142947E-01	-.765183E+01	.114855E+02	0.	0.	.620000E-02
328	02/14/77	0.000	.443115E+01	.142947E-01	-.726353E+01	.114855E+02	0.	0.	.620000E-02
340	02/16/77	0.000	.436333E+01	.142947E-01	-.633599E+01	.114855E+02	0.	0.	.620000E-02
365	02/21/77	0.000	.436333E+01	.142947E-01	-.633599E+01	.114855E+02	0.	0.	.620000E-02
372	02/22/77	0.000	.436333E+01	.142947E-01	-.633599E+01	.114855E+02	0.	0.	.620000E-02
385	02/23/77	0.000	.431616E+01	.142947E-01	-.584847E+01	.114855E+02	0.	0.	.620000E-02
391	03/02/77	0.000	.425096E+01	.142947E-01	-.474185E+01	.114855E+02	0.	0.	.620000E-02
400	03/03/77	0.000	.425594E+01	.142947E-01	-.537225E+01	.114855E+02	0.	0.	.620000E-02
407	03/03/77	0.000	.425594E+01	.142947E-01	-.537225E+01	.114855E+02	0.	0.	.620000E-02
410	03/03/77	0.000	.433824E+01	.142947E-01	-.750508E+01	.114855E+02	0.	0.	.620000E-02
435	03/10/77	0.000	.487538E+01	.142947E-01	-.122169E+02	.114855E+02	0.	0.	.620000E-02
440	03/10/77	0.000	.468982E+01	.142947E-01	-.121120E+02	.114855E+02	0.	0.	.620000E-02
466	03/14/77	0.000	.467729E+01	.136196E-01	-.143214E+02	.112280E+02	0.	0.	.620000E-02
490	03/16/77	0.000	.458791E+01	.163144E-01	-.379541E+01	.115671E+02	0.	0.	.620000E-02
501	03/18/77	0.000	.458791E+01	.163144E-01	-.379541E+01	.115671E+02	0.	0.	.620000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 15: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.448734E+01	.163144E-01	-.949724E+00	.115671E+02	0.	0.	.620000E-02
519	03/21/77	0.000	.461170E+01	.163144E-01	-.536108E+01	.115671E+02	0.	0.	.620000E-02
536	03/23/77	0.000	.461170E+01	.163144E-01	-.536108E+01	.115671E+02	0.	0.	.620000E-02
545	03/23/77	0.000	.463279E+01	.163144E-01	-.407944E+01	.115671E+02	0.	0.	.620000E-02
567	03/28/77	0.000	.455898E+01	.156309E-01	-.756670E+01	.115839E+02	0.	0.	.620000E-02
574	03/29/77	0.000	.448352E+01	.156309E-01	-.527096E+01	.115839E+02	0.	0.	.620000E-02
599	04/01/77	0.000	.450676E+01	.156309E-01	-.635517E+01	.115839E+02	0.	0.	.620000E-02
614	04/05/77	0.000	.450063E+01	.170661E-01	-.400664E+01	.111355E+02	0.	0.	.620000E-02
620	04/06/77	0.000	.449031E+01	.170661E-01	-.491714E+01	.111355E+02	0.	0.	.620000E-02
634	04/28/77	0.000	.466055E+01	.163123E-01	-.494513E+01	.118335E+02	0.	0.	.620000E-02
645	04/28/77	0.000	.466055E+01	.163123E-01	-.494513E+01	.118335E+02	0.	0.	.620000E-02
658	05/09/77	0.000	.459378E+01	.168311E-01	-.348384E+00	.116271E+02	0.	0.	.620000E-02
667	05/10/77	0.000	.457983E+01	.148167E-01	-.577441E+01	.116271E+02	0.	0.	.620000E-02
685	05/11/77	0.000	.471076E+01	.137526E-01	-.117942E+02	.124333E+02	0.	0.	.620000E-02
693	05/12/77	0.000	.451672E+01	.166185E-01	.187339E+01	.124333E+02	0.	0.	.620000E-02
714	05/17/77	0.000	.459111E+01	.167791E-01	-.216360E+01	.113462E+02	0.	0.	.620000E-02
735	05/19/77	0.000	.455831E+01	.167791E-01	.152151E+01	.113462E+02	0.	0.	.620000E-02
758	05/20/77	0.000	.467936E+01	.167791E-01	-.109329E+01	.113462E+02	0.	0.	.620000E-02
774	05/20/77	0.000	.430254E+01	.167791E-01	.129939E+02	.113462E+02	0.	0.	.620000E-02
792	05/23/77	0.000	.468431E+01	.179181E-01	-.108485E+01	.107164E+02	0.	0.	.620000E-02
827	05/25/77	0.000	.464908E+01	.144625E-01	-.584180E+01	.123734E+02	0.	0.	.620000E-02
838	05/25/77	0.000	.447214E+01	.171881E-01	.498899E+01	.123736E+02	0.	0.	.620000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 15: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.460414E+01	.169376E-01	-.254768E+01	.112060E+02	0.	0.	.620000E-02
882	09/22/77	0.000	.451397E+01	.169376E-01	.426297E+01	.112060E+02	0.	0.	.620000E-02
895	09/29/77	0.000	.446529E+01	.169376E-01	-.315014E+01	.112060E+02	0.	0.	.620000E-02
927	10/03/77	0.000	.464031E+01	.147441E-01	-.117728E+02	.122583E+02	0.	0.	.620000E-02
955	10/04/77	0.000	.444381E+01	.147441E-01	-.677961E+01	.122583E+02	0.	0.	.620000E-02
968	10/05/77	0.000	.444381E+01	.147441E-01	-.677961E+01	.122583E+02	0.	0.	.620000E-02
1000	10/11/77	0.000	.447163E+01	.147441E-01	-.720547E+01	.122583E+02	0.	0.	.620000E-02
1103	10/14/77	0.000	.444601E+01	.147441E-01	-.775766E+01	.122583E+02	0.	0.	.620000E-02
1109	10/20/77	0.000	.441582E+01	.147441E-01	-.810721E+01	.122583E+02	0.	0.	.620000E-02
1131	10/21/77	0.000	.449606E+01	.166141E-01	-.548580E+01	.114948E+02	0.	0.	.620000E-02
1144	10/22/77	0.000	.443982E+01	.148731E-01	-.886381E+01	.114949E+02	0.	0.	.620000E-02
1161	10/25/77	0.000	.450145E+01	.167574E-01	-.515059E+01	.115502E+02	0.	0.	.620000E-02
1176	10/25/77	0.000	.445981E+01	.143354E-01	-.112972E+02	.115503E+02	0.	0.	.620000E-02
1182	10/27/77	0.000	.464182E+01	.165375E-01	-.581983E+01	.116583E+02	0.	0.	.620000E-02
1189	10/27/77	0.000	.464182E+01	.165375E-01	-.581983E+01	.116583E+02	0.	0.	.620000E-02
1209	10/28/77	0.000	.459905E+01	.147392E-01	-.106198E+02	.116584E+02	0.	0.	.620000E-02
1212	10/28/77	0.000	.459905E+01	.147392E-01	-.106198E+02	.116584E+02	0.	0.	.620000E-02
1228	10/31/77	0.000	.465822E+01	.163170E-01	-.641786E+01	.115379E+02	0.	0.	.620000E-02
1241	11/02/77	0.000	.461740E+01	.163373E-01	-.635290E+01	.114623E+02	0.	0.	.620000E-02
1257	11/03/77	0.000	.460482E+01	.139512E-01	-.140278E+02	.114623E+02	0.	0.	.620000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 15: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.459307E+01	.168554E-01	-.460443E+01	.115637E+02	0.	0.	.620000E-02
1292	11/07/77	0.000	.457039E+01	.163255E-01	-.633791E+01	.115196E+02	0.	0.	.620000E-02
1308	11/09/77	0.000	.458338E+01	.132483E-01	-.166300E+02	.115197E+02	0.	0.	.620000E-02
1322	11/10/77	0.000	.458783E+01	.162973E-01	-.639244E+01	.115146E+02	0.	0.	.620000E-02
1337	11/10/77	0.000	.455217E+01	.144696E-01	-.113808E+02	.115147E+02	0.	0.	.620000E-02
1354	11/14/77	0.000	.460597E+01	.168830E-01	-.434459E+01	.115110E+02	0.	0.	.620000E-02
1364	11/14/77	0.000	.460597E+01	.168830E-01	-.434459E+01	.115110E+02	0.	0.	.620000E-02
1368	11/14/77	0.000	.458032E+01	.148549E-01	-.106332E+02	.115111E+02	0.	0.	.620000E-02
1381	11/16/77	0.000	.456807E+01	.148549E-01	-.105925E+02	.115111E+02	0.	0.	.620000E-02
1398	11/17/77	0.000	.457299E+01	.148549E-01	-.108310E+02	.115111E+02	0.	0.	.620000E-02
1440	11/28/77	0.000	.461712E+01	.167737E-01	-.554034E+01	.114476E+02	0.	0.	.620000E-02
1455	11/29/77	0.000	.459380E+01	.139235E-01	-.139214E+02	.114476E+02	0.	0.	.620000E-02
1466	11/29/77	0.000	.459380E+01	.139235E-01	-.139214E+02	.114476E+02	0.	0.	.620000E-02
1483	12/02/77	0.000	.455837E+01	.164948E-01	-.549649E+01	.115299E+02	0.	0.	.620000E-02
1502	12/03/77	0.000	.453471E+01	.145533E-01	-.110402E+02	.115303E+02	0.	0.	.620000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 16: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.445268E+01	.197725E-01	-.125088E+01	.923985E+01	0.	0.	.600000E-02
218	01/24/77	0.000	.438567E+01	.197725E-01	.710924E+00	.923985E+01	0.	0.	.600000E-02
227	01/25/77	0.000	.438567E+01	.197725E-01	.710924E+00	.923985E+01	0.	0.	.600000E-02
244	01/28/77	0.000	.442772E+01	.197725E-01	-.100997E+01	.923985E+01	0.	0.	.600000E-02
250	01/29/77	0.000	.430780E+01	.197725E-01	.762994E+00	.923985E+01	0.	0.	.600000E-02
252	01/30/77	0.000	.437466E+01	.197725E-01	-.257295E+00	.923985E+01	0.	0.	.600000E-02
257	01/30/77	0.000	.437466E+01	.197725E-01	-.257295E+00	.923985E+01	0.	0.	.600000E-02
261	01/31/77	0.000	.432113E+01	.197725E-01	-.397151E-01	.923985E+01	0.	0.	.600000E-02
272	01/31/77	0.000	.435283E+01	.197725E-01	.554294E-01	.923985E+01	0.	0.	.600000E-02
282	02/01/77	0.000	.433340E+01	.197725E-01	.560240E-01	.923985E+01	0.	0.	.600000E-02
290	02/02/77	0.000	.433340E+01	.197725E-01	.560240E-01	.923985E+01	0.	0.	.600000E-02
295	02/02/77	0.000	.431805E+01	.197725E-01	-.148274E-01	.923985E+01	0.	0.	.600000E-02
298	02/08/77	0.000	.420623E+01	.197725E-01	.591941E+00	.923985E+01	0.	0.	.600000E-02
303	02/09/77	0.000	.423834E+01	.197725E-01	.275669E+00	.923985E+01	0.	0.	.600000E-02
321	02/11/77	0.000	.423834E+01	.197725E-01	.275669E+00	.923985E+01	0.	0.	.600000E-02
328	02/14/77	0.000	.418729E+01	.197725E-01	.288075E+00	.923985E+01	0.	0.	.600000E-02
340	02/16/77	0.000	.411530E+01	.197725E-01	.626702E+00	.923985E+01	0.	0.	.600000E-02
365	02/21/77	0.000	.411530E+01	.197725E-01	.626702E+00	.923985E+01	0.	0.	.600000E-02
372	02/22/77	0.000	.411530E+01	.197725E-01	.626702E+00	.923985E+01	0.	0.	.600000E-02
385	02/23/77	0.000	.412264E+01	.197725E-01	-.200367E-01	.923985E+01	0.	0.	.600000E-02
391	03/02/77	0.000	.410978E+01	.197725E-01	-.733346E+00	.923985E+01	0.	0.	.600000E-02
400	03/03/77	0.000	.405001E+01	.197725E-01	-.416770E-01	.923985E+01	0.	0.	.600000E-02
407	03/03/77	0.000	.405001E+01	.197725E-01	-.416770E-01	.923985E+01	0.	0.	.600000E-02
410	03/03/77	0.000	.416457E+01	.197725E-01	-.176394E+01	.923985E+01	0.	0.	.600000E-02
435	03/10/77	0.000	.507779E+01	.197725E-01	-.995493E+01	.923985E+01	0.	0.	.600000E-02
440	03/10/77	0.000	.457182E+01	.197725E-01	.101566E+01	.923985E+01	0.	0.	.600000E-02
466	03/14/77	0.000	.454326E+01	.194363E-01	.236190E+00	.911289E+01	0.	0.	.600000E-02
490	03/16/77	0.000	.453044E+01	.194481E-01	-.282810E+00	.917760E+01	0.	0.	.600000E-02
501	03/18/77	0.000	.453044E+01	.194481E-01	-.282810E+00	.917760E+01	0.	0.	.600000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 16: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.442432E+01	.194481E-01	.224990E+01	.917760E+01	0.	0.	.600000E-02
519	03/21/77	0.000	.452270E+01	.194481E-01	-.555519E+00	.917760E+01	0.	0.	.600000E-02
536	03/23/77	0.000	.452270E+01	.194481E-01	-.555519E+00	.917760E+01	0.	0.	.600000E-02
545	03/23/77	0.000	.455822E+01	.194481E-01	-.116100E+01	.917760E+01	0.	0.	.600000E-02
567	03/28/77	0.000	.451001E+01	.199670E-01	.645596E+00	.917967E+01	0.	0.	.600000E-02
574	03/29/77	0.000	.446490E+01	.199670E-01	.906213E+00	.917967E+01	0.	0.	.600000E-02
599	04/01/77	0.000	.440825E+01	.199670E-01	-.439236E+00	.917967E+01	0.	0.	.600000E-02
614	04/05/77	0.000	.441906E+01	.195633E-01	-.115191E+01	.916247E+01	0.	0.	.600000E-02
620	04/06/77	0.000	.433265E+01	.195633E-01	.980483E-01	.916247E+01	0.	0.	.600000E-02
634	04/28/77	0.000	.462176E+01	.194844E-01	-.983087E-01	.926004E+01	0.	0.	.600000E-02
645	04/28/77	0.000	.462176E+01	.194844E-01	-.983087E-01	.926004E+01	0.	0.	.600000E-02
658	05/09/77	0.000	.458709E+01	.201305E-01	.256377E+00	.920723E+01	0.	0.	.600000E-02
667	05/10/77	0.000	.455282E+01	.183216E-01	-.329541E+01	.920728E+01	0.	0.	.600000E-02
685	05/11/77	0.000	.453906E+01	.210092E-01	.258332E+01	.908040E+01	0.	0.	.600000E-02
693	05/12/77	0.000	.456090E+01	.180769E-01	-.459341E+01	.908041E+01	0.	0.	.600000E-02
714	05/17/77	0.000	.455211E+01	.206330E-01	-.153234E+00	.912811E+01	0.	0.	.600000E-02
735	05/19/77	0.000	.454159E+01	.206330E-01	.627786E+00	.912811E+01	0.	0.	.600000E-02
758	05/20/77	0.000	.455279E+01	.206330E-01	.609711E-01	.912811E+01	0.	0.	.600000E-02
774	05/20/77	0.000	.452397E+01	.206330E-01	.811284E+00	.912811E+01	0.	0.	.600000E-02
792	05/23/77	0.000	.451137E+01	.198839E-01	-.632125E+00	.922028E+01	0.	0.	.600000E-02
827	05/25/77	0.000	.460040E+01	.196427E-01	-.299983E+00	.933508E+01	0.	0.	.600000E-02
838	05/25/77	0.000	.456401E+01	.180900E-01	-.352181E+01	.933521E+01	0.	0.	.600000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 16: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.446890E+01	.199943E-01	-.611871E-01	.934915E+01	0.	0.	.600000E-02
882	09/22/77	0.000	.441519E+01	.199943E-01	-.416174E+00	.934915E+01	0.	0.	.600000E-02
895	09/29/77	0.000	.433503E+01	.199943E-01	-.718393E-01	.934915E+01	0.	0.	.600000E-02
927	10/03/77	0.000	.440272E+01	.169935E-01	-.578074E+01	.987543E+01	0.	0.	.600000E-02
955	10/04/77	0.000	.423700E+01	.169935E-01	-.340852E+01	.987543E+01	0.	0.	.600000E-02
968	10/05/77	0.000	.423700E+01	.169935E-01	-.340852E+01	.987543E+01	0.	0.	.600000E-02
1000	10/11/77	0.000	.416449E+01	.169935E-01	-.247924E+01	.987543E+01	0.	0.	.600000E-02
1103	10/14/77	0.000	.407751E+01	.169935E-01	-.214690E+01	.987543E+01	0.	0.	.600000E-02
1109	10/20/77	0.000	.398176E+01	.169935E-01	-.228337E+01	.987543E+01	0.	0.	.600000E-02
1131	10/21/77	0.000	.399000E+01	.194029E-01	-.266720E+00	.943374E+01	0.	0.	.600000E-02
1144	10/22/77	0.000	.392650E+01	.180488E-01	-.130361E+01	.943382E+01	0.	0.	.600000E-02
1161	10/25/77	0.000	.392787E+01	.193156E-01	-.301101E+00	.933684E+01	0.	0.	.600000E-02
1176	10/25/77	0.000	.394871E+01	.154875E-01	-.557781E+01	.933688E+01	0.	0.	.600000E-02
1182	10/27/77	0.000	.451313E+01	.188475E-01	-.207279E+01	.946931E+01	0.	0.	.600000E-02
1189	10/27/77	0.000	.451313E+01	.188475E-01	-.207279E+01	.946931E+01	0.	0.	.600000E-02
1209	10/28/77	0.000	.444378E+01	.176046E-01	-.444061E+01	.946936E+01	0.	0.	.600000E-02
1212	10/28/77	0.000	.444378E+01	.176046E-01	-.444061E+01	.946936E+01	0.	0.	.600000E-02
1228	10/31/77	0.000	.438200E+01	.191020E-01	-.121802E+01	.944672E+01	0.	0.	.600000E-02
1241	11/02/77	0.000	.426795E+01	.200886E-01	.625289E+00	.943727E+01	0.	0.	.600000E-02
1257	11/03/77	0.000	.424194E+01	.177328E-01	-.341861E+01	.943732E+01	0.	0.	.600000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 16: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.421676E+01	.195960E-01	-.182708E+00	.949170E+01	0.	0.	.600000E-02
1292	11/07/77	0.000	.408840E+01	.190600E-01	-.119569E+01	.915891E+01	0.	0.	.600000E-02
1308	11/09/77	0.000	.408345E+01	.158139E-01	-.655501E+01	.915902E+01	0.	0.	.600000E-02
1322	11/10/77	0.000	.400015E+01	.196301E-01	-.488305E-01	.941557E+01	0.	0.	.600000E-02
1337	11/10/77	0.000	.393751E+01	.182744E-01	-.130241E+01	.941564E+01	0.	0.	.600000E-02
1354	11/14/77	0.000	.452842E+01	.194606E-01	-.275891E+00	.944307E+01	0.	0.	.600000E-02
1364	11/14/77	0.000	.452842E+01	.194606E-01	-.275891E+00	.944307E+01	0.	0.	.600000E-02
1368	11/14/77	0.000	.446181E+01	.184531E-01	-.207822E+01	.944315E+01	0.	0.	.600000E-02
1381	11/16/77	0.000	.441680E+01	.184531E-01	-.218900E+01	.944315E+01	0.	0.	.600000E-02
1398	11/17/77	0.000	.434184E+01	.184531E-01	-.238233E+01	.944315E+01	0.	0.	.600000E-02
1440	11/28/77	0.000	.408200E+01	.198339E-01	.257816E+00	.937722E+01	0.	0.	.600000E-02
1455	11/29/77	0.000	.408193E+01	.173176E-01	-.346401E+01	.937724E+01	0.	0.	.600000E-02
1466	11/29/77	0.000	.408193E+01	.173176E-01	-.346401E+01	.937724E+01	0.	0.	.600000E-02
1483	12/02/77	0.000	.399473E+01	.194051E-01	-.119392E+00	.950654E+01	0.	0.	.600000E-02
1502	12/03/77	0.000	.396838E+01	.183479E-01	-.138841E+01	.950684E+01	0.	0.	.600000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 17: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.483161E+01	.632445E-02	-.227212E+02	.222176E+02	0.	0.	.211000E-01
218	01/24/77	0.000	.477734E+01	.632445E-02	-.216179E+02	.222176E+02	0.	0.	.211000E-01
227	01/25/77	0.000	.477734E+01	.632445E-02	-.216179E+02	.222176E+02	0.	0.	.211000E-01
244	01/28/77	0.000	.475622E+01	.632445E-02	-.213787E+02	.222176E+02	0.	0.	.211000E-01
250	01/29/77	0.000	.472987E+01	.632445E-02	-.205250E+02	.222176E+02	0.	0.	.211000E-01
252	01/30/77	0.000	.472267E+01	.632445E-02	-.198337E+02	.222176E+02	0.	0.	.211000E-01
257	01/30/77	0.000	.472267E+01	.632445E-02	-.198337E+02	.222176E+02	0.	0.	.211000E-01
261	01/31/77	0.000	.471444E+01	.632445E-02	-.195801E+02	.222176E+02	0.	0.	.211000E-01
272	01/31/77	0.000	.474561E+01	.632445E-02	-.216036E+02	.222176E+02	0.	0.	.211000E-01
282	02/01/77	0.000	.473209E+01	.632445E-02	-.214782E+02	.222176E+02	0.	0.	.211000E-01
290	02/02/77	0.000	.473209E+01	.632445E-02	-.214782E+02	.222176E+02	0.	0.	.211000E-01
295	02/02/77	0.000	.471341E+01	.632445E-02	-.207377E+02	.222176E+02	0.	0.	.211000E-01
298	02/08/77	0.000	.463861E+01	.632445E-02	-.181516E+02	.222176E+02	0.	0.	.211000E-01
303	02/09/77	0.000	.465417E+01	.632445E-02	-.193212E+02	.222176E+02	0.	0.	.211000E-01
321	02/11/77	0.000	.465417E+01	.632445E-02	-.193212E+02	.222176E+02	0.	0.	.211000E-01
328	02/14/77	0.000	.463068E+01	.632445E-02	-.188766E+02	.222176E+02	0.	0.	.211000E-01
340	02/16/77	0.000	.460085E+01	.632445E-02	-.174551E+02	.222176E+02	0.	0.	.211000E-01
365	02/21/77	0.000	.460085E+01	.632445E-02	-.174551E+02	.222176E+02	0.	0.	.211000E-01
372	02/22/77	0.000	.460085E+01	.632445E-02	-.174551E+02	.222176E+02	0.	0.	.211000E-01
385	02/23/77	0.000	.455160E+01	.632445E-02	-.163611E+02	.222176E+02	0.	0.	.211000E-01
391	03/02/77	0.000	.451255E+01	.632445E-02	-.154394E+02	.222176E+02	0.	0.	.211000E-01
400	03/03/77	0.000	.455397E+01	.632445E-02	-.172679E+02	.222176E+02	0.	0.	.211000E-01
407	03/03/77	0.000	.455397E+01	.632445E-02	-.172679E+02	.222176E+02	0.	0.	.211000E-01
410	03/03/77	0.000	.458836E+01	.632445E-02	-.200078E+02	.222176E+02	0.	0.	.211000E-01
435	03/10/77	0.000	.444924E+01	.632445E-02	.780108E+01	.222176E+02	0.	0.	.211000E-01
440	03/10/77	0.000	.481496E+01	.632445E-02	-.256811E+02	.222176E+02	0.	0.	.211000E-01
466	03/14/77	0.000	.481919E+01	.603293E-02	-.293996E+02	.219699E+02	0.	0.	.211000E-01
490	03/16/77	0.000	.471438E+01	.700040E-02	-.166306E+02	.221181E+02	0.	0.	.211000E-01
501	03/18/77	0.000	.471438E+01	.700040E-02	-.166306E+02	.221181E+02	0.	0.	.211000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 17: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.472904E+01	.700040E-02	-.182707E+02	.221181E+02	0.	0.	.211000E-01
519	03/21/77	0.000	.472491E+01	.700040E-02	-.179853E+02	.221181E+02	0.	0.	.211000E-01
536	03/23/77	0.000	.472491E+01	.700040E-02	-.179853E+02	.221181E+02	0.	0.	.211000E-01
545	03/23/77	0.000	.472030E+01	.700040E-02	-.178539E+02	.221181E+02	0.	0.	.211000E-01
567	03/28/77	0.000	.446598E+01	.841724E-02	-.493360E+01	.214778E+02	0.	0.	.211000E-01
574	03/29/77	0.000	.440902E+01	.841724E-02	-.255297E+01	.214778E+02	0.	0.	.211000E-01
599	04/01/77	0.000	.446120E+01	.841724E-02	-.493307E+01	.214778E+02	0.	0.	.211000E-01
614	04/05/77	0.000	.441007E+01	.889619E-02	-.181053E+01	.211466E+02	0.	0.	.211000E-01
620	04/06/77	0.000	.439738E+01	.889619E-02	-.213828E+01	.211466E+02	0.	0.	.211000E-01
634	04/28/77	0.000	.469623E+01	.793232E-02	-.618999E+01	.222212E+02	0.	0.	.211000E-01
645	04/28/77	0.000	.469623E+01	.793232E-02	-.618999E+01	.222212E+02	0.	0.	.211000E-01
658	05/09/77	0.000	.458150E+01	.859748E-02	.128038E+01	.219454E+02	0.	0.	.211000E-01
667	05/10/77	0.000	.469855E+01	.725444E-02	-.112800E+02	.219455E+02	0.	0.	.211000E-01
685	05/11/77	0.000	.486754E+01	.634027E-02	-.274669E+02	.225363E+02	0.	0.	.211000E-01
693	05/12/77	0.000	.468048E+01	.737961E-02	-.759461E+01	.225363E+02	0.	0.	.211000E-01
714	05/17/77	0.000	.461700E+01	.847660E-02	-.443392E+00	.216005E+02	0.	0.	.211000E-01
735	05/19/77	0.000	.464218E+01	.847660E-02	-.123985E+01	.216005E+02	0.	0.	.211000E-01
758	05/20/77	0.000	.466321E+01	.847660E-02	-.206688E+01	.216005E+02	0.	0.	.211000E-01
774	05/20/77	0.000	.464653E+01	.847660E-02	-.144200E+01	.216005E+02	0.	0.	.211000E-01
792	05/23/77	0.000	.463301E+01	.872085E-02	.313833E+00	.218326E+02	0.	0.	.211000E-01
827	05/25/77	0.000	.466630E+01	.786866E-02	-.559615E+01	.221885E+02	0.	0.	.211000E-01
838	05/25/77	0.000	.483785E+01	.576091E-02	-.295506E+02	.221888E+02	0.	0.	.211000E-01

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INSTRUMENT NO. 17: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.468728E+01	.816775E-02	-.388151E+01	.224348E+02	0.	0.	.211000E-01
882	09/22/77	0.000	.468446E+01	.816775E-02	-.526478E+01	.224348E+02	0.	0.	.211000E-01
895	09/29/77	0.000	.463335E+01	.816775E-02	-.371941E+01	.224348E+02	0.	0.	.211000E-01
927	10/03/77	0.000	.469981E+01	.776303E-02	-.804090E+01	.230022E+02	0.	0.	.211000E-01
955	10/04/77	0.000	.465038E+01	.776303E-02	-.665609E+01	.230022E+02	0.	0.	.211000E-01
968	10/05/77	0.000	.465038E+01	.776303E-02	-.665609E+01	.230022E+02	0.	0.	.211000E-01
1000	10/11/77	0.000	.460274E+01	.776303E-02	-.333024E+01	.230022E+02	0.	0.	.211000E-01
1103	10/14/77	0.000	.462099E+01	.776303E-02	-.498091E+01	.230022E+02	0.	0.	.211000E-01
1109	10/20/77	0.000	.459860E+01	.776303E-02	-.503248E+01	.230022E+02	0.	0.	.211000E-01
1131	10/21/77	0.000	.456312E+01	.866567E-02	.737002E+00	.227165E+02	0.	0.	.211000E-01
1144	10/22/77	0.000	.470660E+01	.641992E-02	-.177654E+02	.227167E+02	0.	0.	.211000E-01
1161	10/25/77	0.000	.455225E+01	.859402E-02	.116962E+01	.227447E+02	0.	0.	.211000E-01
1176	10/25/77	0.000	.459105E+01	.753529E-02	-.672461E+01	.227448E+02	0.	0.	.211000E-01
1182	10/27/77	0.000	.454380E+01	.853374E-02	.403438E+00	.231444E+02	0.	0.	.211000E-01
1189	10/27/77	0.000	.454380E+01	.853374E-02	.403438E+00	.231444E+02	0.	0.	.211000E-01
1209	10/28/77	0.000	.463195E+01	.708040E-02	-.110454E+02	.231445E+02	0.	0.	.211000E-01
1212	10/28/77	0.000	.463195E+01	.708040E-02	-.110454E+02	.231445E+02	0.	0.	.211000E-01
1228	10/31/77	0.000	.455991E+01	.819548E-02	-.277209E+01	.228033E+02	0.	0.	.211000E-01
1241	11/02/77	0.000	.450794E+01	.823538E-02	-.194855E+01	.228571E+02	0.	0.	.211000E-01
1257	11/03/77	0.000	.476768E+01	.561706E-02	-.311642E+02	.228572E+02	0.	0.	.211000E-01

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INSTRUMENT NO. 17: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.447904E+01	.854624E-02	.974525E-01	.232014E+02	0.	0.	.211000E-01
1292	11/07/77	0.000	.442715E+01	.813848E-02	-.281627E+01	.232665E+02	0.	0.	.211000E-01
1308	11/09/77	0.000	.461335E+01	.572464E-02	-.245814E+02	.232668E+02	0.	0.	.211000E-01
1322	11/10/77	0.000	.439644E+01	.828488E-02	-.253321E+01	.228771E+02	0.	0.	.211000E-01
1337	11/10/77	0.000	.472822E+01	.473755E-02	-.399064E+02	.228773E+02	0.	0.	.211000E-01
1354	11/14/77	0.000	.454023E+01	.837176E-02	-.255515E+01	.228606E+02	0.	0.	.211000E-01
1364	11/14/77	0.000	.454023E+01	.837176E-02	-.255515E+01	.228606E+02	0.	0.	.211000E-01
1368	11/14/77	0.000	.468407E+01	.614826E-02	-.232332E+02	.228608E+02	0.	0.	.211000E-01
1381	11/16/77	0.000	.463773E+01	.614826E-02	-.218079E+02	.228608E+02	0.	0.	.211000E-01
1398	11/17/77	0.000	.451983E+01	.614826E-02	-.191626E+02	.228608E+02	0.	0.	.211000E-01
1440	11/28/77	0.000	.383995E+01	.911887E-02	-.128583E+01	.208566E+02	0.	0.	.211000E-01
1455	11/29/77	0.000	.471651E+01	.236183E-02	-.737680E+02	.208567E+02	0.	0.	.211000E-01
1466	11/29/77	0.000	.471651E+01	.236183E-02	-.737680E+02	.208567E+02	0.	0.	.211000E-01
1483	12/02/77	0.000	.347365E+01	.885521E-02	.173851E+00	.222652E+02	0.	0.	.211000E-01
1502	12/03/77	0.000	.365445E+01	.561442E-02	-.958001E+01	.222659E+02	0.	0.	.211000E-01

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INSTRUMENT NO. 18: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.444358E+01	.164233E-01	.812393E+00	.120295E+02	0.	0.	.136000E-01
218	01/24/77	0.000	.441457E+01	.164233E-01	-.761452E+00	.120295E+02	0.	0.	.136000E-01
227	01/25/77	0.000	.441457E+01	.164233E-01	-.761452E+00	.120295E+02	0.	0.	.136000E-01
244	01/28/77	0.000	.442410E+01	.164233E-01	-.137819E+01	.120295E+02	0.	0.	.136000E-01
250	01/29/77	0.000	.437146E+01	.164233E-01	-.715352E+00	.120295E+02	0.	0.	.136000E-01
252	01/30/77	0.000	.440879E+01	.164233E-01	-.935362E+00	.120295E+02	0.	0.	.136000E-01
257	01/30/77	0.000	.440879E+01	.164233E-01	-.935362E+00	.120295E+02	0.	0.	.136000E-01
261	01/31/77	0.000	.439004E+01	.164233E-01	-.975643E+00	.120295E+02	0.	0.	.136000E-01
272	01/31/77	0.000	.439161E+01	.164233E-01	-.100002E+01	.120295E+02	0.	0.	.136000E-01
282	02/01/77	0.000	.437366E+01	.164233E-01	-.829270E+00	.120295E+02	0.	0.	.136000E-01
290	02/02/77	0.000	.437366E+01	.164233E-01	-.829270E+00	.120295E+02	0.	0.	.136000E-01
295	02/02/77	0.000	.437794E+01	.164233E-01	-.957877E+00	.120295E+02	0.	0.	.136000E-01
298	02/08/77	0.000	.430731E+01	.164233E-01	-.114160E+01	.120295E+02	0.	0.	.136000E-01
303	02/09/77	0.000	.431259E+01	.164233E-01	-.744167E+00	.120295E+02	0.	0.	.136000E-01
321	02/11/77	0.000	.431259E+01	.164233E-01	-.744167E+00	.120295E+02	0.	0.	.136000E-01
328	02/14/77	0.000	.429331E+01	.164233E-01	-.119293E+01	.120295E+02	0.	0.	.136000E-01
340	02/16/77	0.000	.426382E+01	.164233E-01	-.399003E+00	.120295E+02	0.	0.	.136000E-01
365	02/21/77	0.000	.426382E+01	.164233E-01	-.399003E+00	.120295E+02	0.	0.	.136000E-01
372	02/22/77	0.000	.426382E+01	.164233E-01	-.399003E+00	.120295E+02	0.	0.	.136000E-01
385	02/23/77	0.000	.424055E+01	.164233E-01	.592769E-01	.120295E+02	0.	0.	.136000E-01
391	03/02/77	0.000	.427217E+01	.164233E-01	-.917493E+00	.120295E+02	0.	0.	.136000E-01
400	03/03/77	0.000	.425506E+01	.164233E-01	-.447775E+00	.120295E+02	0.	0.	.136000E-01
407	03/03/77	0.000	.425506E+01	.164233E-01	-.447775E+00	.120295E+02	0.	0.	.136000E-01
410	03/03/77	0.000	.434303E+01	.164233E-01	-.279866E+01	.120295E+02	0.	0.	.136000E-01
435	03/10/77	0.000	.478643E+01	.164233E-01	-.623391E+00	.120295E+02	0.	0.	.136000E-01
440	03/10/77	0.000	.458561E+01	.164233E-01	-.138496E+01	.120295E+02	0.	0.	.136000E-01
466	03/14/77	0.000	.452977E+01	.167023E-01	.591190E+00	.121411E+02	0.	0.	.136000E-01
490	03/16/77	0.000	.454140E+01	.163273E-01	-.767610E+00	.122216E+02	0.	0.	.136000E-01
501	03/18/77	0.000	.454140E+01	.163273E-01	-.767610E+00	.122216E+02	0.	0.	.136000E-01

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INSTRUMENT NO. 18: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.461271E+01	.163273E-01	-.318202E+01	.122216E+02	0.	0.	.136000E-01
519	03/21/77	0.000	.456959E+01	.163273E-01	-.160537E+01	.122216E+02	0.	0.	.136000E-01
536	03/23/77	0.000	.456959E+01	.163273E-01	-.160537E+01	.122216E+02	0.	0.	.136000E-01
545	03/23/77	0.000	.455200E+01	.163273E-01	-.853955E+00	.122216E+02	0.	0.	.136000E-01
567	03/28/77	0.000	.453138E+01	.163967E-01	-.130218E+01	.119559E+02	0.	0.	.136000E-01
574	03/29/77	0.000	.451313E+01	.163967E-01	-.113339E+01	.119559E+02	0.	0.	.136000E-01
599	04/01/77	0.000	.453116E+01	.163967E-01	-.170374E+01	.119559E+02	0.	0.	.136000E-01
614	04/05/77	0.000	.455554E+01	.168367E-01	-.728370E+00	.117669E+02	0.	0.	.136000E-01
620	04/06/77	0.000	.449383E+01	.168367E-01	-.446633E+00	.117669E+02	0.	0.	.136000E-01
634	04/28/77	0.000	.464094E+01	.159936E-01	-.239782E+01	.119491E+02	0.	0.	.136000E-01
645	04/28/77	0.000	.464094E+01	.159936E-01	-.239782E+01	.119491E+02	0.	0.	.136000E-01
658	05/09/77	0.000	.459393E+01	.166533E-01	-.736645E+00	.117018E+02	0.	0.	.136000E-01
667	05/10/77	0.000	.460372E+01	.135845E-01	-.104826E+02	.117018E+02	0.	0.	.136000E-01
685	05/11/77	0.000	.454822E+01	.172207E-01	.152675E+01	.115070E+02	0.	0.	.136000E-01
693	05/12/77	0.000	.461596E+01	.135330E-01	-.113128E+02	.115071E+02	0.	0.	.136000E-01
714	05/17/77	0.000	.455306E+01	.160759E-01	-.272774E+01	.116034E+02	0.	0.	.136000E-01
735	05/19/77	0.000	.453827E+01	.160759E-01	-.221630E+01	.116034E+02	0.	0.	.136000E-01
758	05/20/77	0.000	.456820E+01	.160759E-01	-.281622E+01	.116034E+02	0.	0.	.136000E-01
774	05/20/77	0.000	.455693E+01	.160759E-01	-.282210E+01	.116034E+02	0.	0.	.136000E-01
792	05/23/77	0.000	.452071E+01	.161947E-01	-.158389E+01	.120041E+02	0.	0.	.136000E-01
827	05/25/77	0.000	.462128E+01	.161083E-01	-.176288E+01	.118609E+02	0.	0.	.136000E-01
838	05/25/77	0.000	.459395E+01	.144807E-01	-.653561E+01	.118606E+02	0.	0.	.136000E-01

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INSTRUMENT NO. 18: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.455376E+01	.161543E-01	-.120934E+01	.118513E+02	0.	0.	.136000E-01
882	09/22/77	0.000	.454793E+01	.161543E-01	-.144161E+01	.118513E+02	0.	0.	.136000E-01
895	09/29/77	0.000	.452817E+01	.161543E-01	-.515209E+00	.118513E+02	0.	0.	.136000E-01
927	10/03/77	0.000	.457310E+01	.141288E-01	-.689851E+01	.120977E+02	0.	0.	.136000E-01
955	10/04/77	0.000	.449927E+01	.141288E-01	-.548641E+01	.120977E+02	0.	0.	.136000E-01
968	10/05/77	0.000	.449927E+01	.141288E-01	-.548641E+01	.120977E+02	0.	0.	.136000E-01
1000	10/11/77	0.000	.448896E+01	.141288E-01	-.452492E+01	.120977E+02	0.	0.	.136000E-01
1103	10/14/77	0.000	.447859E+01	.141288E-01	-.518762E+01	.120977E+02	0.	0.	.136000E-01
1109	10/20/77	0.000	.444391E+01	.141288E-01	-.446192E+01	.120977E+02	0.	0.	.136000E-01
1131	10/21/77	0.000	.449814E+01	.135421E-01	-.693697E+01	.117931E+02	0.	0.	.136000E-01
1144	10/22/77	0.000	.449752E+01	.127112E-01	-.100448E+02	.117930E+02	0.	0.	.136000E-01
1161	10/25/77	0.000	.448797E+01	.139682E-01	-.593605E+01	.115744E+02	0.	0.	.136000E-01
1176	10/25/77	0.000	.456166E+01	.111472E-01	-.177354E+02	.115744E+02	0.	0.	.136000E-01
1182	10/27/77	0.000	.463788E+01	.137668E-01	-.715029E+01	.119064E+02	0.	0.	.136000E-01
1189	10/27/77	0.000	.463788E+01	.137668E-01	-.715029E+01	.119064E+02	0.	0.	.136000E-01
1209	10/28/77	0.000	.462629E+01	.137668E-01	-.800922E+01	.119064E+02	0.	0.	.136000E-01
1212	10/28/77	0.000	.462629E+01	.137668E-01	-.800922E+01	.119064E+02	0.	0.	.136000E-01
1228	10/31/77	0.000	.462080E+01	.142351E-01	-.555532E+01	.116516E+02	0.	0.	.136000E-01
1241	11/02/77	0.000	.461497E+01	.135503E-01	-.781297E+01	.116724E+02	0.	0.	.136000E-01
1257	11/03/77	0.000	.471033E+01	.109609E-01	-.218008E+02	.116722E+02	0.	0.	.136000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 18: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.462763E+01	.132710E-01	-.873064E+01	.118605E+02	0.	0.	.136000E-01
1292	11/07/77	0.000	.459206E+01	.133428E-01	-.794342E+01	.116228E+02	0.	0.	.136000E-01
1308	11/09/77	0.000	.469187E+01	.114631E-01	-.196652E+02	.116227E+02	0.	0.	.136000E-01
1322	11/10/77	0.000	.463461E+01	.131916E-01	-.945168E+01	.115313E+02	0.	0.	.136000E-01
1337	11/10/77	0.000	.470241E+01	.111317E-01	-.206688E+02	.115310E+02	0.	0.	.136000E-01
1354	11/14/77	0.000	.462660E+01	.135625E-01	-.771504E+01	.117023E+02	0.	0.	.136000E-01
1364	11/14/77	0.000	.462660E+01	.135625E-01	-.771504E+01	.117023E+02	0.	0.	.136000E-01
1368	11/14/77	0.000	.512154E+01	.531839E-02	-.857858E+02	.117021E+02	0.	0.	.136000E-01
1381	11/16/77	0.000	.513166E+01	.531839E-02	-.870742E+02	.117021E+02	0.	0.	.136000E-01
1398	11/17/77	0.000	.512362E+01	.531839E-02	-.860914E+02	.117021E+02	0.	0.	.136000E-01
1440	11/28/77	0.000	.462170E+01	.130920E-01	-.997540E+01	.115366E+02	0.	0.	.136000E-01
1455	11/29/77	0.000	.469223E+01	.109398E-01	-.216290E+02	.115364E+02	0.	0.	.136000E-01
1466	11/29/77	0.000	.469223E+01	.109398E-01	-.216290E+02	.115364E+02	0.	0.	.136000E-01
1483	12/02/77	0.000	.461488E+01	.120956E-01	-.127343E+02	.114470E+02	0.	0.	.136000E-01
1502	12/03/77	0.000	.468981E+01	.108199E-01	-.218770E+02	.114470E+02	0.	0.	.136000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 19: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.468188E+01	.168799E-01	-.747309E+01	.883771E+01	0.	0.	.530000E-02
218	01/24/77	0.000	.463207E+01	.168799E-01	-.786292E+01	.883771E+01	0.	0.	.530000E-02
227	01/25/77	0.000	.463207E+01	.168799E-01	-.786292E+01	.883771E+01	0.	0.	.530000E-02
244	01/28/77	0.000	.463686E+01	.168799E-01	-.891227E+01	.883771E+01	0.	0.	.530000E-02
250	01/29/77	0.000	.453399E+01	.168799E-01	-.669519E+01	.883771E+01	0.	0.	.530000E-02
252	01/30/77	0.000	.457388E+01	.168799E-01	-.668269E+01	.883771E+01	0.	0.	.530000E-02
257	01/30/77	0.000	.457388E+01	.168799E-01	-.668269E+01	.883771E+01	0.	0.	.530000E-02
261	01/31/77	0.000	.449823E+01	.168799E-01	-.574938E+01	.883771E+01	0.	0.	.530000E-02
272	01/31/77	0.000	.462579E+01	.168799E-01	-.932860E+01	.883771E+01	0.	0.	.530000E-02
282	02/01/77	0.000	.456830E+01	.168799E-01	-.831488E+01	.883771E+01	0.	0.	.530000E-02
290	02/02/77	0.000	.456830E+01	.168799E-01	-.831488E+01	.883771E+01	0.	0.	.530000E-02
295	02/02/77	0.000	.454527E+01	.168799E-01	-.778288E+01	.883771E+01	0.	0.	.530000E-02
298	02/08/77	0.000	.437141E+01	.168799E-01	-.502483E+01	.883771E+01	0.	0.	.530000E-02
303	02/09/77	0.000	.448799E+01	.168799E-01	-.795159E+01	.883771E+01	0.	0.	.530000E-02
321	02/11/77	0.000	.448799E+01	.168799E-01	-.795159E+01	.883771E+01	0.	0.	.530000E-02
328	02/14/77	0.000	.437899E+01	.168799E-01	-.642580E+01	.883771E+01	0.	0.	.530000E-02
340	02/16/77	0.000	.429786E+01	.168799E-01	-.513294E+01	.883771E+01	0.	0.	.530000E-02
365	02/21/77	0.000	.429786E+01	.168799E-01	-.513294E+01	.883771E+01	0.	0.	.530000E-02
372	02/22/77	0.000	.429786E+01	.168799E-01	-.513294E+01	.883771E+01	0.	0.	.530000E-02
385	02/23/77	0.000	.433645E+01	.168799E-01	-.604561E+01	.883771E+01	0.	0.	.530000E-02
391	03/02/77	0.000	.425060E+01	.168799E-01	-.480638E+01	.883771E+01	0.	0.	.530000E-02
400	03/03/77	0.000	.423579E+01	.168799E-01	-.468850E+01	.883771E+01	0.	0.	.530000E-02
407	03/03/77	0.000	.423579E+01	.168799E-01	-.468850E+01	.883771E+01	0.	0.	.530000E-02
410	03/03/77	0.000	.436569E+01	.168799E-01	-.772392E+01	.883771E+01	0.	0.	.530000E-02
435	03/10/77	0.000	.510513E+01	.168799E-01	-.244816E+02	.883771E+01	0.	0.	.530000E-02
440	03/10/77	0.000	.461599E+01	.168799E-01	-.106852E+02	.883771E+01	0.	0.	.530000E-02
466	03/14/77	0.000	.461449E+01	.157727E-01	-.138406E+02	.851046E+01	0.	0.	.530000E-02
490	03/16/77	0.000	.453096E+01	.197778E-01	-.290010E+00	.896509E+01	0.	0.	.530000E-02
501	03/18/77	0.000	.453096E+01	.197778E-01	-.290010E+00	.896509E+01	0.	0.	.530000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 19: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.434290E+01	.197778E-01	.149087E+02	.896509E+01	0.	0.	.530000E-02
519	03/21/77	0.000	.459972E+01	.197778E-01	.769015E+01	.896509E+01	0.	0.	.530000E-02
536	03/23/77	0.000	.459972E+01	.197778E-01	.769015E+01	.896509E+01	0.	0.	.530000E-02
545	03/23/77	0.000	.461275E+01	.197778E-01	.114917E+02	.896509E+01	0.	0.	.530000E-02
567	03/28/77	0.000	.465581E+01	.189913E-01	-.413006E+01	.362647E+01	0.	0.	.530000E-02
574	03/29/77	0.000	.468910E+01	.189913E-01	-.595809E+01	.362647E+01	0.	0.	.530000E-02
599	04/01/77	0.000	.460632E+01	.189913E-01	-.332070E+01	.362647E+01	0.	0.	.530000E-02
614	04/05/77	0.000	.462879E+01	.196591E-01	-.342442E+01	.333940E+01	0.	0.	.530000E-02
620	04/06/77	0.000	.466023E+01	.196591E-01	-.595453E+01	.333940E+01	0.	0.	.530000E-02
634	04/28/77	0.000	.466761E+01	.209201E-01	.128819E+01	.314466E+01	0.	0.	.530000E-02
645	04/28/77	0.000	.466761E+01	.209201E-01	.128819E+01	.314466E+01	0.	0.	.530000E-02
658	05/09/77	0.000	.457323E+01	.196427E-01	.871062E+00	.356024E+01	0.	0.	.530000E-02
667	05/10/77	0.000	.455210E+01	.196427E-01	.582409E+00	.356024E+01	0.	0.	.530000E-02
685	05/11/77	0.000	.467292E+01	.165356E-01	-.870630E+01	.365474E+01	0.	0.	.530000E-02
693	05/12/77	0.000	.447283E+01	.165356E-01	-.162203E+01	.365474E+01	0.	0.	.530000E-02
714	05/17/77	0.000	.456958E+01	.197275E-01	-.372207E+00	.324559E+01	0.	0.	.530000E-02
735	05/19/77	0.000	.462822E+01	.197275E-01	-.228007E+01	.324559E+01	0.	0.	.530000E-02
758	05/20/77	0.000	.471510E+01	.197275E-01	-.548999E+01	.324559E+01	0.	0.	.530000E-02
774	05/20/77	0.000	.472532E+01	.197275E-01	-.552490E+01	.324559E+01	0.	0.	.530000E-02
792	05/23/77	0.000	.452264E+01	.208076E-01	.349889E+01	.355371E+01	0.	0.	.530000E-02
827	05/25/77	0.000	.454600E+01	.191177E-01	-.146682E+00	.354604E+01	0.	0.	.530000E-02
838	05/25/77	0.000	.452243E+01	.191177E-01	-.647186E+00	.354604E+01	0.	0.	.530000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 19: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.444051E+01	.193927E-01	-.548022E+00	.873257E+01	0.	0.	.530000E-02
882	09/22/77	0.000	.443134E+01	.193927E-01	-.143790E+01	.873257E+01	0.	0.	.530000E-02
895	09/29/77	0.000	.440139E+01	.193927E-01	-.127332E+01	.873257E+01	0.	0.	.530000E-02
927	10/03/77	0.000	.425887E+01	.195777E-01	-.165584E-01	.876935E+01	0.	0.	.530000E-02
955	10/04/77	0.000	.431968E+01	.195777E-01	-.127496E+01	.876935E+01	0.	0.	.530000E-02
968	10/05/77	0.000	.431968E+01	.195777E-01	-.127496E+01	.876935E+01	0.	0.	.530000E-02
1000	10/11/77	0.000	.416734E+01	.195777E-01	.354450E+00	.876935E+01	0.	0.	.530000E-02
1103	10/14/77	0.000	.418664E+01	.195777E-01	.973251E-02	.876935E+01	0.	0.	.530000E-02
1109	10/20/77	0.000	.417741E+01	.195777E-01	-.174089E+00	.876935E+01	0.	0.	.530000E-02
1131	10/21/77	0.000	.415578E+01	.193040E-01	-.706780E+00	.860533E+01	0.	0.	.530000E-02
1144	10/22/77	0.000	.418220E+01	.175606E-01	-.342841E+01	.860528E+01	0.	0.	.530000E-02
1161	10/25/77	0.000	.409637E+01	.197268E-01	.360306E+00	.871138E+01	0.	0.	.530000E-02
1176	10/25/77	0.000	.414141E+01	.178297E-01	-.305321E+01	.871137E+01	0.	0.	.530000E-02
1182	10/27/77	0.000	.441614E+01	.192143E-01	-.125806E+01	.877235E+01	0.	0.	.530000E-02
1189	10/27/77	0.000	.441614E+01	.192143E-01	-.125806E+01	.877235E+01	0.	0.	.530000E-02
1209	10/28/77	0.000	.443909E+01	.192143E-01	-.221055E+01	.877235E+01	0.	0.	.530000E-02
1212	10/28/77	0.000	.443909E+01	.192143E-01	-.221055E+01	.877235E+01	0.	0.	.530000E-02
1228	10/31/77	0.000	.435340E+01	.195519E-01	-.611891E+00	.875756E+01	0.	0.	.530000E-02
1241	11/02/77	0.000	.438346E+01	.191435E-01	-.139006E+01	.877940E+01	0.	0.	.530000E-02
1257	11/03/77	0.000	.438401E+01	.173645E-01	-.473861E+01	.877930E+01	0.	0.	.530000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 19: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.439617E+01	.188519E-01	-.197076E+01	.884242E+01	0.	0.	.530000E-02
1292	11/07/77	0.000	.439720E+01	.196553E-01	-.569964E+00	.842038E+01	0.	0.	.530000E-02
1308	11/09/77	0.000	.446591E+01	.166235E-01	-.862121E+01	.842025E+01	0.	0.	.530000E-02
1322	11/10/77	0.000	.439063E+01	.193304E-01	-.117360E+01	.878196E+01	0.	0.	.530000E-02
1337	11/10/77	0.000	.438101E+01	.185709E-01	-.259421E+01	.878176E+01	0.	0.	.530000E-02
1354	11/14/77	0.000	.446803E+01	.191578E-01	-.165094E+01	.888710E+01	0.	0.	.530000E-02
1364	11/14/77	0.000	.446803E+01	.191578E-01	-.165094E+01	.888710E+01	0.	0.	.530000E-02
1368	11/14/77	0.000	.440777E+01	.192801E-01	-.326410E+00	.888698E+01	0.	0.	.530000E-02
1381	11/16/77	0.000	.446798E+01	.192801E-01	-.206585E+01	.888698E+01	0.	0.	.530000E-02
1398	11/17/77	0.000	.444609E+01	.192801E-01	-.121369E+01	.888698E+01	0.	0.	.530000E-02
1440	11/28/77	0.000	.439556E+01	.196772E-01	-.132561E+01	.866259E+01	0.	0.	.530000E-02
1455	11/29/77	0.000	.436547E+01	.179817E-01	-.411061E+01	.866248E+01	0.	0.	.530000E-02
1466	11/29/77	0.000	.436547E+01	.179817E-01	-.411061E+01	.866248E+01	0.	0.	.530000E-02
1483	12/02/77	0.000	.440895E+01	.187718E-01	-.221829E+01	.882933E+01	0.	0.	.530000E-02
1502	12/03/77	0.000	.440477E+01	.175620E-01	-.505261E+01	.882933E+01	0.	0.	.530000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 20: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.469446E+01	.572337E-02	-.284702E+02	.215284E+02	0.	0.	.144000E-01
218	01/24/77	0.000	.453628E+01	.572337E-02	-.234502E+02	.215284E+02	0.	0.	.144000E-01
227	01/25/77	0.000	.453628E+01	.572337E-02	-.234502E+02	.215284E+02	0.	0.	.144000E-01
244	01/28/77	0.000	.453720E+01	.572337E-02	-.253715E+02	.215284E+02	0.	0.	.144000E-01
250	01/29/77	0.000	.443558E+01	.572337E-02	-.210475E+02	.215284E+02	0.	0.	.144000E-01
252	01/30/77	0.000	.445125E+01	.572337E-02	-.212964E+02	.215284E+02	0.	0.	.144000E-01
257	01/30/77	0.000	.445125E+01	.572337E-02	-.212964E+02	.215284E+02	0.	0.	.144000E-01
261	01/31/77	0.000	.443835E+01	.572337E-02	-.213314E+02	.215284E+02	0.	0.	.144000E-01
272	01/31/77	0.000	.443324E+01	.572337E-02	-.214448E+02	.215284E+02	0.	0.	.144000E-01
282	02/01/77	0.000	.441855E+01	.572337E-02	-.215936E+02	.215284E+02	0.	0.	.144000E-01
290	02/02/77	0.000	.441855E+01	.572337E-02	-.215936E+02	.215284E+02	0.	0.	.144000E-01
295	02/02/77	0.000	.441179E+01	.572337E-02	-.214264E+02	.215284E+02	0.	0.	.144000E-01
298	02/08/77	0.000	.431451E+01	.572337E-02	-.186416E+02	.215284E+02	0.	0.	.144000E-01
303	02/09/77	0.000	.432871E+01	.572337E-02	-.196068E+02	.215284E+02	0.	0.	.144000E-01
321	02/11/77	0.000	.432871E+01	.572337E-02	-.196068E+02	.215284E+02	0.	0.	.144000E-01
328	02/14/77	0.000	.431448E+01	.572337E-02	-.201720E+02	.215284E+02	0.	0.	.144000E-01
340	02/16/77	0.000	.425981E+01	.572337E-02	-.180446E+02	.215284E+02	0.	0.	.144000E-01
365	02/21/77	0.000	.425981E+01	.572337E-02	-.180446E+02	.215284E+02	0.	0.	.144000E-01
372	02/22/77	0.000	.425981E+01	.572337E-02	-.180446E+02	.215284E+02	0.	0.	.144000E-01
385	02/23/77	0.000	.418338E+01	.572337E-02	-.162361E+02	.215284E+02	0.	0.	.144000E-01
391	03/02/77	0.000	.411238E+01	.572337E-02	-.141117E+02	.215284E+02	0.	0.	.144000E-01
400	03/03/77	0.000	.416152E+01	.572337E-02	-.157338E+02	.215284E+02	0.	0.	.144000E-01
407	03/03/77	0.000	.416152E+01	.572337E-02	-.157338E+02	.215284E+02	0.	0.	.144000E-01
410	03/03/77	0.000	.418025E+01	.572337E-02	-.172218E+02	.215284E+02	0.	0.	.144000E-01
435	03/10/77	0.000	.439857E+01	.572337E-02	.877592E+01	.215284E+02	0.	0.	.144000E-01
440	03/10/77	0.000	.488368E+01	.572337E-02	-.361715E+02	.215284E+02	0.	0.	.144000E-01
466	03/14/77	0.000	.506036E+01	.434759E-02	-.660922E+02	.204500E+02	0.	0.	.144000E-01
490	03/16/77	0.000	.484155E+01	.555062E-02	-.369622E+02	.215873E+02	0.	0.	.144000E-01
501	03/18/77	0.000	.484155E+01	.555062E-02	-.369622E+02	.215873E+02	0.	0.	.144000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 20: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.488293E+01	.555062E-02	-.415876E+02	.215873E+02	0.	0.	.144000E-01
519	03/21/77	0.000	.482010E+01	.555062E-02	-.361405E+02	.215873E+02	0.	0.	.144000E-01
536	03/23/77	0.000	.482010E+01	.555062E-02	-.361405E+02	.215873E+02	0.	0.	.144000E-01
545	03/23/77	0.000	.480375E+01	.555062E-02	-.357746E+02	.215873E+02	0.	0.	.144000E-01
567	03/28/77	0.000	.442845E+01	.829401E-02	-.557259E+01	.210123E+02	0.	0.	.144000E-01
574	03/29/77	0.000	.436395E+01	.829401E-02	-.351929E+01	.210123E+02	0.	0.	.144000E-01
599	04/01/77	0.000	.439200E+01	.829401E-02	-.566401E+01	.210123E+02	0.	0.	.144000E-01
614	04/05/77	0.000	.440307E+01	.894828E-02	-.375920E+01	.196351E+02	0.	0.	.144000E-01
620	04/06/77	0.000	.435123E+01	.894828E-02	-.400268E+01	.196351E+02	0.	0.	.144000E-01
634	04/28/77	0.000	.463669E+01	.828381E-02	-.625355E+01	.208518E+02	0.	0.	.144000E-01
645	04/28/77	0.000	.463669E+01	.828381E-02	-.625355E+01	.208518E+02	0.	0.	.144000E-01
658	05/09/77	0.000	.456545E+01	.897963E-02	.515518E+00	.200701E+02	0.	0.	.144000E-01
667	05/10/77	0.000	.453806E+01	.897963E-02	-.387440E+00	.200701E+02	0.	0.	.144000E-01
685	05/11/77	0.000	.440311E+01	.104883E-01	.118523E+02	.198828E+02	0.	0.	.144000E-01
693	05/12/77	0.000	.448151E+01	.104883E-01	.652514E+01	.198828E+02	0.	0.	.144000E-01
714	05/17/77	0.000	.467453E+01	.860030E-02	-.531374E+01	.126026E+02	0.	0.	.144000E-01
735	05/19/77	0.000	.464538E+01	.860030E-02	-.595149E+01	.126026E+02	0.	0.	.144000E-01
758	05/20/77	0.000	.461973E+01	.860030E-02	-.518221E+01	.126026E+02	0.	0.	.144000E-01
774	05/20/77	0.000	.454598E+01	.860030E-02	-.214141E+01	.126026E+02	0.	0.	.144000E-01
792	05/23/77	0.000	.464237E+01	.804890E-02	-.980354E+01	.137510E+02	0.	0.	.144000E-01
827	05/25/77	0.000	.468548E+01	.698764E-02	-.157710E+02	.142230E+02	0.	0.	.144000E-01
838	05/25/77	0.000	.542123E+01	.237840E-02	-.143686E+03	.142227E+02	0.	0.	.144000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 20: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.466231E+01	.708753E-02	-.114076E+02	.215238E+02	0.	0.	.144000E-01
882	09/22/77	0.000	.462553E+01	.708753E-02	-.115419E+02	.215238E+02	0.	0.	.144000E-01
895	09/29/77	0.000	.458076E+01	.708753E-02	-.102146E+02	.215238E+02	0.	0.	.144000E-01
927	10/03/77	0.000	.475912E+01	.543069E-02	-.311763E+02	.232195E+02	0.	0.	.144000E-01
955	10/04/77	0.000	.460453E+01	.543069E-02	-.215321E+02	.232195E+02	0.	0.	.144000E-01
968	10/05/77	0.000	.460453E+01	.543069E-02	-.215321E+02	.232195E+02	0.	0.	.144000E-01
1000	10/11/77	0.000	.455703E+01	.543069E-02	-.196413E+02	.232195E+02	0.	0.	.144000E-01
1103	10/14/77	0.000	.452192E+01	.543069E-02	-.193983E+02	.232195E+02	0.	0.	.144000E-01
1109	10/20/77	0.000	.446591E+01	.543069E-02	-.179946E+02	.232195E+02	0.	0.	.144000E-01
1131	10/21/77	0.000	.428202E+01	.842980E-02	.183103E+01	.214407E+02	0.	0.	.144000E-01
1144	10/22/77	0.000	.374610E+01	.268508E-01	.363346E+02	.214406E+02	0.	0.	.144000E-01
1161	10/25/77	0.000	.425519E+01	.834929E-02	.159501E+01	.218351E+02	0.	0.	.144000E-01
1176	10/25/77	0.000	.417333E+01	.834929E-02	.273415E+01	.218351E+02	0.	0.	.144000E-01
1182	10/27/77	0.000	.455670E+01	.853666E-02	.280085E+01	.215817E+02	0.	0.	.144000E-01
1189	10/27/77	0.000	.455670E+01	.853666E-02	.280085E+01	.215817E+02	0.	0.	.144000E-01
1209	10/28/77	0.000	.450348E+01	.853666E-02	.290374E+01	.215817E+02	0.	0.	.144000E-01
1212	10/28/77	0.000	.450348E+01	.853666E-02	.290374E+01	.215817E+02	0.	0.	.144000E-01
1228	10/31/77	0.000	.463120E+01	.708201E-02	-.101794E+02	.208309E+02	0.	0.	.144000E-01
1241	11/02/77	0.000	.456972E+01	.711701E-02	-.801295E+01	.207370E+02	0.	0.	.144000E-01
1257	11/03/77	0.000	.455552E+01	.711701E-02	-.943387E+01	.207370E+02	0.	0.	.144000E-01

CE-EPRI TWC PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 20: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.449293E+01	.764399E-02	-.194367E+01	.219717E+02	0.	0.	.144000E-01
1292	11/07/77	0.000	.446863E+01	.718407E-02	-.413940E+01	.222342E+02	0.	0.	.144000E-01
1308	11/09/77	0.000	.508549E+01	.296737E-02	-.845772E+02	.222338E+02	0.	0.	.144000E-01
1322	11/10/77	0.000	.455562E+01	.657333E-02	-.122010E+02	.213854E+02	0.	0.	.144000E-01
1337	11/10/77	0.000	.576903E+01	.138496E-02	-.244614E+03	.213849E+02	0.	0.	.144000E-01
1354	11/14/77	0.000	.442310E+01	.749808E-02	-.265785E+01	.216925E+02	0.	0.	.144000E-01
1364	11/14/77	0.000	.442310E+01	.749808E-02	-.265785E+01	.216925E+02	0.	0.	.144000E-01
1368	11/14/77	0.000	.502382E+01	.299920E-02	-.785030E+02	.216922E+02	0.	0.	.144000E-01
1381	11/16/77	0.000	.501678E+01	.299520E-02	-.779671E+02	.216922E+02	0.	0.	.144000E-01
1398	11/17/77	0.000	.499045E+01	.299920E-02	-.758732E+02	.216922E+02	0.	0.	.144000E-01
1440	11/28/77	0.000	.426222E+01	.814197E-02	.541442E+00	.212263E+02	0.	0.	.144000E-01
1455	11/29/77	0.000	.422097E+01	.814197E-02	.380135E+00	.212263E+02	0.	0.	.144000E-01
1466	11/29/77	0.000	.422097E+01	.814197E-02	.380135E+00	.212263E+02	0.	0.	.144000E-01
1483	12/02/77	0.000	.433569E+01	.626135E-02	-.991458E+01	.209672E+02	0.	0.	.144000E-01
1502	12/03/77	0.000	.430344E+01	.626135E-02	-.963757E+01	.209672E+02	0.	0.	.144000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 25: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	16.004	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
218	01/24/77	16.015	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
227	01/25/77	16.027	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
244	01/28/77	15.990	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
250	01/29/77	16.014	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
252	01/30/77	16.036	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
257	01/30/77	16.036	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
261	01/31/77	16.014	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
272	01/31/77	16.025	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
282	02/01/77	16.013	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
290	02/02/77	16.013	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
295	02/02/77	16.012	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
298	02/08/77	15.951	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
303	02/09/77	15.969	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
321	02/11/77	15.969	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
328	02/14/77	15.967	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
340	02/16/77	15.978	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
365	02/21/77	15.978	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
372	02/22/77	15.958	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
385	02/23/77	15.995	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
391	03/02/77	15.986	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
400	03/03/77	15.969	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
407	03/03/77	15.969	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
410	03/03/77	15.997	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
435	03/10/77	15.982	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
440	03/10/77	15.988	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
466	03/14/77	15.987	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
490	03/16/77	15.983	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
501	03/18/77	15.965	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 25: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.981	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
519	03/21/77	15.991	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
536	03/23/77	15.986	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
545	03/23/77	15.990	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
567	03/28/77	15.988	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
574	03/29/77	16.008	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
599	04/01/77	15.972	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
614	04/05/77	15.960	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
620	04/06/77	15.982	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
634	04/28/77	15.984	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
645	04/28/77	15.996	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
658	05/09/77	15.954	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
667	05/10/77	16.013	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
685	05/11/77	15.961	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
693	05/12/77	16.005	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
714	05/17/77	16.010	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
735	05/19/77	15.995	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
758	05/20/77	15.983	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
774	05/20/77	15.998	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
792	05/23/77	15.984	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
827	05/25/77	15.982	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
838	05/25/77	16.024	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 25: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.946	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
882	09/22/77	15.961	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
895	09/29/77	15.963	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
927	10/03/77	15.973	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
955	10/04/77	15.973	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
968	10/05/77	15.980	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1000	10/11/77	15.991	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1103	10/14/77	15.975	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1109	10/20/77	15.972	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1131	10/21/77	15.972	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1144	10/22/77	15.992	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1161	10/25/77	15.975	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1176	10/25/77	16.018	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1182	10/27/77	16.020	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1189	10/27/77	16.020	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1209	10/28/77	16.007	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1212	10/28/77	16.007	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1228	10/31/77	15.982	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1241	11/02/77	16.117	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1257	11/03/77	16.003	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 25: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.993	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1292	11/07/77	15.982	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1308	11/09/77	15.995	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1322	11/10/77	15.997	.682000E+02	-.462861E-03	.394517E-01	.211469E-08	.483871E-06	-.100000E+01	.450000E-01
1337	11/10/77	16.150	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1354	11/14/77	16.262	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1364	11/14/77	16.262	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1368	11/14/77	16.174	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1381	11/16/77	16.159	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1398	11/17/77	16.151	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1440	11/28/77	16.174	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1455	11/29/77	16.183	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1466	11/29/77	16.183	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1483	12/02/77	16.198	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02
1502	12/03/77	16.185	.682000E+02	.520938E-03	.387976E-01	.112899E-06	.504815E-06	-.100000E+01	.202900E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 26: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
218	01/24/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
227	01/25/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
244	01/28/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
250	01/29/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
252	01/30/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
257	01/30/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
261	01/31/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
272	01/31/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
282	02/01/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
290	02/02/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
295	02/02/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
298	02/08/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
303	02/09/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
321	02/11/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
328	02/14/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
340	02/16/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
365	02/21/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
372	02/22/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
385	02/23/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
391	03/02/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
400	03/03/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
407	03/03/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
410	03/03/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
435	03/10/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
440	03/10/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
466	03/14/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
490	03/16/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
501	03/18/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 26: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
519	03/21/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
536	03/23/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
545	03/23/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
567	03/28/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
574	03/29/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
599	04/01/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
614	04/05/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
620	04/06/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
634	04/28/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
645	04/28/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
658	05/09/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
667	05/10/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
685	05/11/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
693	05/12/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
714	05/17/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
735	05/19/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
758	05/20/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
774	05/20/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
792	05/23/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
827	05/25/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04
838	05/25/77	0.000	.118407E+05	.115439E+05	-.107558E-02	0.	0.	0.	.619331E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 26: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.544144E+04	.778681E+04	0.	0.	0.	0.	.268302E+05
882	09/22/77	0.000	.544144E+04	.778681E+04	0.	0.	0.	0.	.268302E+05
895	09/29/77	0.000	.544144E+04	.778681E+04	0.	0.	0.	0.	.268302E+05
927	10/03/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
955	10/04/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
968	10/05/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
1000	10/11/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
1103	10/14/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
1109	10/20/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
1131	10/21/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
1144	10/22/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
1161	10/25/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
1176	10/25/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
1182	10/27/77	0.000	-.182713E+04	.147514E+05	-.519576E-02	0.	0.	0.	.143036E+05
1189	10/27/77	0.000	-.372934E+05	.118357E+05	.201159E-03	0.	0.	0.	.187437E+05
1209	10/28/77	0.000	-.372934E+05	.118357E+05	.201159E-03	0.	0.	0.	.187437E+05
1212	10/28/77	0.000	-.377034E+05	.116009E+05	-.125518E-03	0.	0.	0.	.432002E+04
1228	10/31/77	0.000	-.377034E+05	.116009E+05	-.125518E-03	0.	0.	0.	.432002E+04
1241	11/02/77	0.000	-.377034E+05	.116009E+05	-.125518E-03	0.	0.	0.	.432002E+04
1257	11/03/77	0.000	-.377034E+05	.116009E+05	-.125518E-03	0.	0.	0.	.432002E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 26: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	-.401001E+05	.112583E+05	-.124870E-02	0.	0.	0.	.561806E+04
1292	11/07/77	0.000	-.401001E+05	.112583E+05	-.124870E-02	0.	0.	0.	.561806E+04
1308	11/09/77	0.000	-.401001E+05	.112583E+05	-.124870E-02	0.	0.	0.	.561806E+04
1322	11/10/77	0.000	-.433984E+05	.117419E+05	-.138321E-02	0.	0.	0.	.870860E+04
1337	11/10/77	0.000	-.433984E+05	.117419E+05	-.138321E-02	0.	0.	0.	.870860E+04
1354	11/14/77	0.000	.611180E+04	.255710E+04	-.272045E-02	0.	0.	0.	.170736E+04
1364	11/14/77	0.000	.611180E+04	.255710E+04	-.272045E-02	0.	0.	0.	.170736E+04
1368	11/14/77	0.000	.611180E+04	.255710E+04	-.272045E-02	0.	0.	0.	.170736E+04
1381	11/16/77	0.000	-.185097E+05	.992046E+04	-.718660E-03	0.	0.	0.	.196890E+04
1398	11/17/77	0.000	-.185097E+05	.992046E+04	-.718660E-03	0.	0.	0.	.196890E+04
1440	11/28/77	0.000	-.185097E+05	.992046E+04	-.718660E-03	0.	0.	0.	.196890E+04
1455	11/29/77	0.000	-.185097E+05	.992046E+04	-.718660E-03	0.	0.	0.	.196890E+04
1466	11/29/77	0.000	-.185097E+05	.992046E+04	-.718660E-03	0.	0.	0.	.196890E+04
1483	12/02/77	0.000	.139817E+04	.179005E+04	-.165461E-02	0.	0.	0.	.648730E+04
1502	12/03/77	0.000	.139817E+04	.179005E+04	-.165461E-02	0.	0.	0.	.648730E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 27: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
218	01/24/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
227	01/25/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
244	01/28/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
250	01/29/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
252	01/30/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
257	01/30/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
261	01/31/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
272	01/31/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
282	02/01/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
290	02/02/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
295	02/02/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
298	02/08/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
303	02/09/77	0.000	-.208223E+05	.168104E+05	0.	0.	0.	0.	.139527E+05
321	02/11/77	0.000	0.	.600000E+04	-.182000E-02	0.	0.	0.	0.
328	02/14/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
340	02/16/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
365	02/21/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
372	02/22/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
385	02/23/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
391	03/02/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
400	03/03/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
407	03/03/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
410	03/03/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
435	03/10/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
440	03/10/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
466	03/14/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
490	03/16/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
501	03/18/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 27: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
519	03/21/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
536	03/23/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
545	03/23/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
567	03/28/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
574	03/29/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
599	04/01/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
614	04/05/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
620	04/06/77	0.000	0.	0.	.600000E+04	0.	0.	0.	0.
634	04/28/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
645	04/28/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
658	05/09/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
667	05/10/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
685	05/11/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
693	05/12/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
714	05/17/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
735	05/19/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
758	05/20/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
774	05/20/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
792	05/23/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
827	05/25/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04
838	05/25/77	0.000	-.381371E+04	.108223E+05	-.907352E-04	0.	0.	0.	.404326E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 27: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	0.	0.	0.	0.	0.	0.	0.
882	09/22/77	0.000	0.	0.	0.	0.	0.	0.	0.
895	09/29/77	0.000	0.	0.	0.	0.	0.	0.	0.
927	10/03/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
955	10/04/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
968	10/05/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
1000	10/11/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
1103	10/14/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
1109	10/20/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
1131	10/21/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
1144	10/22/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
1161	10/25/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
1176	10/25/77	0.000	.247254E+05	.125238E+05	-.628446E-02	0.	0.	0.	.529871E+04
1182	10/27/77	0.000	.290553E+05	.126283E+05	-.660213E-02	0.	0.	0.	.103423E+05
1189	10/27/77	0.000	.290553E+05	.126283E+05	-.660213E-02	0.	0.	0.	.103423E+05
1209	10/28/77	0.000	.290553E+05	.126283E+05	-.660213E-02	0.	0.	0.	.103423E+05
1212	10/28/77	0.000	.323134E+05	.129848E+05	-.582748E-02	0.	0.	0.	.122995E+05
1228	10/31/77	0.000	.323134E+05	.129848E+05	-.582748E-02	0.	0.	0.	.122995E+05
1241	11/02/77	0.000	.323134E+05	.129848E+05	-.582748E-02	0.	0.	0.	.122995E+05
1257	11/03/77	0.000	.323134E+05	.129848E+05	-.582748E-02	0.	0.	0.	.122995E+05

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 27: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.315744E+05	.128348E+05	-.611123E-02	0.	0.	0.	.955238E+04
1292	11/07/77	0.000	.315744E+05	.128348E+05	-.611123E-02	0.	0.	0.	.955238E+04
1308	11/09/77	0.000	.315744E+05	.128348E+05	-.611123E-02	0.	0.	0.	.955238E+04
1322	11/10/77	0.000	.259051E+05	.131848E+05	-.479221E-02	0.	0.	0.	.147082E+05
1337	11/10/77	0.000	.259051E+05	.131848E+05	-.479221E-02	0.	0.	0.	.147082E+05
1354	11/14/77	0.000	.264645E+04	.197535E+04	.166091E-02	0.	0.	0.	.547726E+04
1364	11/14/77	0.000	.264645E+04	.197535E+04	.166091E-02	0.	0.	0.	.547726E+04
1368	11/14/77	0.000	.264645E+04	.197535E+04	.166091E-02	0.	0.	0.	.547726E+04
1381	11/16/77	0.000	.293410E+05	.105827E+05	-.782529E-02	0.	0.	0.	.690996E+04
1398	11/17/77	0.000	.293410E+05	.105827E+05	-.782529E-02	0.	0.	0.	.690996E+04
1440	11/28/77	0.000	.293410E+05	.105827E+05	-.782529E-02	0.	0.	0.	.690996E+04
1455	11/29/77	0.000	.293410E+05	.105827E+05	-.782529E-02	0.	0.	0.	.690996E+04
1466	11/29/77	0.000	.293410E+05	.105827E+05	-.782529E-02	0.	0.	0.	.690996E+04
1483	12/02/77	0.000	.244902E+04	.214411E+04	-.170451E-02	0.	0.	0.	.391832E+04
1502	12/03/77	0.000	.244902E+04	.214411E+04	-.170451E-02	0.	0.	0.	.391832E+04

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 28: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	-.150000E+01	0.	-.968600E+00	0.	0.	0.	-.100000E+01
218	01/24/77	0.000	-.150000E+01	0.	-.968600E+00	0.	0.	0.	-.100000E+01
227	01/25/77	0.000	-.150000E+01	0.	-.968600E+00	0.	0.	0.	-.100000E+01
244	01/28/77	0.000	-.150000E+01	0.	-.968600E+00	0.	0.	0.	-.100000E+01
250	01/29/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
252	01/30/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
257	01/30/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
261	01/31/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
272	01/31/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
282	02/01/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
290	02/02/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
295	02/02/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
298	02/08/77	0.000	-.150000E+01	0.	-.968600E+00	0.	0.	0.	-.100000E+01
303	02/09/77	0.000	-.150000E+01	0.	-.968600E+00	0.	0.	0.	-.100000E+01
321	02/11/77	0.000	-.150000E+01	0.	-.968600E+00	0.	0.	0.	-.100000E+01
328	02/14/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
340	02/16/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
365	02/21/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
372	02/22/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
385	02/23/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
391	03/02/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
400	03/03/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
407	03/03/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
410	03/03/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
435	03/10/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
440	03/10/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
466	03/14/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
490	03/16/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.
501	03/18/77	0.000	0.	0.	-.900000E+00	0.	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 28: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
519	03/21/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
536	03/23/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
545	03/23/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
567	03/28/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
574	03/29/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
599	04/01/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
614	04/05/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
620	04/06/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
634	04/28/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
645	04/28/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
658	05/09/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
667	05/10/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
685	05/11/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
693	05/12/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
714	05/17/77	0.000	-.122504E+02	0.	.429730E+01	0.	0.	0.	.819164E+00
735	05/19/77	0.000	-.122504E+02	0.	.429730E+01	0.	0.	0.	.819164E+00
758	05/20/77	0.000	-.122504E+02	0.	.429730E+01	0.	0.	0.	.819164E+00
774	05/20/77	0.000	-.122504E+02	0.	.429730E+01	0.	0.	0.	.819164E+00
792	05/23/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
827	05/25/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
838	05/25/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 28: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
882	09/22/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
895	09/29/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
927	10/03/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
955	10/04/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
968	10/05/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1000	10/11/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1103	10/14/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1109	10/20/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1131	10/21/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1144	10/22/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1161	10/25/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1176	10/25/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1182	10/27/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1189	10/27/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1209	10/28/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1212	10/28/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1228	10/31/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1241	11/02/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1257	11/03/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 28: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1292	11/07/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1308	11/09/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1322	11/10/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1337	11/10/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1354	11/14/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1364	11/14/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1368	11/14/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1381	11/16/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1398	11/17/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1440	11/28/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1455	11/29/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1466	11/29/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1483	12/02/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01
1502	12/03/77	0.000	0.	0.	.467682E+01	0.	0.	0.	.834082E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 29: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.1800C0E+01	0.	.961100E+00	0.	0.	0.	.100000E+01
218	01/24/77	0.000	.180000E+01	0.	.961100E+00	0.	0.	0.	.100000E+01
227	01/25/77	0.000	.180000E+01	0.	.961100E+00	0.	0.	0.	.100000E+01
244	01/28/77	0.000	.180000E+01	0.	.961100E+00	0.	0.	0.	.100000E+01
250	01/29/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
252	01/30/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
257	01/30/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
261	01/31/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
272	01/31/77	0.000	0.	0.	.9C0000E+00	0.	0.	0.	0.
282	02/01/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
290	02/02/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
295	02/02/77	0.000	0.	0.	.9C00C0E+00	0.	0.	0.	0.
298	02/08/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
303	02/09/77	0.000	0.	0.	.9C0000E+00	0.	0.	0.	0.
321	02/11/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
328	02/14/77	0.000	0.	0.	.9C0000E+00	0.	0.	0.	0.
340	02/16/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
365	02/21/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
372	02/22/77	0.000	0.	0.	.9C0000E+00	0.	0.	0.	0.
385	02/23/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
391	03/02/77	0.000	0.	0.	.9C00C0E+00	0.	0.	0.	0.
400	03/03/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
407	03/03/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
410	03/03/77	0.000	0.	0.	.9C00C0E+00	0.	0.	0.	0.
435	03/10/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
440	03/10/77	0.000	0.	0.	.9C0000E+00	0.	0.	0.	0.
466	03/14/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
490	03/16/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
501	03/18/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 29: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
519	03/21/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
536	03/23/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
545	03/23/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
567	03/28/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
574	03/29/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
599	04/01/77	0.000	0.	0.	.900000E+00	0.	0.	0.	0.
614	04/05/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
620	04/06/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
634	04/28/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
645	04/28/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
658	05/09/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
667	05/10/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
685	05/11/77	0.000	0.	0.	0.	0.	0.	0.	0.
693	05/12/77	0.000	0.	0.	0.	0.	0.	0.	0.
714	05/17/77	0.000	0.	0.	0.	0.	0.	0.	0.
735	05/19/77	0.000	0.	0.	0.	0.	0.	0.	0.
758	05/20/77	0.000	0.	0.	0.	0.	0.	0.	0.
774	05/20/77	0.000	0.	0.	0.	0.	0.	0.	0.
792	05/23/77	0.000	0.	0.	0.	0.	0.	0.	0.
827	05/25/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
838	05/25/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 29: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
882	09/22/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
895	09/29/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
927	10/03/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
955	10/04/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
968	10/05/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1000	10/11/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1103	10/14/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1109	10/20/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1131	10/21/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1144	10/22/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1161	10/25/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1176	10/25/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1182	10/27/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1189	10/27/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1209	10/28/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1212	10/28/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1228	10/31/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1241	11/02/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1257	11/03/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01

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INSTRUMENT NO. 29: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1292	11/07/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1308	11/09/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1322	11/10/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1337	11/10/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1354	11/14/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1364	11/14/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1368	11/14/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1381	11/16/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1398	11/17/77	0.000	0.	0.	.455259E+01	0.	0.	0.	.818876E+01
1440	11/28/77	0.000	0.	0.	.511152E+01	0.	0.	0.	.241363E+01
1455	11/29/77	0.000	0.	0.	.511152E+01	0.	0.	0.	.241363E+01
1466	11/29/77	0.000	0.	0.	.511152E+01	0.	0.	0.	.241363E+01
1483	12/02/77	0.000	0.	0.	.511152E+01	0.	0.	0.	.241363E+01
1502	12/03/77	0.000	0.	0.	.511152E+01	0.	0.	0.	.241363E+01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 33: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	50.060	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
218	01/24/77	49.899	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
227	01/25/77	50.061	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
244	01/28/77	50.190	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
250	01/29/77	50.118	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
252	01/30/77	50.130	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
257	01/30/77	50.130	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
261	01/31/77	50.009	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
272	01/31/77	50.071	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
282	02/01/77	50.110	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
290	02/02/77	50.110	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
295	02/02/77	50.151	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
298	02/08/77	50.095	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
303	02/09/77	50.214	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
321	02/11/77	50.214	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
328	02/14/77	50.082	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
340	02/16/77	50.034	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
365	02/21/77	50.034	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
372	02/22/77	50.179	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
385	02/23/77	50.137	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
391	03/02/77	50.064	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
400	03/03/77	50.097	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
407	03/03/77	50.097	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
410	03/03/77	50.194	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
435	03/10/77	50.152	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
440	03/10/77	50.042	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
466	03/14/77	50.226	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
490	03/16/77	50.016	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
501	03/18/77	50.320	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 33: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	50.356	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
519	03/21/77	50.155	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
536	03/23/77	50.160	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
545	03/23/77	50.056	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
567	03/28/77	50.195	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
574	03/29/77	50.204	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
599	04/01/77	50.148	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
614	04/05/77	50.263	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
620	04/06/77	50.029	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
634	04/28/77	50.196	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
645	04/28/77	50.236	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
658	05/09/77	50.243	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
667	05/10/77	50.265	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
685	05/11/77	50.170	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
693	05/12/77	50.322	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
714	05/17/77	50.090	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
735	05/19/77	50.231	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
758	05/20/77	50.388	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
774	05/20/77	50.132	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
792	05/23/77	50.074	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
827	05/25/77	50.083	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
838	05/25/77	49.943	0.	-.540304E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00

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INSTRUMENT NO. 33: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	50.077	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
882	09/22/77	50.127	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
895	09/29/77	49.980	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
927	10/03/77	49.910	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
955	10/04/77	49.926	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
968	10/05/77	49.970	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1000	10/11/77	50.076	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1103	10/14/77	50.047	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1109	10/20/77	50.300	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1131	10/21/77	50.150	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1144	10/22/77	50.054	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1161	10/25/77	50.307	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1176	10/25/77	50.226	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1182	10/27/77	50.653	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1189	10/27/77	50.653	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1209	10/28/77	49.638	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1212	10/28/77	49.638	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1228	10/31/77	50.168	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1241	11/02/77	50.051	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1257	11/03/77	49.973	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00

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INSTRUMENT NO. 33: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	50.025	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1292	11/07/77	50.161	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1308	11/09/77	50.002	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1322	11/10/77	50.058	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1337	11/10/77	50.076	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1354	11/14/77	50.389	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1364	11/14/77	50.389	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1368	11/14/77	50.090	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1381	11/16/77	50.214	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1398	11/17/77	50.179	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1440	11/28/77	50.324	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1455	11/29/77	50.247	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1466	11/29/77	50.247	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1483	12/02/77	50.196	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00
1502	12/03/77	50.255	0.	-.540394E-01	.418270E+00	.617830E-05	.507573E-05	.100000E+01	.117300E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 34: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.384690E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
218	01/24/77	0.000	.385523E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
227	01/25/77	0.000	.385523E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
244	01/28/77	0.000	.389832E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
250	01/29/77	0.000	.384346E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
252	01/30/77	0.000	.395112E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
257	01/30/77	0.000	.395112E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
261	01/31/77	0.000	.385707E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
272	01/31/77	0.000	.384617E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
282	02/01/77	0.000	.385426E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
290	02/02/77	0.000	.385426E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
295	02/02/77	0.000	.386279E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
298	02/08/77	0.000	.385825E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
303	02/09/77	0.000	.385903E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
321	02/11/77	0.000	.385903E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
328	02/14/77	0.000	.386497E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
340	02/16/77	0.000	.386664E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
365	02/21/77	0.000	.386664E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
372	02/22/77	0.000	.386664E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
385	02/23/77	0.000	.390809E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
391	03/02/77	0.000	.394015E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
400	03/03/77	0.000	.387962E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
407	03/03/77	0.000	.387962E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
410	03/03/77	0.000	.389265E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
435	03/10/77	0.000	.403675E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
440	03/10/77	0.000	.391180E+01	.100640E-01	0.	0.	0.	0.	.374000E-01
466	03/14/77	0.000	.340835E+01	.204802E-01	.191286E+02	0.	0.	0.	.374000E-01
490	03/16/77	0.000	.329722E+01	.358448E-01	.257752E+02	0.	0.	0.	.374000E-01
501	03/18/77	0.000	.329722E+01	.358448E-01	.257752E+02	0.	0.	0.	.374000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 34: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.325462E+01	.358448E-01	.257752E+02	0.	0.	0.	.374000E-01
519	03/21/77	0.000	.330150E+01	.358448E-01	.257752E+02	0.	0.	0.	.374000E-01
536	03/23/77	0.000	.330150E+01	.358448E-01	.257752E+02	0.	0.	0.	.374000E-01
545	03/23/77	0.000	.337020E+01	.358448E-01	.257752E+02	0.	0.	0.	.374000E-01
567	03/28/77	0.000	.312185E+01	.358448E-01	.265032E+02	0.	0.	0.	.374000E-01
574	03/29/77	0.000	.307946E+01	.358448E-01	.265032E+02	0.	0.	0.	.374000E-01
599	04/01/77	0.000	.276849E+01	.358448E-01	.265032E+02	0.	0.	0.	.374000E-01
614	04/05/77	0.000	.333705E+01	.358448E-01	.249469E+02	0.	0.	0.	.374000E-01
620	04/06/77	0.000	.326758E+01	.358448E-01	.249469E+02	0.	0.	0.	.374000E-01
634	04/28/77	0.000	.327767E+01	.358448E-01	.260015E+02	0.	0.	0.	.374000E-01
645	04/28/77	0.000	.327767E+01	.358448E-01	.260015E+02	0.	0.	0.	.374000E-01
658	05/09/77	0.000	.293037E+01	.358448E-01	.278189E+02	0.	0.	0.	.374000E-01
667	05/10/77	0.000	.311971E+01	.368388E-01	.278940E+02	0.	0.	0.	.374000E-01
685	05/11/77	0.000	.326356E+01	.368388E-01	.271404E+02	0.	0.	0.	.374000E-01
693	05/12/77	0.000	.321572E+01	.368388E-01	.271404E+02	0.	0.	0.	.374000E-01
714	05/17/77	0.000	.311127E+01	.368388E-01	.277514E+02	0.	0.	0.	.374000E-01
735	05/19/77	0.000	.326907E+01	.368388E-01	.277514E+02	0.	0.	0.	.374000E-01
758	05/20/77	0.000	.326583E+01	.368388E-01	.277514E+02	0.	0.	0.	.374000E-01
774	05/20/77	0.000	.328310E+01	.368388E-01	.277514E+02	0.	0.	0.	.374000E-01
792	05/23/77	0.000	.326897E+01	.368388E-01	.284061E+02	0.	0.	0.	.374000E-01
827	05/25/77	0.000	.328977E+01	.368388E-01	.286232E+02	0.	0.	0.	.374000E-01
838	05/25/77	0.000	.335401E+01	.243737E-01	.244432E+02	0.	0.	0.	.374000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 34: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.325411E+01	.393658E-01	.310171E+02	0.	0.	0.	.374000E-01
882	09/22/77	0.000	.331155E+01	.393658E-01	.310171E+02	0.	0.	0.	.374000E-01
895	09/29/77	0.000	.253993E+01	.393658E-01	.310171E+02	0.	0.	0.	.374000E-01
927	10/03/77	0.000	.324960E+01	.393658E-01	.293364E+02	0.	0.	0.	.374000E-01
955	10/04/77	0.000	.318664E+01	.393658E-01	.293364E+02	0.	0.	0.	.374000E-01
968	10/05/77	0.000	.318664E+01	.393658E-01	.293364E+02	0.	0.	0.	.374000E-01
1000	10/11/77	0.000	.299879E+01	.393658E-01	.293364E+02	0.	0.	0.	.374000E-01
1103	10/14/77	0.000	.275484E+01	.393658E-01	.293364E+02	0.	0.	0.	.374000E-01
1109	10/20/77	0.000	.255067E+01	.393658E-01	.293364E+02	0.	0.	0.	.374000E-01
1131	10/21/77	0.000	.326605E+01	.393658E-01	.274269E+02	0.	0.	0.	.374000E-01
1144	10/22/77	0.000	.317825E+01	.390622E-01	.273750E+02	0.	0.	0.	.374000E-01
1161	10/25/77	0.000	.329314E+01	.390622E-01	.269227E+02	0.	0.	0.	.374000E-01
1176	10/25/77	0.000	.335844E+01	.227997E-01	.213546E+02	0.	0.	0.	.374000E-01
1182	10/27/77	0.000	.347559E+01	.227997E-01	.225668E+02	0.	0.	0.	.374000E-01
1189	10/27/77	0.000	.347559E+01	.227997E-01	.225668E+02	0.	0.	0.	.374000E-01
1209	10/28/77	0.000	.338791E+01	.227997E-01	.225668E+02	0.	0.	0.	.374000E-01
1212	10/28/77	0.000	.338791E+01	.227997E-01	.225668E+02	0.	0.	0.	.374000E-01
1228	10/31/77	0.000	.346784E+01	.227997E-01	.230157E+02	0.	0.	0.	.374000E-01
1241	11/02/77	0.000	.340720E+01	.227997E-01	.216201E+02	0.	0.	0.	.374000E-01
1257	11/03/77	0.000	.335485E+01	.227997E-01	.216201E+02	0.	0.	0.	.374000E-01

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INSTRUMENT NO. 34: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.343877E+01	.227997E-01	.218982E+02	0.	0.	0.	.374000E-01
1292	11/07/77	0.000	.346407E+01	.227997E-01	.223972E+02	0.	0.	0.	.374000E-01
1308	11/09/77	0.000	.345482E+01	.227997E-01	.223972E+02	0.	0.	0.	.374000E-01
1322	11/10/77	0.000	.347074E+01	.227997E-01	.233752E+02	0.	0.	0.	.374000E-01
1337	11/10/77	0.000	.328921E+01	.288494E-01	.263132E+02	0.	0.	0.	.374000E-01
1354	11/14/77	0.000	.342891E+01	.288494E-01	.263432E+02	0.	0.	0.	.374000E-01
1364	11/14/77	0.000	.342891E+01	.288494E-01	.263432E+02	0.	0.	0.	.374000E-01
1368	11/14/77	0.000	.322547E+01	.368027E-01	.285612E+02	0.	0.	0.	.374000E-01
1381	11/16/77	0.000	.316167E+01	.368027E-01	.285612E+02	0.	0.	0.	.374000E-01
1398	11/17/77	0.000	.300945E+01	.368027E-01	.285612E+02	0.	0.	0.	.374000E-01
1440	11/28/77	0.000	.335327E+01	.368027E-01	.286111E+02	0.	0.	0.	.374000E-01
1455	11/29/77	0.000	.316732E+01	.414575E-01	.294148E+02	0.	0.	0.	.374000E-01
1466	11/29/77	0.000	.316732E+01	.414575E-01	.294148E+02	0.	0.	0.	.374000E-01
1483	12/02/77	0.000	.332057E+01	.414575E-01	.287580E+02	0.	0.	0.	.374000E-01
1502	12/03/77	0.000	.335679E+01	.248147E-01	.238276E+02	0.	0.	0.	.374000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 35: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.424491E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
218	01/24/77	0.000	.423880E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
227	01/25/77	0.000	.423880E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
244	01/28/77	0.000	.426459E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
250	01/29/77	0.000	.421794E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
252	01/30/77	0.000	.429843E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
257	01/30/77	0.000	.429843E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
261	01/31/77	0.000	.422116E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
272	01/31/77	0.000	.422844E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
282	02/01/77	0.000	.422744E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
290	02/02/77	0.000	.422744E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
295	02/02/77	0.000	.422069E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
298	02/08/77	0.000	.421441E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
303	02/09/77	0.000	.421365E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
321	02/11/77	0.000	.421365E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
328	02/14/77	0.000	.419914E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
340	02/16/77	0.000	.418343E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
365	02/21/77	0.000	.418343E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
372	02/22/77	0.000	.418343E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
385	02/23/77	0.000	.416694E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
391	03/02/77	0.000	.421130E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
400	03/03/77	0.000	.416587E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
407	03/03/77	0.000	.416587E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
410	03/03/77	0.000	.417310E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
435	03/10/77	0.000	.440442E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
440	03/10/77	0.000	.414774E+01	.199568E-01	.831939E+01	0.	0.	0.	.115000E-01
466	03/14/77	0.000	.427768E+01	.163429E-01	-.195410E+00	0.	0.	0.	.115000E-01
490	03/16/77	0.000	.397124E+01	.334179E-01	.212952E+02	0.	0.	0.	.115000E-01
501	03/18/77	0.000	.397124E+01	.334179E-01	.212952E+02	0.	0.	0.	.115000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 35: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.401767E+01	.334179E-01	.212952E+02	0.	0.	0.	.115000E-01
519	03/21/77	0.000	.402007E+01	.334179E-01	.212952E+02	0.	0.	0.	.115000E-01
536	03/23/77	0.000	.402007E+01	.334179E-01	.212952E+02	0.	0.	0.	.115000E-01
545	03/23/77	0.000	.398378E+01	.334179E-01	.212952E+02	0.	0.	0.	.115000E-01
567	03/28/77	0.000	.398319E+01	.334179E-01	.215290E+02	0.	0.	0.	.115000E-01
574	03/29/77	0.000	.392206E+01	.334179E-01	.215290E+02	0.	0.	0.	.115000E-01
599	04/01/77	0.000	.394228E+01	.334179E-01	.215290E+02	0.	0.	0.	.115000E-01
614	04/05/77	0.000	.403721E+01	.334179E-01	.203689E+02	0.	0.	0.	.115000E-01
620	04/06/77	0.000	.401605E+01	.334179E-01	.203689E+02	0.	0.	0.	.115000E-01
634	04/28/77	0.000	.401691E+01	.334179E-01	.196393E+02	0.	0.	0.	.115000E-01
645	04/28/77	0.000	.401691E+01	.334179E-01	.196393E+02	0.	0.	0.	.115000E-01
658	05/09/77	0.000	.349643E+01	.334179E-01	.223741E+02	0.	0.	0.	.115000E-01
667	05/10/77	0.000	.379118E+01	.389520E-01	.236162E+02	0.	0.	0.	.115000E-01
685	05/11/77	0.000	.395922E+01	.389520E-01	.215580E+02	0.	0.	0.	.115000E-01
693	05/12/77	0.000	.407017E+01	.389520E-01	.215580E+02	0.	0.	0.	.115000E-01
714	05/17/77	0.000	.405467E+01	.389520E-01	.213096E+02	0.	0.	0.	.115000E-01
735	05/19/77	0.000	.409378E+01	.389520E-01	.213096E+02	0.	0.	0.	.115000E-01
758	05/20/77	0.000	.409490E+01	.389520E-01	.213096E+02	0.	0.	0.	.115000E-01
774	05/20/77	0.000	.409729E+01	.389520E-01	.213096E+02	0.	0.	0.	.115000E-01
792	05/23/77	0.000	.401862E+01	.389520E-01	.215218E+02	0.	0.	0.	.115000E-01
827	05/25/77	0.000	.392559E+01	.389520E-01	.218061E+02	0.	0.	0.	.115000E-01
838	05/25/77	0.000	.417544E+01	.169264E-01	.117219E+01	0.	0.	0.	.115000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 35: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.414466E+01	.199817E-01	.698697E+01	0.	0.	0.	.115000E-01
882	09/22/77	0.000	.406389E+01	.199817E-01	.698697E+01	0.	0.	0.	.115000E-01
895	09/29/77	0.000	.405239E+01	.199817E-01	.698697E+01	0.	0.	0.	.115000E-01
927	10/03/77	0.000	.417222E+01	.199817E-01	.719056E+01	0.	0.	0.	.115000E-01
955	10/04/77	0.000	.406527E+01	.199817E-01	.719056E+01	0.	0.	0.	.115000E-01
968	10/05/77	0.000	.406527E+01	.199817E-01	.719056E+01	0.	0.	0.	.115000E-01
1000	10/11/77	0.000	.416955E+01	.199817E-01	.719056E+01	0.	0.	0.	.115000E-01
1103	10/14/77	0.000	.409303E+01	.199817E-01	.719056E+01	0.	0.	0.	.115000E-01
1109	10/20/77	0.000	.409434E+01	.199817E-01	.719056E+01	0.	0.	0.	.115000E-01
1131	10/21/77	0.000	.412437E+01	.199817E-01	.811479E+01	0.	0.	0.	.115000E-01
1144	10/22/77	0.000	.407203E+01	.194828E-01	.728579E+01	0.	0.	0.	.115000E-01
1161	10/25/77	0.000	.410118E+01	.194828E-01	.808065E+01	0.	0.	0.	.115000E-01
1176	10/25/77	0.000	.398019E+01	.217756E-01	.113342E+02	0.	0.	0.	.115000E-01
1182	10/27/77	0.000	.400781E+01	.217756E-01	.114050E+02	0.	0.	0.	.115000E-01
1189	10/27/77	0.000	.400781E+01	.217756E-01	.114050E+02	0.	0.	0.	.115000E-01
1209	10/28/77	0.000	.406446E+01	.179469E-01	.565119E+01	0.	0.	0.	.115000E-01
1212	10/28/77	0.000	.406446E+01	.179469E-01	.565119E+01	0.	0.	0.	.115000E-01
1228	10/31/77	0.000	.405124E+01	.179469E-01	.714854E+01	0.	0.	0.	.115000E-01
1241	11/02/77	0.000	.402031E+01	.179469E-01	.780680E+01	0.	0.	0.	.115000E-01
1257	11/03/77	0.000	.386456E+01	.230198E-01	.143166E+02	0.	0.	0.	.115000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 35: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.388638E+01	.230198E-01	.142128E+02	0.	0.	0.	.115000E-01
1292	11/07/77	0.000	.382830E+01	.230198E-01	.143111E+02	0.	0.	0.	.115000E-01
1308	11/09/77	0.000	.375913E+01	.274871E-01	.175590E+02	0.	0.	0.	.115000E-01
1322	11/10/77	0.000	.369065E+01	.274871E-01	.179247E+02	0.	0.	0.	.115000E-01
1337	11/10/77	0.000	.375915E+01	.236889E-01	.153428E+02	0.	0.	0.	.115000E-01
1354	11/14/77	0.000	.359873E+01	.236889E-01	.171162E+02	0.	0.	0.	.115000E-01
1364	11/14/77	0.000	.359873E+01	.236889E-01	.171162E+02	0.	0.	0.	.115000E-01
1368	11/14/77	0.000	.363340E+01	.245050E-01	.176136E+02	0.	0.	0.	.115000E-01
1381	11/16/77	0.000	.364254E+01	.245050E-01	.176136E+02	0.	0.	0.	.115000E-01
1398	11/17/77	0.000	.363268E+01	.245050E-01	.176136E+02	0.	0.	0.	.115000E-01
1440	11/28/77	0.000	.295023E+01	.245050E-01	.210290E+02	0.	0.	0.	.115000E-01
1455	11/29/77	0.000	.328555E+01	.145762E-01	.149912E+02	0.	0.	0.	.115000E-01
1466	11/29/77	0.000	.328555E+01	.145762E-01	.149912E+02	0.	0.	0.	.115000E-01
1483	12/02/77	0.000	.312559E+01	.145762E-01	.152766E+02	0.	0.	0.	.115000E-01
1502	12/03/77	0.000	.339179E+01	.104401E-01	.958039E+01	0.	0.	0.	.115000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 36: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.448972E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
218	01/24/77	0.000	.448391E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
227	01/25/77	0.000	.448391E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
244	01/28/77	0.000	.449068E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
250	01/29/77	0.000	.447228E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
252	01/30/77	0.000	.450391E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
257	01/30/77	0.000	.450391E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
261	01/31/77	0.000	.447117E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
272	01/31/77	0.000	.448269E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
282	02/01/77	0.000	.447368E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
290	02/02/77	0.000	.447368E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
295	02/02/77	0.000	.447234E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
298	02/08/77	0.000	.445259E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
303	02/09/77	0.000	.445822E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
321	02/11/77	0.000	.445822E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
328	02/14/77	0.000	.444637E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
340	02/16/77	0.000	.443407E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
365	02/21/77	0.000	.443407E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
372	02/22/77	0.000	.443407E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
385	02/23/77	0.000	.444510E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
391	03/02/77	0.000	.445631E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
400	03/03/77	0.000	.442333E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
407	03/03/77	0.000	.442333E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
410	03/03/77	0.000	.444443E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
435	03/10/77	0.000	.459409E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
440	03/10/77	0.000	.443343E+01	.133252E-01	-.145372E+02	0.	0.	0.	.141000E-01
466	03/14/77	0.000	.457410E+01	.108250E-01	-.283346E+02	0.	0.	0.	.141000E-01
490	03/16/77	0.000	.405148E+01	.267631E-01	.132974E+02	0.	0.	0.	.141000E-01
501	03/18/77	0.000	.405148E+01	.267631E-01	.132974E+02	0.	0.	0.	.141000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 36: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.404916E+01	.267631E-01	.132974E+02	0.	0.	0.	.141000E-01
519	03/21/77	0.000	.404058E+01	.267631E-01	.132974E+02	0.	0.	0.	.141000E-01
536	03/23/77	0.000	.404058E+01	.267631E-01	.132974E+02	0.	0.	0.	.141000E-01
545	03/23/77	0.000	.404371E+01	.267631E-01	.132974E+02	0.	0.	0.	.141000E-01
567	03/28/77	0.000	.405371E+01	.267631E-01	.125051E+02	0.	0.	0.	.141000E-01
574	03/29/77	0.000	.405594E+01	.267631E-01	.125051E+02	0.	0.	0.	.141000E-01
599	04/01/77	0.000	.404740E+01	.267631E-01	.125051E+02	0.	0.	0.	.141000E-01
614	04/05/77	0.000	.405907E+01	.267631E-01	.111780E+02	0.	0.	0.	.141000E-01
620	04/06/77	0.000	.410915E+01	.267631E-01	.111780E+02	0.	0.	0.	.141000E-01
634	04/28/77	0.000	.419529E+01	.267631E-01	.960932E+01	0.	0.	0.	.141000E-01
645	04/28/77	0.000	.419529E+01	.267631E-01	.960932E+01	0.	0.	0.	.141000E-01
658	05/09/77	0.000	.373217E+01	.267631E-01	.142356E+02	0.	0.	0.	.141000E-01
667	05/10/77	0.000	.397659E+01	.334132E-01	.173150E+02	0.	0.	0.	.141000E-01
685	05/11/77	0.000	.406967E+01	.334132E-01	.148762E+02	0.	0.	0.	.141000E-01
693	05/12/77	0.000	.419036E+01	.334132E-01	.148762E+02	0.	0.	0.	.141000E-01
714	05/17/77	0.000	.413374E+01	.334132E-01	.151741E+02	0.	0.	0.	.141000E-01
735	05/19/77	0.000	.417481E+01	.334132E-01	.151741E+02	0.	0.	0.	.141000E-01
758	05/20/77	0.000	.413817E+01	.334132E-01	.151741E+02	0.	0.	0.	.141000E-01
774	05/20/77	0.000	.414145E+01	.334132E-01	.151741E+02	0.	0.	0.	.141000E-01
792	05/23/77	0.000	.407511E+01	.334132E-01	.157442E+02	0.	0.	0.	.141000E-01
827	05/25/77	0.000	.393086E+01	.334132E-01	.156684E+02	0.	0.	0.	.141000E-01
838	05/25/77	0.000	.408994E+01	.214788E-01	.597019E+01	0.	0.	0.	.141000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 36: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.519258E+01	.574606E-02	-.104167E+03	0.	0.	0.	.141000E-01
882	09/22/77	0.000	.515881E+01	.574606E-02	-.104167E+03	0.	0.	0.	.141000E-01
895	09/29/77	0.000	.515334E+01	.574606E-02	-.104167E+03	0.	0.	0.	.141000E-01
927	10/03/77	0.000	.483623E+01	.574606E-02	-.667087E+02	0.	0.	0.	.141000E-01
955	10/04/77	0.000	.481569E+01	.574606E-02	-.667087E+02	0.	0.	0.	.141000E-01
968	10/05/77	0.000	.481569E+01	.574606E-02	-.667087E+02	0.	0.	0.	.141000E-01
1000	10/11/77	0.000	.482916E+01	.574606E-02	-.667087E+02	0.	0.	0.	.141000E-01
1103	10/14/77	0.000	.480612E+01	.574606E-02	-.667087E+02	0.	0.	0.	.141000E-01
1109	10/20/77	0.000	.479805E+01	.574606E-02	-.667087E+02	0.	0.	0.	.141000E-01
1131	10/21/77	0.000	.457505E+01	.574606E-02	-.475639E+02	0.	0.	0.	.141000E-01
1144	10/22/77	0.000	.459818E+01	.549071E-02	-.513316E+02	0.	0.	0.	.141000E-01
1161	10/25/77	0.000	.445671E+01	.549071E-02	-.411990E+02	0.	0.	0.	.141000E-01
1176	10/25/77	0.000	.366678E+01	.179378E-01	.805279E+01	0.	0.	0.	.141000E-01
1182	10/27/77	0.000	.372897E+01	.179378E-01	.645936E+01	0.	0.	0.	.141000E-01
1189	10/27/77	0.000	.372897E+01	.179378E-01	.645936E+01	0.	0.	0.	.141000E-01
1209	10/28/77	0.000	.414084E+01	.934324E-02	-.156256E+02	0.	0.	0.	.141000E-01
1212	10/28/77	0.000	.414084E+01	.934324E-02	-.156256E+02	0.	0.	0.	.141000E-01
1228	10/31/77	0.000	.412263E+01	.934324E-02	-.148693E+02	0.	0.	0.	.141000E-01
1241	11/02/77	0.000	.396626E+01	.934324E-02	-.977279E+01	0.	0.	0.	.141000E-01
1257	11/03/77	0.000	.364596E+01	.163764E-01	.666879E+01	0.	0.	0.	.141000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 36: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.372511E+01	.163764E-01	.463852E+01	0.	0.	0.	.141000E-01
1292	11/07/77	0.000	.372848E+01	.163764E-01	.413103E+01	0.	0.	0.	.141000E-01
1308	11/09/77	0.000	.420812E+01	.804621E-02	-.219860E+02	0.	0.	0.	.141000E-01
1322	11/10/77	0.000	.418710E+01	.804621E-02	-.207680E+02	0.	0.	0.	.141000E-01
1337	11/10/77	0.000	.511370E+01	.270232E-02	-.122789E+03	0.	0.	0.	.141000E-01
1354	11/14/77	0.000	.509158E+01	.270232E-02	-.118689E+03	0.	0.	0.	.141000E-01
1364	11/14/77	0.000	.509158E+01	.270232E-02	-.118689E+03	0.	0.	0.	.141000E-01
1368	11/14/77	0.000	.598242E+01	.105072E-02	-.353979E+03	0.	0.	0.	.141000E-01
1381	11/16/77	0.000	.598103E+01	.105072E-02	-.353979E+03	0.	0.	0.	.141000E-01
1398	11/17/77	0.000	.597948E+01	.105072E-02	-.353979E+03	0.	0.	0.	.141000E-01
1440	11/28/77	0.000	.589889E+01	.105072E-02	-.324300E+03	0.	0.	0.	.141000E-01
1455	11/29/77	0.000	.373794E+01	.118986E-01	-.358661E+01	0.	0.	0.	.141000E-01
1466	11/29/77	0.000	.373794E+01	.118986E-01	-.358661E+01	0.	0.	0.	.141000E-01
1483	12/02/77	0.000	.371573E+01	.118986E-01	-.288949E+01	0.	0.	0.	.141000E-01
1502	12/03/77	0.000	.336386E+01	.211662E-01	.889699E+01	0.	0.	0.	.141000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 37: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	16.016	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
218	01/24/77	16.022	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
227	01/25/77	16.068	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
244	01/28/77	16.456	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
250	01/29/77	16.240	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
252	01/30/77	16.076	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
257	01/30/77	16.076	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
261	01/31/77	16.053	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
272	01/31/77	16.116	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
282	02/01/77	16.041	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
290	02/02/77	16.041	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
295	02/02/77	16.059	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
298	02/08/77	16.035	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
303	02/09/77	16.152	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
321	02/11/77	16.152	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
328	02/14/77	16.152	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
340	02/16/77	16.127	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
365	02/21/77	16.127	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
372	02/22/77	16.133	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
385	02/23/77	16.194	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
391	03/02/77	16.136	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
400	03/03/77	16.139	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
407	03/03/77	16.139	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
410	03/03/77	16.113	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
435	03/10/77	16.159	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
440	03/10/77	16.092	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
466	03/14/77	16.196	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
490	03/16/77	16.223	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
501	03/18/77	16.216	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02

CE-EPRI TMC PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 37: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	16.108	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
519	03/21/77	16.133	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
536	03/23/77	16.222	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
545	03/23/77	16.226	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
567	03/28/77	16.184	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
574	03/29/77	16.164	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
599	04/01/77	16.119	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
614	04/05/77	16.128	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
620	04/06/77	16.105	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
634	04/28/77	15.959	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
645	04/28/77	16.385	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
658	05/09/77	16.227	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
667	05/10/77	16.205	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
685	05/11/77	16.202	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
693	05/12/77	16.206	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
714	05/17/77	16.232	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
735	05/19/77	16.214	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
758	05/20/77	16.209	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
774	05/20/77	16.092	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
792	05/23/77	16.085	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
827	05/25/77	16.173	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
838	05/25/77	16.094	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 37: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	16.235	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
882	09/22/77	16.179	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
895	09/29/77	16.276	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
927	10/03/77	16.171	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
955	10/04/77	16.222	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
968	10/05/77	16.154	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1000	10/11/77	16.094	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1103	10/14/77	16.113	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1109	10/20/77	16.107	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1131	10/21/77	16.093	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1144	10/22/77	16.109	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1161	10/25/77	16.126	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1176	10/25/77	16.113	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1182	10/27/77	16.061	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1189	10/27/77	16.061	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1209	10/28/77	16.117	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1212	10/28/77	16.117	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1228	10/31/77	16.117	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1241	11/02/77	16.169	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1257	11/03/77	16.089	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 37: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	16.170	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1292	11/07/77	16.267	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1308	11/09/77	16.267	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1322	11/10/77	16.267	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1337	11/10/77	16.071	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1354	11/14/77	16.092	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1364	11/14/77	16.092	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1368	11/14/77	15.856	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1381	11/16/77	16.013	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1398	11/17/77	16.301	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1440	11/28/77	16.301	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1455	11/29/77	16.279	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1466	11/29/77	16.279	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1483	12/02/77	14.928	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02
1502	12/03/77	16.119	0.	-.158902E-02	.546077E-01	-.140364E-05	.719663E-06	.100000E+01	.336000E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 38: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	16.015	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
218	01/24/77	16.021	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
227	01/25/77	16.037	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
244	01/28/77	17.494	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
250	01/29/77	15.945	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
252	01/30/77	15.980	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
257	01/30/77	15.980	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
261	01/31/77	15.974	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
272	01/31/77	15.956	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
282	02/01/77	15.972	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
290	02/02/77	15.972	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
295	02/02/77	15.970	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
298	02/08/77	15.961	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
303	02/09/77	15.779	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
321	02/11/77	15.779	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
328	02/14/77	15.801	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
340	02/16/77	15.794	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
365	02/21/77	15.794	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
372	02/22/77	15.809	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
385	02/23/77	15.878	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
391	03/02/77	15.872	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
400	03/03/77	15.843	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
407	03/03/77	15.843	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
410	03/03/77	15.874	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
435	03/10/77	15.849	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
440	03/10/77	15.865	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
466	03/14/77	15.872	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
490	03/16/77	15.870	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
501	03/18/77	15.812	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 38: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.841	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
519	03/21/77	15.861	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
536	03/23/77	15.877	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
545	03/23/77	15.872	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
567	03/28/77	15.889	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
574	03/29/77	15.868	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
599	04/01/77	15.851	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
614	04/05/77	15.874	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
620	04/06/77	15.850	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
634	04/28/77	15.875	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
645	04/28/77	15.849	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
658	05/09/77	15.872	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
667	05/10/77	15.848	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
685	05/11/77	15.884	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
693	05/12/77	15.856	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
714	05/17/77	15.858	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
735	05/19/77	15.859	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
758	05/20/77	15.872	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
774	05/20/77	15.856	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
792	05/23/77	15.837	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
827	05/25/77	15.914	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
838	05/25/77	15.844	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 38: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.861	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
882	09/22/77	15.857	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
895	09/29/77	15.838	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
927	10/03/77	15.863	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
955	10/04/77	15.862	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
968	10/05/77	15.860	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1000	10/11/77	15.835	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1103	10/14/77	15.843	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1109	10/20/77	15.835	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1131	10/21/77	15.830	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1144	10/22/77	15.829	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1161	10/25/77	15.830	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1176	10/25/77	15.827	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1182	10/27/77	15.861	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1189	10/27/77	15.861	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1209	10/28/77	15.817	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1212	10/28/77	15.853	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1228	10/31/77	15.865	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1241	11/02/77	15.838	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1257	11/03/77	15.827	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 38: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.860	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1292	11/07/77	15.852	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1308	11/09/77	15.823	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1322	11/10/77	15.880	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1337	11/10/77	15.830	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1354	11/14/77	15.856	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1364	11/14/77	15.856	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1368	11/14/77	15.835	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1381	11/16/77	15.826	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1398	11/17/77	15.818	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1440	11/28/77	15.838	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1455	11/29/77	15.824	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1466	11/29/77	15.824	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1483	12/02/77	15.858	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02
1502	12/03/77	15.824	0.	-.255897E-02	.547839E-01	-.468086E-06	.637735E-06	.100000E+01	.404250E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 39: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	16.006	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
218	01/24/77	15.998	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
227	01/25/77	16.009	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
244	01/28/77	15.984	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
250	01/29/77	16.002	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
252	01/30/77	15.985	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
257	01/30/77	15.985	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
261	01/31/77	15.976	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
272	01/31/77	15.993	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
282	02/01/77	15.992	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
290	02/02/77	15.992	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
295	02/02/77	16.009	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
298	02/08/77	15.982	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
303	02/09/77	15.981	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
321	02/11/77	15.981	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
328	02/14/77	15.985	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
340	02/16/77	15.992	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
365	02/21/77	15.992	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
372	02/22/77	15.989	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
385	02/23/77	15.975	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
391	03/02/77	15.955	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
400	03/03/77	15.998	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
407	03/03/77	15.998	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
410	03/03/77	16.018	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
435	03/10/77	15.941	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
440	03/10/77	15.994	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
466	03/14/77	15.974	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
490	03/16/77	15.973	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
501	03/18/77	15.951	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 39: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.963	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
519	03/21/77	15.982	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
536	03/23/77	15.962	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
545	03/23/77	15.976	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
567	03/28/77	15.911	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
574	03/29/77	15.934	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
599	04/01/77	15.977	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
614	04/05/77	15.969	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
620	04/06/77	15.975	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
634	04/28/77	15.966	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
645	04/28/77	15.956	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
658	05/09/77	15.955	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
667	05/10/77	15.957	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
685	05/11/77	15.953	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
693	05/12/77	15.964	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
714	05/17/77	15.970	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
735	05/19/77	15.980	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
758	05/20/77	15.950	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
774	05/20/77	15.955	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
792	05/23/77	15.961	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
827	05/25/77	15.974	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
838	05/25/77	15.964	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 39: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.975	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
882	09/22/77	15.949	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
895	09/29/77	15.959	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
927	10/03/77	15.903	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
955	10/04/77	15.972	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
968	10/05/77	16.012	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1000	10/11/77	15.992	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1103	10/14/77	16.008	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1109	10/20/77	15.996	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1131	10/21/77	16.001	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1144	10/22/77	15.996	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1161	10/25/77	15.986	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1176	10/25/77	16.008	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1182	10/27/77	16.002	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1189	10/27/77	16.002	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1209	10/28/77	15.996	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1212	10/28/77	15.996	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1228	10/31/77	16.012	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1241	11/02/77	16.011	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1257	11/03/77	15.997	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 39: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	16.002	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1292	11/07/77	15.967	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1308	11/09/77	15.992	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1322	11/10/77	15.889	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1337	11/10/77	15.993	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1354	11/14/77	16.002	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1364	11/14/77	16.002	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1368	11/14/77	15.996	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1381	11/16/77	15.986	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1398	11/17/77	15.992	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1440	11/28/77	15.821	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1455	11/29/77	16.005	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1466	11/29/77	16.005	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1483	12/02/77	16.867	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02
1502	12/03/77	15.982	0.	-.177373E-02	.551295E-01	-.102954E-05	.726751E-06	.100000E+01	.346500E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 40: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	16.074	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
218	01/24/77	16.078	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
227	01/25/77	16.078	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
244	01/28/77	16.052	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
250	01/29/77	16.081	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
252	01/30/77	15.917	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
257	01/30/77	15.917	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
261	01/31/77	16.050	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
272	01/31/77	16.098	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
282	02/01/77	16.085	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
290	02/02/77	16.085	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
295	02/02/77	16.079	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
298	02/08/77	16.057	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
303	02/09/77	16.059	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
321	02/11/77	16.059	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
328	02/14/77	16.066	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
340	02/16/77	16.063	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
365	02/21/77	16.063	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
372	02/22/77	16.042	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
385	02/23/77	16.060	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
391	03/02/77	15.915	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
400	03/03/77	16.025	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
407	03/03/77	16.025	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
410	03/03/77	16.049	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
435	03/10/77	16.005	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
440	03/10/77	16.025	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
466	03/14/77	16.005	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
490	03/16/77	16.026	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
501	03/18/77	16.011	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02

CE-EPRI TWC PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 40: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.979	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
519	03/21/77	16.028	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
536	03/23/77	15.953	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
545	03/23/77	16.024	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
567	03/28/77	16.014	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
574	03/29/77	16.020	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
599	04/01/77	15.984	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
614	04/05/77	15.907	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
620	04/06/77	15.950	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
634	04/28/77	15.860	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
645	04/28/77	15.895	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
658	05/09/77	15.858	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
667	05/10/77	15.867	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
685	05/11/77	15.851	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
693	05/12/77	15.856	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
714	05/17/77	15.842	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
735	05/19/77	15.852	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
758	05/20/77	15.853	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
774	05/20/77	15.841	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
792	05/23/77	15.827	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
827	05/25/77	15.837	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
838	05/25/77	15.787	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 40: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.817	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
882	09/22/77	15.858	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
895	09/29/77	15.837	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
927	10/03/77	15.800	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
955	10/04/77	15.839	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
968	10/05/77	15.849	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1000	10/11/77	15.835	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1103	10/14/77	15.850	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1109	10/20/77	15.841	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1131	10/21/77	15.799	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1144	10/22/77	15.831	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1161	10/25/77	15.836	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1176	10/25/77	15.832	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1182	10/27/77	15.807	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1189	10/27/77	15.807	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1209	10/28/77	15.832	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1212	10/28/77	15.802	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1228	10/31/77	15.840	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1241	11/02/77	15.814	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1257	11/03/77	15.792	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 40: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.829	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1292	11/07/77	15.876	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1308	11/09/77	15.923	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1322	11/10/77	15.696	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1337	11/10/77	15.795	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1354	11/14/77	15.843	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1364	11/14/77	15.843	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1368	11/14/77	15.820	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1381	11/16/77	15.804	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1398	11/17/77	15.821	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1440	11/28/77	15.839	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1455	11/29/77	15.825	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1466	11/29/77	15.825	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1483	12/02/77	15.809	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02
1502	12/03/77	15.815	0.	-.129362E-02	.547565E-01	-.625319E-06	.832376E-06	.100000E+01	.514500E-02

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 41: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	16.402	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
218	01/24/77	16.750	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
227	01/25/77	16.423	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
244	01/28/77	16.423	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
250	01/29/77	16.423	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
252	01/30/77	15.107	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
257	01/30/77	15.107	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
261	01/31/77	16.385	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
272	01/31/77	16.446	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
282	02/01/77	16.405	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
290	02/02/77	16.405	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
295	02/02/77	16.425	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
298	02/08/77	16.479	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
303	02/09/77	16.433	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
321	02/11/77	16.433	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
328	02/14/77	16.378	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
340	02/16/77	16.306	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
365	02/21/77	16.306	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
372	02/22/77	16.243	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
385	02/23/77	16.287	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
391	03/02/77	16.231	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
400	03/03/77	16.336	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
407	03/03/77	16.336	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
410	03/03/77	16.342	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
435	03/10/77	16.344	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
440	03/10/77	16.309	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
466	03/14/77	16.304	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
490	03/16/77	16.311	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
501	03/18/77	16.301	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 41: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	16.297	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
519	03/21/77	16.267	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
536	03/23/77	16.350	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
545	03/23/77	16.285	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
567	03/28/77	16.398	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
574	03/29/77	16.451	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
599	04/01/77	16.290	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
614	04/05/77	16.229	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
620	04/06/77	16.365	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
634	04/28/77	16.284	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
645	04/28/77	16.284	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
658	05/09/77	16.223	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
667	05/10/77	16.533	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
685	05/11/77	16.256	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
693	05/12/77	16.488	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
714	05/17/77	16.460	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
735	05/19/77	16.407	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
758	05/20/77	16.368	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
774	05/20/77	16.428	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
792	05/23/77	16.606	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
827	05/25/77	16.342	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
838	05/25/77	16.561	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 41: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	16.532	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
882	09/22/77	16.433	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
895	09/29/77	16.507	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
927	10/03/77	16.408	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
955	10/04/77	16.408	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
968	10/05/77	16.421	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1000	10/11/77	16.451	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1103	10/14/77	16.355	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1109	10/20/77	16.406	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1131	10/21/77	16.334	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1144	10/22/77	16.421	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1161	10/25/77	16.302	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1176	10/25/77	16.429	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1182	10/27/77	16.363	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1189	10/27/77	16.363	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1209	10/28/77	16.452	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1212	10/28/77	16.452	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1228	10/31/77	16.274	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1241	11/02/77	16.346	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1257	11/03/77	16.390	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 41: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	16.324	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1292	11/07/77	16.307	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1308	11/09/77	16.307	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1322	11/10/77	16.331	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1337	11/10/77	16.404	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1354	11/14/77	16.188	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1364	11/14/77	16.188	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1368	11/14/77	50.369	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1381	11/16/77	16.384	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1398	11/17/77	16.446	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1440	11/28/77	16.278	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1455	11/29/77	16.278	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1466	11/29/77	16.278	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1483	12/02/77	16.278	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00
1502	12/03/77	16.323	.600000E+01	.102001E+00	.237927E+02	-.574374E-02	0.	0.	.135000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 42: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.739	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
218	01/24/77	15.277	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
227	01/25/77	15.244	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
244	01/28/77	15.312	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
250	01/29/77	15.219	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
252	01/30/77	15.350	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
257	01/30/77	15.350	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
261	01/31/77	15.251	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
272	01/31/77	15.253	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
282	02/01/77	15.232	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
290	02/02/77	15.232	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
295	02/02/77	15.252	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
298	02/08/77	15.251	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
303	02/09/77	15.239	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
321	02/11/77	15.239	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
328	02/14/77	15.277	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
340	02/16/77	15.231	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
365	02/21/77	15.231	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
372	02/22/77	15.257	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
385	02/23/77	15.261	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
391	03/02/77	15.244	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
400	03/03/77	18.632	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
407	03/03/77	18.632	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
410	03/03/77	15.280	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
435	03/10/77	15.264	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
440	03/10/77	15.230	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
466	03/14/77	15.307	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
490	03/16/77	15.235	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
501	03/18/77	15.202	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 42: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.272	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
519	03/21/77	15.236	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
536	03/23/77	15.221	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
545	03/23/77	15.233	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
567	03/28/77	15.268	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
574	03/29/77	15.277	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
599	04/01/77	15.358	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
614	04/05/77	15.367	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
620	04/06/77	15.201	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
634	04/28/77	15.572	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
645	04/28/77	15.233	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
658	05/09/77	15.415	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
667	05/10/77	15.249	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
685	05/11/77	15.327	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
693	05/12/77	15.219	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
714	05/17/77	15.233	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
735	05/19/77	15.377	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
758	05/20/77	15.357	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
774	05/20/77	15.360	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
792	05/23/77	15.361	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
827	05/25/77	15.464	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
838	05/25/77	15.198	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 42: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.684	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
882	09/22/77	15.403	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
895	09/29/77	15.359	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
927	10/03/77	15.375	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
955	10/04/77	15.265	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
968	10/05/77	15.281	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1000	10/11/77	15.443	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1103	10/14/77	15.467	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1109	10/20/77	15.596	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1131	10/21/77	15.742	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1144	10/22/77	15.594	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1161	10/25/77	16.078	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1176	10/25/77	15.579	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1182	10/27/77	15.730	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1189	10/27/77	15.730	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1209	10/28/77	15.674	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1212	10/28/77	15.596	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1228	10/31/77	15.663	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1241	11/02/77	15.614	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1257	11/03/77	15.484	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 42: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.779	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1292	11/07/77	15.722	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1308	11/09/77	15.592	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1322	11/10/77	15.720	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1337	11/10/77	15.613	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1354	11/14/77	15.726	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1364	11/14/77	15.726	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1368	11/14/77	15.470	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1381	11/16/77	15.529	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1398	11/17/77	15.534	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1440	11/28/77	15.715	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1455	11/29/77	15.558	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1466	11/29/77	15.558	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1483	12/02/77	15.616	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00
1502	12/03/77	15.514	.600000E+01	.161725E+00	.229975E+02	.284105E-02	0.	0.	.202500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 43: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.975	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
218	01/24/77	15.976	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
227	01/25/77	15.971	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
244	01/28/77	16.010	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
250	01/29/77	15.992	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
252	01/30/77	16.011	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
257	01/30/77	16.011	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
261	01/31/77	15.972	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
272	01/31/77	15.982	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
282	02/01/77	15.991	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
290	02/02/77	15.991	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
295	02/02/77	15.987	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
298	02/08/77	15.997	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
303	02/09/77	15.988	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
321	02/11/77	15.988	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
328	02/14/77	15.971	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
340	02/16/77	15.980	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
365	02/21/77	15.980	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
372	02/22/77	15.978	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
385	02/23/77	15.982	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
391	03/02/77	15.968	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
400	03/03/77	15.976	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
407	03/03/77	15.976	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
410	03/03/77	15.982	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
435	03/10/77	15.969	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
440	03/10/77	15.978	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
466	03/14/77	15.978	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
490	03/16/77	16.031	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
501	03/18/77	16.023	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01

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INSTRUMENT NO. 43: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	16.033	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
519	03/21/77	16.015	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
536	03/23/77	16.052	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
545	03/23/77	16.041	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
567	03/28/77	16.022	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
574	03/29/77	15.856	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
599	04/01/77	15.880	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
614	04/05/77	15.946	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
620	04/06/77	15.854	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
634	04/28/77	15.964	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
645	04/28/77	15.966	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
658	05/09/77	15.995	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
667	05/10/77	15.928	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
685	05/11/77	15.975	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
693	05/12/77	15.934	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
714	05/17/77	15.921	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
735	05/19/77	15.922	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
758	05/20/77	15.876	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
774	05/20/77	15.960	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
792	05/23/77	15.974	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
827	05/25/77	15.970	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
838	05/25/77	15.942	0.	-.991828E-01	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01

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INSTRUMENT NO. 43: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.950	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
882	09/22/77	15.873	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
895	09/29/77	15.984	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
927	10/03/77	15.972	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
955	10/04/77	15.993	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
968	10/05/77	15.895	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1000	10/11/77	15.886	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1103	10/14/77	15.890	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1109	10/20/77	15.876	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1131	10/21/77	15.975	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1144	10/22/77	15.979	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1161	10/25/77	15.977	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1176	10/25/77	15.974	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1182	10/27/77	16.032	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1189	10/27/77	16.032	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1209	10/28/77	15.969	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1212	10/28/77	15.969	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1228	10/31/77	16.586	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1241	11/02/77	15.991	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1257	11/03/77	15.897	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01

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INSTRUMENT NO. 43: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.998	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1292	11/07/77	15.888	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1308	11/09/77	15.888	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1322	11/10/77	15.888	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1337	11/10/77	15.773	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1354	11/14/77	15.916	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1364	11/14/77	15.916	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1368	11/14/77	15.857	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1381	11/16/77	15.872	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1398	11/17/77	15.908	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1440	11/28/77	15.908	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1455	11/29/77	15.937	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1466	11/29/77	15.937	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1483	12/02/77	15.718	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01
1502	12/03/77	15.954	0.	-.991828E-02	.393344E+00	-.539021E-05	.354920E-05	.100000E+01	.195000E-01

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INSTRUMENT NO. 44: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.886	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
218	01/24/77	15.883	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
227	01/25/77	15.872	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
244	01/28/77	15.830	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
250	01/29/77	15.975	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
252	01/30/77	16.004	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
257	01/30/77	16.004	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
261	01/31/77	15.971	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
272	01/31/77	15.973	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
282	02/01/77	15.979	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
290	02/02/77	15.979	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
295	02/02/77	15.979	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
298	02/08/77	15.938	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
303	02/09/77	15.887	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
321	02/11/77	15.887	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
328	02/14/77	15.940	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
340	02/16/77	15.950	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
365	02/21/77	15.950	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
372	02/22/77	15.932	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
385	02/23/77	15.958	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
391	03/02/77	15.949	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
400	03/03/77	15.943	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
407	03/03/77	15.943	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
410	03/03/77	15.953	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
435	03/10/77	15.898	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
440	03/10/77	15.894	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
466	03/14/77	15.931	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
490	03/16/77	15.916	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
501	03/18/77	15.907	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01

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INSTRUMENT NO. 44: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.932	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
519	03/21/77	15.934	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
536	03/23/77	15.939	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
545	03/23/77	15.943	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
567	03/28/77	15.931	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
574	03/29/77	15.930	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
599	04/01/77	15.040	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
614	04/05/77	16.069	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
620	04/06/77	16.034	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
634	04/28/77	16.066	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
645	04/28/77	16.040	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
658	05/09/77	16.022	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
667	05/10/77	16.006	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
685	05/11/77	16.000	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
693	05/12/77	16.017	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
714	05/17/77	16.022	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
735	05/19/77	16.025	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
758	05/20/77	16.037	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
774	05/20/77	16.029	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
792	05/23/77	15.981	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
827	05/25/77	16.007	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
838	05/25/77	15.970	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01

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INSTRUMENT NO. 44: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	16.065	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
882	09/22/77	16.074	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
895	09/29/77	15.923	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
927	10/03/77	16.030	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
955	10/04/77	16.055	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
968	10/05/77	16.046	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1000	10/11/77	16.063	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1103	10/14/77	16.064	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1109	10/20/77	16.061	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1131	10/21/77	16.015	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1144	10/22/77	16.051	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1161	10/25/77	16.038	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1176	10/25/77	16.054	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1182	10/27/77	16.037	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1189	10/27/77	16.037	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1209	10/28/77	16.044	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1212	10/28/77	16.070	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1228	10/31/77	16.092	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1241	11/02/77	16.070	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1257	11/03/77	16.045	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 44: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	16.147	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1292	11/07/77	16.082	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1308	11/09/77	16.047	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1322	11/10/77	16.060	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1337	11/10/77	16.043	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1354	11/14/77	16.076	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1364	11/14/77	16.076	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1368	11/14/77	16.052	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1381	11/16/77	16.047	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1398	11/17/77	16.058	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1440	11/28/77	16.064	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1455	11/29/77	16.039	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1466	11/29/77	16.039	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1483	12/02/77	16.064	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01
1502	12/03/77	16.047	0.	-.755717E-02	.395149E+00	.185854E-05	.315376E-05	.100000E+01	.131250E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 45: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.931	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
218	01/24/77	15.897	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
227	01/25/77	15.961	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
244	01/28/77	15.920	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
250	01/29/77	15.930	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
252	01/30/77	15.913	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
257	01/30/77	15.913	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
261	01/31/77	15.921	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
272	01/31/77	15.924	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
282	02/01/77	15.918	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
290	02/02/77	15.918	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
295	02/02/77	15.944	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
298	02/08/77	15.882	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
303	02/09/77	15.869	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
321	02/11/77	15.869	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
328	02/14/77	15.856	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
340	02/16/77	15.874	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
365	02/21/77	15.874	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
372	02/22/77	15.924	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
385	02/23/77	15.844	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
391	03/02/77	15.843	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
400	03/03/77	15.847	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
407	03/03/77	15.847	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
410	03/03/77	15.864	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
435	03/10/77	15.900	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
440	03/10/77	15.916	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
466	03/14/77	15.901	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
490	03/16/77	15.909	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
501	03/18/77	15.895	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 45: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.886	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
519	03/21/77	15.883	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
536	03/23/77	15.882	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
545	03/23/77	15.880	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
567	03/28/77	15.675	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
574	03/29/77	15.666	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
599	04/01/77	15.909	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
614	04/05/77	15.895	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
620	04/06/77	15.895	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
634	04/28/77	15.888	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
645	04/28/77	15.878	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
658	05/09/77	15.826	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
667	05/10/77	15.846	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
685	05/11/77	15.834	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
693	05/12/77	15.845	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
714	05/17/77	15.882	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
735	05/19/77	15.888	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
758	05/20/77	15.868	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
774	05/20/77	15.860	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
792	05/23/77	15.851	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
827	05/25/77	15.850	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
838	05/25/77	15.899	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01

INSTRUMENT NO. 45: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.852	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
882	09/22/77	15.725	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
895	09/29/77	15.776	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
927	10/03/77	15.888	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
955	10/04/77	15.729	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
968	10/05/77	15.836	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1000	10/11/77	15.831	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1103	10/14/77	15.913	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1109	10/20/77	15.807	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1131	10/21/77	15.880	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1144	10/22/77	15.902	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1161	10/25/77	15.873	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1176	10/25/77	15.913	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1182	10/27/77	15.895	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1189	10/27/77	15.899	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1209	10/28/77	15.889	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1212	10/28/77	15.889	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1228	10/31/77	15.879	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1241	11/02/77	15.898	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1257	11/03/77	15.877	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 45: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.865	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1292	11/07/77	15.779	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1308	11/09/77	15.830	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1322	11/10/77	15.829	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1337	11/10/77	15.856	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1354	11/14/77	15.816	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1364	11/14/77	15.816	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1368	11/14/77	15.852	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1381	11/16/77	15.833	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1398	11/17/77	15.908	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1440	11/28/77	15.908	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1455	11/29/77	15.900	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1466	11/29/77	15.900	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1483	12/02/77	16.007	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01
1502	12/03/77	15.887	0.	.845629E-02	.394127E+00	-.969996E-06	.317804E-05	.100000E+01	.198750E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 46: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	17.646	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
218	01/24/77	15.997	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
227	01/25/77	15.991	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
244	01/28/77	16.140	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
250	01/29/77	16.130	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
252	01/30/77	16.152	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
257	01/30/77	16.152	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
261	01/31/77	16.127	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
272	01/31/77	16.126	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
282	02/01/77	16.136	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
290	02/02/77	16.136	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
295	02/02/77	15.995	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
298	02/08/77	16.172	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
303	02/09/77	16.171	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
321	02/11/77	16.171	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
328	02/14/77	16.180	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
340	02/16/77	16.183	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
365	02/21/77	16.183	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
372	02/22/77	17.959	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
385	02/23/77	17.998	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
391	03/02/77	19.789	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
400	03/03/77	19.867	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
407	03/03/77	19.867	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
410	03/03/77	15.882	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
435	03/10/77	15.839	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
440	03/10/77	15.843	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
466	03/14/77	15.857	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
490	03/16/77	15.851	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
501	03/18/77	15.832	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01

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INSTRUMENT NO. 46: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.843	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
519	03/21/77	15.868	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
536	03/23/77	15.860	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
545	03/23/77	15.862	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
567	03/28/77	15.841	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
574	03/29/77	15.841	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
599	04/01/77	15.753	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
614	04/05/77	15.859	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
620	04/06/77	15.837	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
634	04/28/77	15.908	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
645	04/28/77	15.878	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
658	05/09/77	15.877	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
667	05/10/77	15.861	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
685	05/11/77	15.879	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
693	05/12/77	15.868	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
714	05/17/77	15.863	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
735	05/19/77	15.888	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
758	05/20/77	15.897	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
774	05/20/77	15.892	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
792	05/23/77	15.889	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
827	05/25/77	15.915	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
838	05/25/77	15.857	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.923	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
882	09/22/77	15.922	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
895	09/29/77	15.907	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
927	10/03/77	15.923	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
955	10/04/77	15.905	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
968	10/05/77	15.919	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1000	10/11/77	16.034	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1103	10/14/77	15.926	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1109	10/20/77	15.920	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1131	10/21/77	15.850	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1144	10/22/77	15.853	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1161	10/25/77	15.884	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1176	10/25/77	15.851	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1182	10/27/77	15.877	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1189	10/27/77	15.877	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1209	10/28/77	15.857	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1212	10/28/77	15.871	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1228	10/31/77	15.891	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1241	11/02/77	15.900	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1257	11/03/77	15.846	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.996	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1292	11/07/77	15.942	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1308	11/09/77	15.895	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1322	11/10/77	15.931	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1337	11/10/77	15.865	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1354	11/14/77	15.921	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1364	11/14/77	15.921	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1368	11/14/77	15.900	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1381	11/16/77	15.887	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1398	11/17/77	15.899	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1440	11/28/77	15.977	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1455	11/29/77	15.948	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1466	11/29/77	15.948	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1483	12/02/77	15.972	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01
1502	12/03/77	15.985	0.	-.869376E-02	.391761E+00	-.132966E-05	.342711E-05	.100000E+01	.135000E-01

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.716	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
218	01/24/77	15.710	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
227	01/25/77	15.698	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
244	01/28/77	15.776	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
250	01/29/77	15.731	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
252	01/30/77	15.768	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
257	01/30/77	15.768	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
261	01/31/77	15.712	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
272	01/31/77	15.711	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
282	02/01/77	15.695	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
290	02/02/77	15.695	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
295	02/02/77	15.691	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
298	02/08/77	15.651	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
303	02/09/77	15.668	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
321	02/11/77	15.668	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
328	02/14/77	15.650	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
340	02/16/77	15.631	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
365	02/21/77	15.631	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
372	02/22/77	15.654	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
385	02/23/77	15.610	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
391	03/02/77	15.599	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
400	03/03/77	15.586	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
407	03/03/77	15.586	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
410	03/03/77	15.609	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
435	03/10/77	15.587	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
440	03/10/77	15.585	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
466	03/14/77	15.565	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
490	03/16/77	15.553	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
501	03/18/77	15.548	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00

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INSTRUMENT NO. 47: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.583	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
519	03/21/77	15.573	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
536	03/23/77	15.551	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
545	03/23/77	15.552	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
567	03/28/77	15.538	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
574	03/29/77	15.526	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
599	04/01/77	15.487	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
614	04/05/77	15.548	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
620	04/06/77	15.492	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
634	04/28/77	15.500	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
645	04/28/77	15.500	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
658	05/09/77	15.450	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
667	05/10/77	15.390	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
685	05/11/77	15.427	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
693	05/12/77	15.395	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
714	05/17/77	15.373	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
735	05/19/77	15.433	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
758	05/20/77	15.440	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
774	05/20/77	15.409	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
792	05/23/77	15.396	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
827	05/25/77	15.446	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
838	05/25/77	15.332	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 47: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.260	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
882	09/22/77	15.239	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
895	09/29/77	15.207	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
927	10/03/77	15.192	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
955	10/04/77	15.171	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
968	10/05/77	15.371	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1000	10/11/77	15.273	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1103	10/14/77	15.112	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1109	10/20/77	15.107	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1131	10/21/77	15.081	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1144	10/22/77	15.049	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1161	10/25/77	15.104	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1176	10/25/77	15.065	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1182	10/27/77	17.647	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1189	10/27/77	17.647	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1209	10/28/77	15.067	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1212	10/28/77	15.067	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1228	10/31/77	15.093	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1241	11/02/77	15.086	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1257	11/03/77	15.027	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 47: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.101	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1292	11/07/77	15.100	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1308	11/09/77	15.004	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1322	11/10/77	15.064	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1337	11/10/77	15.015	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1354	11/14/77	15.420	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1364	11/14/77	15.420	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1368	11/14/77	15.006	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1381	11/16/77	15.025	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1398	11/17/77	15.046	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1440	11/28/77	15.708	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1455	11/29/77	15.017	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1466	11/29/77	15.017	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1483	12/02/77	15.017	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00
1502	12/03/77	15.003	.600000E+01	-.146594E+00	.232260E+02	.272744E-02	0.	0.	.177000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 48: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.262	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
218	01/24/77	15.340	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
227	01/25/77	15.235	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
244	01/28/77	16.778	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
250	01/29/77	16.778	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
252	01/30/77	16.612	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
257	01/30/77	16.612	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
261	01/31/77	16.596	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
272	01/31/77	16.661	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
282	02/01/77	16.733	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
290	02/02/77	16.733	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
295	02/02/77	16.413	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
298	02/08/77	16.628	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
303	02/09/77	16.601	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
321	02/11/77	16.601	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
328	02/14/77	16.428	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
340	02/16/77	16.350	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
365	02/21/77	16.350	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
372	02/22/77	16.455	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
385	02/23/77	16.468	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
391	03/02/77	16.322	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
400	03/03/77	16.486	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
407	03/03/77	16.486	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
410	03/03/77	16.413	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
435	03/10/77	16.568	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
440	03/10/77	16.324	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
466	03/14/77	16.277	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
490	03/16/77	16.209	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
501	03/18/77	16.334	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 48: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	16.241	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
519	03/21/77	16.243	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
536	03/23/77	16.172	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
545	03/23/77	16.348	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
567	03/28/77	16.196	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
574	03/29/77	16.151	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
599	04/01/77	16.161	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
614	04/05/77	16.124	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
620	04/06/77	16.015	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
634	04/28/77	16.096	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
645	04/28/77	15.870	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
658	05/09/77	15.835	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
667	05/10/77	15.807	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
685	05/11/77	15.784	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
693	05/12/77	15.769	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
714	05/17/77	15.574	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
735	05/19/77	15.812	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
758	05/20/77	15.730	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
774	05/20/77	15.750	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
792	05/23/77	15.646	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
827	05/25/77	15.752	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
838	05/25/77	15.650	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 48: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.361	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
882	09/22/77	15.032	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
895	09/29/77	14.905	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
927	10/03/77	14.875	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
955	10/04/77	15.417	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
968	10/05/77	14.788	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1000	10/11/77	14.888	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1103	10/14/77	14.858	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1109	10/20/77	14.804	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1131	10/21/77	14.682	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1144	10/22/77	14.641	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1161	10/25/77	14.801	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1176	10/25/77	14.695	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1182	10/27/77	14.603	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1189	10/27/77	14.603	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1209	10/28/77	14.797	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1212	10/28/77	14.526	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1228	10/31/77	14.862	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1241	11/02/77	14.505	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1257	11/03/77	14.563	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 48: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	14.571	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1292	11/07/77	14.567	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1308	11/09/77	14.570	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1322	11/10/77	14.654	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1337	11/10/77	14.690	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1354	11/14/77	14.645	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1364	11/14/77	14.645	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1368	11/14/77	14.492	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1381	11/16/77	14.532	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1398	11/17/77	14.547	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1440	11/28/77	14.505	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1455	11/29/77	14.433	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1466	11/29/77	14.433	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1483	12/02/77	14.476	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00
1502	12/03/77	14.609	.600000E+01	.203093E-01	.231736E+02	.162139E-02	0.	0.	.247500E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 53: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
218	01/24/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
227	01/25/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
244	01/28/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
250	01/29/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
252	01/30/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
257	01/30/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
261	01/31/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
272	01/31/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
282	02/01/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
290	02/02/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
295	02/02/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
298	02/08/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
303	02/09/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
321	02/11/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
328	02/14/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
340	02/16/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
365	02/21/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
372	02/22/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
385	02/23/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
391	03/02/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
400	03/03/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
407	03/03/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
410	03/03/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
435	03/10/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
440	03/10/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
466	03/14/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
490	03/16/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
501	03/18/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.

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INSTRUMENT NO. 53: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
519	03/21/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
536	03/23/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
545	03/23/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
567	03/28/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
574	03/29/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
599	04/01/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
614	04/05/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
620	04/06/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
634	04/28/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
645	04/28/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
658	05/09/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
667	05/10/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
685	05/11/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
693	05/12/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
714	05/17/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
735	05/19/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
758	05/20/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
774	05/20/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
792	05/23/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
827	05/25/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
838	05/25/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.

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INSTRUMENT NO. 53: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
882	09/22/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
895	09/29/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
927	10/03/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
955	10/04/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
968	10/05/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1000	10/11/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1103	10/14/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1109	10/20/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1131	10/21/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1144	10/22/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1161	10/25/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1176	10/25/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1182	10/27/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1189	10/27/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1209	10/28/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1212	10/28/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1228	10/31/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1241	11/02/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1257	11/03/77	0.000	.5616C0E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.

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INSTRUMENT NO. 53: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1292	11/07/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1308	11/09/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1322	11/10/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1337	11/10/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1354	11/14/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1364	11/14/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1368	11/14/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1381	11/16/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1398	11/17/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1440	11/28/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1455	11/29/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1466	11/29/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1483	12/02/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.
1502	12/03/77	0.000	.561600E+01	-.900000E-02	.314054E+01	.225530E-02	0.	0.	0.

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INSTRUMENT NO. 54: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
218	01/24/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
227	01/25/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
244	01/28/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
250	01/29/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
252	01/30/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
257	01/30/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
261	01/31/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
272	01/31/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
282	02/01/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
290	02/02/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
295	02/02/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
298	02/08/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
303	02/09/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
321	02/11/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
328	02/14/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
340	02/16/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
365	02/21/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
372	02/22/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
385	02/23/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
391	03/02/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
400	03/03/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
407	03/03/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
410	03/03/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
435	03/10/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
440	03/10/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
466	03/14/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
490	03/16/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
501	03/18/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 54: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
519	03/21/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
536	03/23/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
545	03/23/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
567	03/28/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
574	03/29/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
599	04/01/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
614	04/05/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
620	04/06/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
634	04/28/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
645	04/28/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
658	05/09/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
667	05/10/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
685	05/11/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
693	05/12/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
714	05/17/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
735	05/19/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
758	05/20/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
774	05/20/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
792	05/23/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
827	05/25/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
838	05/25/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.

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INSTRUMENT NO. 54: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
882	09/22/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
895	09/29/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
927	10/03/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
955	10/04/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
968	10/05/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1000	10/11/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1103	10/14/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1109	10/20/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1131	10/21/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1144	10/22/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1161	10/25/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1176	10/25/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1182	10/27/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1189	10/27/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1209	10/28/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1212	10/28/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1228	10/31/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1241	11/02/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1257	11/03/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 54: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1292	11/07/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1308	11/09/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1322	11/10/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1337	11/10/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1354	11/14/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1364	11/14/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1368	11/14/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1381	11/16/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1398	11/17/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1440	11/28/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1455	11/29/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1466	11/29/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1483	12/02/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.
1502	12/03/77	0.000	.572200E+01	-.900000E-02	.313482E+01	.225568E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 55: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
218	01/24/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
227	01/25/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
244	01/28/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
250	01/29/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
252	01/30/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
257	01/30/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
261	01/31/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
272	01/31/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
282	02/01/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
290	02/02/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
295	02/02/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
298	02/08/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
303	02/09/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
321	02/11/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
328	02/14/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
340	02/16/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
365	02/21/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
372	02/22/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
385	02/23/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
391	03/02/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
400	03/03/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
407	03/03/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
410	03/03/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
435	03/10/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
440	03/10/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
466	03/14/77	0.000	.5677C0E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
490	03/16/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
501	03/18/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 55: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
519	03/21/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
536	03/23/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
545	03/23/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
567	03/28/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
574	03/29/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
599	04/01/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
614	04/05/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
620	04/06/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
634	04/28/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
645	04/28/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
658	05/09/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
667	05/10/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
685	05/11/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
693	05/12/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
714	05/17/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
735	05/19/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
758	05/20/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
774	05/20/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
792	05/23/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
827	05/25/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
838	05/25/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 55: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
882	09/22/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
895	09/29/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
927	10/03/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
955	10/04/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
968	10/05/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1000	10/11/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1103	10/14/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1109	10/20/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1131	10/21/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1144	10/22/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1161	10/25/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1176	10/25/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1182	10/27/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1189	10/27/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1209	10/28/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1212	10/28/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1228	10/31/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1241	11/02/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1257	11/03/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 55: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1292	11/07/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1308	11/09/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1322	11/10/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1337	11/10/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1354	11/14/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1364	11/14/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1368	11/14/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1381	11/16/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1398	11/17/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1440	11/28/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1455	11/29/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1466	11/29/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1483	12/02/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.
1502	12/03/77	0.000	.567700E+01	-.900000E-02	.313820E+01	.224318E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 56: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
218	01/24/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
227	01/25/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
244	01/28/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
250	01/29/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
252	01/30/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
257	01/30/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
261	01/31/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
272	01/31/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
282	02/01/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
290	02/02/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
295	02/02/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
298	02/08/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
303	02/09/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
321	02/11/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
328	02/14/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
340	02/16/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
365	02/21/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
372	02/22/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
385	02/23/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
391	03/02/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
400	03/03/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
407	03/03/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
410	03/03/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
435	03/10/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
440	03/10/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
466	03/14/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
490	03/16/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
501	03/18/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 56: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
519	03/21/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
536	03/23/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
545	03/23/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
567	03/28/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
574	03/29/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
599	04/01/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
614	04/05/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
620	04/06/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
634	04/28/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
645	04/28/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
658	05/09/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
667	05/10/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
685	05/11/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
693	05/12/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
714	05/17/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
735	05/19/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
758	05/20/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
774	05/20/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
792	05/23/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
827	05/25/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
838	05/25/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 56: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
882	09/22/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
895	09/29/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
927	10/03/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
955	10/04/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
968	10/05/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1000	10/11/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1103	10/14/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1109	10/20/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1131	10/21/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1144	10/22/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1161	10/25/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1176	10/25/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1182	10/27/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1189	10/27/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1209	10/28/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1212	10/28/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1228	10/31/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1241	11/02/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1257	11/03/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 56: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1292	11/07/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1308	11/09/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1322	11/10/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1337	11/10/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1354	11/14/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1364	11/14/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1368	11/14/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1381	11/16/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1398	11/17/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1440	11/28/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1455	11/29/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1466	11/29/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1483	12/02/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.
1502	12/03/77	0.000	.566300E+01	-.900000E-02	.313271E+01	.221485E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 58: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
218	01/24/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
227	01/25/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
244	01/28/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
250	01/29/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
252	01/30/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
257	01/30/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
261	01/31/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
272	01/31/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
282	02/01/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
290	02/02/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
295	02/02/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
298	02/08/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
303	02/09/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
321	02/11/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
328	02/14/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
340	02/16/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
365	02/21/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
372	02/22/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
385	02/23/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
391	03/02/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
400	03/03/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
407	03/03/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
410	03/03/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
435	03/10/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
440	03/10/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
466	03/14/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
490	03/16/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
501	03/18/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 58: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
519	03/21/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
536	03/23/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
545	03/23/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
567	03/28/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
574	03/29/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
599	04/01/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
614	04/05/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
620	04/06/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
634	04/28/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
645	04/28/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
658	05/09/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
667	05/10/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
685	05/11/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
693	05/12/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
714	05/17/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
735	05/19/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
758	05/20/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
774	05/20/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
792	05/23/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
827	05/25/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
838	05/25/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 58: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
882	09/22/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
895	09/29/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
927	10/03/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
955	10/04/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
968	10/05/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1000	10/11/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1103	10/14/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1109	10/20/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1131	10/21/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1144	10/22/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1161	10/25/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1176	10/25/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1182	10/27/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1189	10/27/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1209	10/28/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1212	10/28/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1228	10/31/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1241	11/02/77	0.000	.5618C0E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1257	11/03/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 58: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1292	11/07/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1308	11/09/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1322	11/10/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1337	11/10/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1354	11/14/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1364	11/14/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1368	11/14/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1381	11/16/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1398	11/17/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1440	11/28/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1455	11/29/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1466	11/29/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1483	12/02/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.
1502	12/03/77	0.000	.561800E+01	-.900000E-02	.314351E+01	.224102E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 59: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
218	01/24/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
227	01/25/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
244	01/28/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
250	01/29/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
252	01/30/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
257	01/30/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
261	01/31/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
272	01/31/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
282	02/01/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
290	02/02/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
295	02/02/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
298	02/08/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
303	02/09/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
321	02/11/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
328	02/14/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
340	02/16/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
365	02/21/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
372	02/22/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
385	02/23/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
391	03/02/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
400	03/03/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
407	03/03/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
410	03/03/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
435	03/10/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
440	03/10/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
466	03/14/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
490	03/16/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
501	03/18/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.

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INSTRUMENT NO. 59: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
519	03/21/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
536	03/23/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
545	03/23/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
567	03/28/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
574	03/29/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
599	04/01/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
614	04/05/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
620	04/06/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
634	04/28/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
645	04/28/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
658	05/09/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
667	05/10/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
685	05/11/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
693	05/12/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
714	05/17/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
735	05/19/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
758	05/20/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
774	05/20/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
792	05/23/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
827	05/25/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
838	05/25/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.

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INSTRUMENT NO. 59: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
882	09/22/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
895	09/29/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
927	10/03/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
955	10/04/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
968	10/05/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1000	10/11/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1103	10/14/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1109	10/20/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1131	10/21/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1144	10/22/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1161	10/25/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1176	10/25/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1182	10/27/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1189	10/27/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1209	10/28/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1212	10/28/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1228	10/31/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1241	11/02/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1257	11/03/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.

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INSTRUMENT NO. 59: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	0.000	.4369C0E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1292	11/07/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1308	11/09/77	0.000	.4369C0E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1322	11/10/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1337	11/10/77	0.000	.4369C0E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1354	11/14/77	0.000	.4369C0E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1364	11/14/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1368	11/14/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1381	11/16/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1398	11/17/77	0.000	.4369C0E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1440	11/28/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1455	11/29/77	0.000	.4369C0E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1466	11/29/77	0.000	.4369C0E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1483	12/02/77	0.000	.436900E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.
1502	12/03/77	0.000	.4369C0E+01	-.900000E-02	.313484E+01	.230209E-02	0.	0.	0.

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 60: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	16.050	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
218	01/24/77	16.055	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
227	01/25/77	16.067	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
244	01/28/77	16.048	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
250	01/29/77	16.062	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
252	01/30/77	15.905	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
257	01/30/77	15.905	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
261	01/31/77	15.905	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
272	01/31/77	16.069	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
282	02/01/77	16.055	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
290	02/02/77	16.055	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
295	02/02/77	16.056	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
298	02/08/77	16.063	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
303	02/09/77	15.994	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
321	02/11/77	15.994	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
328	02/14/77	16.057	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
340	02/16/77	16.079	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
365	02/21/77	16.079	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
372	02/22/77	16.044	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
385	02/23/77	16.068	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
391	03/02/77	15.948	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
400	03/03/77	16.053	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
407	03/03/77	16.053	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
410	03/03/77	16.091	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
435	03/10/77	16.091	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
440	03/10/77	16.071	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
466	03/14/77	16.068	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
490	03/16/77	16.047	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
501	03/18/77	16.037	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00

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INSTRUMENT NO. 60: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	16.014	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
519	03/21/77	16.051	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
536	03/23/77	16.022	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
545	03/23/77	16.058	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
567	03/28/77	15.997	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
574	03/29/77	16.079	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
599	04/01/77	16.074	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
614	04/05/77	15.924	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
620	04/06/77	16.082	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
634	04/28/77	15.921	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
645	04/28/77	16.100	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
658	05/09/77	15.929	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
667	05/10/77	16.107	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
685	05/11/77	15.927	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
693	05/12/77	16.064	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
714	05/17/77	16.122	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
735	05/19/77	16.070	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
758	05/20/77	16.088	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
774	05/20/77	16.062	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
792	05/23/77	16.067	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
827	05/25/77	15.918	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
838	05/25/77	16.134	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00

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INSTRUMENT NO. 60: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.933	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
882	09/22/77	16.045	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
895	09/29/77	16.057	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
927	10/03/77	15.920	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
955	10/04/77	16.042	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
968	10/05/77	16.042	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1000	10/11/77	15.906	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1103	10/14/77	16.030	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1109	10/20/77	16.029	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1131	10/21/77	15.910	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1144	10/22/77	16.076	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1161	10/25/77	15.896	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1176	10/25/77	16.091	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1182	10/27/77	15.913	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1189	10/27/77	15.913	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1209	10/28/77	16.074	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1212	10/28/77	16.074	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1228	10/31/77	15.909	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1241	11/02/77	15.921	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1257	11/03/77	16.092	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 60: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.903	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1292	11/07/77	15.910	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1308	11/09/77	16.068	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1322	11/10/77	15.906	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1337	11/10/77	16.082	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1354	11/14/77	15.915	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1364	11/14/77	15.915	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1368	11/14/77	16.045	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1381	11/16/77	16.055	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1398	11/17/77	16.059	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1440	11/28/77	15.918	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1455	11/29/77	16.039	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1466	11/29/77	16.039	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1483	12/02/77	15.924	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00
1502	12/03/77	16.017	0.	.204163E+00	.314883E+01	-.916851E-04	.338597E-04	.100000E+01	.171000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 61: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.744	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
218	01/24/77	15.767	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
227	01/25/77	15.785	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
244	01/28/77	15.800	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
250	01/29/77	15.748	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
252	01/30/77	15.712	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
257	01/30/77	15.712	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
261	01/31/77	15.745	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
272	01/31/77	15.744	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
282	02/01/77	15.815	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
290	02/02/77	15.815	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
295	02/02/77	15.329	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
298	02/08/77	15.691	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
303	02/09/77	15.687	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
321	02/11/77	15.687	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
328	02/14/77	15.523	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
340	02/16/77	15.569	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
365	02/21/77	15.569	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
372	02/22/77	15.621	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
385	02/23/77	15.631	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
391	03/02/77	15.554	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
400	03/03/77	15.598	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
407	03/03/77	15.598	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
410	03/03/77	15.308	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
435	03/10/77	15.575	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
440	03/10/77	15.559	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
466	03/14/77	15.508	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
490	03/16/77	15.496	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
501	03/18/77	15.563	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 61: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.528	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
519	03/21/77	15.456	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
536	03/23/77	15.508	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
545	03/23/77	15.556	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
567	03/28/77	15.547	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
574	03/29/77	15.535	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
599	04/01/77	15.492	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
614	04/05/77	15.558	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
620	04/06/77	15.557	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
634	04/28/77	15.491	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
645	04/28/77	15.487	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
658	05/09/77	15.436	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
667	05/10/77	15.454	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
685	05/11/77	15.497	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
693	05/12/77	15.543	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
714	05/17/77	15.476	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
735	05/19/77	15.470	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
758	05/20/77	15.452	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
774	05/20/77	15.495	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
792	05/23/77	15.479	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
827	05/25/77	15.439	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
838	05/25/77	15.471	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 61: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.352	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
882	09/22/77	15.255	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
895	09/29/77	15.525	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
927	10/03/77	15.423	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
955	10/04/77	15.452	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
968	10/05/77	15.655	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1000	10/11/77	15.575	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1103	10/14/77	15.608	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1109	10/20/77	15.584	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1131	10/21/77	15.544	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1144	10/22/77	15.593	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1161	10/25/77	15.544	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1176	10/25/77	15.597	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1182	10/27/77	15.432	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1189	10/27/77	15.432	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1209	10/28/77	15.521	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1212	10/28/77	15.521	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1228	10/31/77	15.618	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1241	11/02/77	15.599	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1257	11/03/77	15.544	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 61: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.288	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1292	11/07/77	15.870	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1308	11/09/77	15.877	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1322	11/10/77	15.524	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1337	11/10/77	15.628	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1354	11/14/77	15.590	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1364	11/14/77	15.590	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1368	11/14/77	15.648	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1381	11/16/77	15.664	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1398	11/17/77	15.649	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1440	11/28/77	15.650	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1455	11/29/77	15.794	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1466	11/29/77	15.794	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1483	12/02/77	15.686	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01
1502	12/03/77	15.744	0.	-.580747E-02	.156941E+00	-.440003E-06	.132133E-05	.100000E+01	.121500E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 62: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.766	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
218	01/24/77	15.760	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
227	01/25/77	15.746	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
244	01/28/77	15.762	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
250	01/29/77	15.760	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
252	01/30/77	15.761	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
257	01/30/77	15.761	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
261	01/31/77	15.761	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
272	01/31/77	15.658	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
282	02/01/77	15.668	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
290	02/02/77	15.668	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
295	02/02/77	15.682	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
298	02/08/77	15.666	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
303	02/09/77	15.673	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
321	02/11/77	15.673	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
328	02/14/77	15.672	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
340	02/16/77	15.682	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
365	02/21/77	15.682	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
372	02/22/77	15.669	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
385	02/23/77	15.687	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
391	03/02/77	15.655	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
400	03/03/77	15.674	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
407	03/03/77	15.674	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
410	03/03/77	15.695	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
435	03/10/77	15.668	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
440	03/10/77	15.926	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
466	03/14/77	16.550	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
490	03/16/77	16.650	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
501	03/18/77	15.666	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00

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INSTRUMENT NO. 62: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.673	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
519	03/21/77	15.687	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
536	03/23/77	15.679	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
545	03/23/77	15.675	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
567	03/28/77	16.548	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
574	03/29/77	15.626	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
599	04/01/77	15.679	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
614	04/05/77	15.668	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
620	04/06/77	15.677	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
634	04/28/77	15.662	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
645	04/28/77	15.672	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
658	05/09/77	15.669	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
667	05/10/77	15.673	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
685	05/11/77	15.661	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
693	05/12/77	15.677	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
714	05/17/77	15.672	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
735	05/19/77	15.674	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
758	05/20/77	15.680	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
774	05/20/77	15.666	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
792	05/23/77	15.657	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
827	05/25/77	15.663	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
838	05/25/77	15.644	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00

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INSTRUMENT NO. 62: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.633	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
882	09/22/77	15.667	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
895	09/29/77	15.653	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
927	10/03/77	15.641	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
955	10/04/77	15.660	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
968	10/05/77	15.652	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1000	10/11/77	15.717	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1103	10/14/77	15.660	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1109	10/20/77	15.661	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1131	10/21/77	15.807	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1144	10/22/77	-.006	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1161	10/25/77	-.014	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1176	10/25/77	-.002	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1182	10/27/77	-.005	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1189	10/27/77	-.005	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1209	10/28/77	-.011	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1212	10/28/77	-.011	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1228	10/31/77	-.003	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1241	11/02/77	-.003	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1257	11/03/77	-.012	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00

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INSTRUMENT NO. 62: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	-.004	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1292	11/07/77	-.012	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1308	11/09/77	-.014	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1322	11/10/77	-.014	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1337	11/10/77	-.014	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1354	11/14/77	-.003	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1364	11/14/77	-.003	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1368	11/14/77	-.009	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1381	11/16/77	-.013	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1398	11/17/77	-.008	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1440	11/28/77	-.011	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1455	11/29/77	-.011	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1466	11/29/77	-.011	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1483	12/02/77	-.013	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00
1502	12/03/77	-.013	.100000E+01	.198211E-01	.315142E+01	.583747E-04	.338294E-04	.100000E+01	.144000E+00

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INSTRUMENT NO. 64: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.932	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
218	01/24/77	15.974	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
227	01/25/77	15.916	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
244	01/28/77	16.446	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
250	01/29/77	15.912	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
252	01/30/77	0.000	.600000E+01	-.578389E+01	.229010E+02	.114056E-01	0.	0.	.521966E+01
257	01/30/77	0.000	.600000E+01	-.578389E+01	.229010E+02	.114056E-01	0.	0.	.521966E+01
261	01/31/77	0.000	.600000E+01	-.578389E+01	.229010E+02	.114056E-01	0.	0.	.521966E+01
272	01/31/77	15.913	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
282	02/01/77	15.915	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
290	02/02/77	15.915	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
295	02/02/77	16.115	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
298	02/08/77	15.932	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
303	02/09/77	15.903	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
321	02/11/77	15.903	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
328	02/14/77	15.931	.600000E+01	-.171052E-0.	.234816E+02	.175872E-03	0.	0.	.900000E-01
340	02/16/77	15.901	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
365	02/21/77	15.901	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
372	02/22/77	15.901	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
385	02/23/77	15.901	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
391	03/02/77	15.984	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
400	03/03/77	15.993	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
407	03/03/77	15.993	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
410	03/03/77	15.993	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
435	03/10/77	15.993	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
440	03/10/77	16.023	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
466	03/14/77	16.051	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
490	03/16/77	16.015	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
501	03/18/77	16.000	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01

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INSTRUMENT NO. 64: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	16.011	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
519	03/21/77	16.010	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
536	03/23/77	16.001	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
545	03/23/77	16.011	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
567	03/28/77	16.048	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
574	03/29/77	16.052	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
599	04/01/77	15.956	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
614	04/05/77	16.009	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
620	04/06/77	15.991	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
634	04/28/77	16.088	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
645	04/28/77	16.030	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
658	05/09/77	16.093	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
667	05/10/77	16.061	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
685	05/11/77	16.012	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
693	05/12/77	15.999	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
714	05/17/77	49.931	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
735	05/19/77	16.071	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
758	05/20/77	16.035	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
774	05/20/77	54.844	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
792	05/23/77	16.095	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
827	05/25/77	16.121	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
838	05/25/77	16.091	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 64: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	16.091	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
882	09/22/77	50.680	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
895	09/29/77	16.000	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
927	10/03/77	16.119	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
955	10/04/77	16.104	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
968	10/05/77	16.104	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1000	10/11/77	16.104	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1103	10/14/77	16.104	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1109	10/20/77	16.104	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1131	10/21/77	16.118	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1144	10/22/77	16.063	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1161	10/25/77	16.190	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1176	10/25/77	16.078	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1182	10/27/77	16.236	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1189	10/27/77	16.236	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1209	10/28/77	16.094	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1212	10/28/77	16.094	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1228	10/31/77	16.079	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1241	11/02/77	16.064	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1257	11/03/77	16.058	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	16.252	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1292	11/07/77	16.094	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1308	11/09/77	16.092	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1322	11/10/77	16.133	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1337	11/10/77	16.157	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1354	11/14/77	16.138	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1364	11/14/77	16.138	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1368	11/14/77	16.031	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1381	11/16/77	51.118	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1398	11/17/77	16.046	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1440	11/28/77	16.121	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1455	11/29/77	16.087	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1466	11/29/77	16.087	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1483	12/02/77	16.027	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01
1502	12/03/77	15.987	.600000E+01	-.171052E-01	.234816E+02	.175872E-03	0.	0.	.900000E-01

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INSTRUMENT NO. 65: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.614	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
218	01/24/77	15.380	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
227	01/25/77	15.327	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
244	01/28/77	15.734	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
250	01/29/77	15.203	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
252	01/30/77	15.643	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
257	01/30/77	15.643	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
261	01/31/77	15.287	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
272	01/31/77	15.197	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
282	02/01/77	15.434	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
290	02/02/77	15.434	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
295	02/02/77	15.263	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
298	02/08/77	15.467	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
303	02/09/77	15.269	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
321	02/11/77	15.269	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
328	02/14/77	15.331	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
340	02/16/77	15.249	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
365	02/21/77	15.249	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
372	02/22/77	15.443	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
385	02/23/77	15.189	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
391	03/02/77	15.545	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
400	03/03/77	15.205	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
407	03/03/77	15.205	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
410	03/03/77	15.115	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
435	03/10/77	15.191	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
440	03/10/77	15.187	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
466	03/14/77	15.338	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
490	03/16/77	15.257	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
501	03/18/77	15.195	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.355	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
519	03/21/77	15.192	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
536	03/23/77	15.417	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
545	03/23/77	15.312	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
567	03/28/77	15.205	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
574	03/29/77	14.987	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
599	04/01/77	15.249	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
614	04/05/77	15.631	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
620	04/06/77	15.148	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
634	04/28/77	15.553	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
645	04/28/77	14.913	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
658	05/09/77	15.715	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
667	05/10/77	15.064	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
685	05/11/77	15.574	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
693	05/12/77	14.846	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
714	05/17/77	14.924	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
735	05/19/77	14.980	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
758	05/20/77	15.056	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
774	05/20/77	15.053	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
792	05/23/77	15.127	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
827	05/25/77	15.509	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
838	05/25/77	14.806	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.794	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
882	09/22/77	15.573	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
895	09/29/77	15.552	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
927	10/03/77	15.745	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
955	10/04/77	15.691	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
968	10/05/77	15.471	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1000	10/11/77	15.831	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1103	10/14/77	15.657	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1109	10/20/77	15.689	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1131	10/21/77	15.763	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1144	10/22/77	15.468	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1161	10/25/77	15.898	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1176	10/25/77	15.419	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1182	10/27/77	15.845	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1189	10/27/77	15.845	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1209	10/28/77	15.480	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1212	10/28/77	15.480	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1228	10/31/77	15.991	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1241	11/02/77	15.737	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1257	11/03/77	15.403	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00

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1272	11/04/77	15.893	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1292	11/07/77	15.848	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1308	11/09/77	15.505	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1322	11/10/77	15.811	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1337	11/10/77	15.518	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1354	11/14/77	15.996	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1364	11/14/77	15.996	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1368	11/14/77	15.588	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1381	11/16/77	15.575	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1398	11/17/77	15.622	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1440	11/28/77	15.872	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1455	11/29/77	15.607	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1466	11/29/77	15.607	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1483	12/02/77	15.825	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00
1502	12/03/77	15.722	0.	.171399E+00	.232378E+02	.380077E-02	0.	0.	.202500E+00

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.929	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
218	01/24/77	15.892	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
227	01/25/77	15.877	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
244	01/28/77	15.870	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
250	01/29/77	15.889	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
252	01/30/77	15.879	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
257	01/30/77	15.879	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
261	01/31/77	15.904	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
272	01/31/77	15.886	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
282	02/01/77	15.901	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	.100000E+01	.707739E+00
290	02/02/77	15.901	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	-.100000E+01	.707739E+00
295	02/02/77	15.737	-.975000E+01	-.452136E+00	.313969E+01	0.	0.	-.100000E+01	.707739E+00
298	02/08/77	38.247	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
303	02/09/77	38.234	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
321	02/11/77	38.234	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
328	02/14/77	38.240	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
340	02/16/77	38.262	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
365	02/21/77	38.262	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
372	02/22/77	38.236	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
385	02/23/77	38.253	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
391	03/02/77	38.267	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	-.100000E+01	.324000E+00
400	03/03/77	38.246	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	-.100000E+01	.324000E+00
407	03/03/77	38.246	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
410	03/03/77	38.266	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
435	03/10/77	38.262	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
440	03/10/77	38.275	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
466	03/14/77	38.284	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
490	03/16/77	38.292	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
501	03/18/77	38.278	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 66: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	38.273	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
519	03/21/77	38.289	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
536	03/23/77	38.285	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
545	03/23/77	38.291	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
567	03/28/77	38.284	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
574	03/29/77	38.276	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
599	04/01/77	38.289	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
614	04/05/77	38.291	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
620	04/06/77	38.289	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
634	04/28/77	38.305	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
645	04/28/77	38.277	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
658	05/09/77	38.285	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
667	05/10/77	38.276	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
685	05/11/77	38.291	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
693	05/12/77	38.272	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
714	05/17/77	38.317	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
735	05/19/77	38.282	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
758	05/20/77	38.289	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
774	05/20/77	38.293	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
792	05/23/77	38.306	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
827	05/25/77	38.306	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
838	05/25/77	38.307	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 66: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	38.318	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
882	09/22/77	38.280	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
895	09/29/77	38.284	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
927	10/03/77	38.315	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
955	10/04/77	38.304	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
968	10/05/77	38.301	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1000	10/11/77	38.308	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1103	10/14/77	38.298	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1109	10/20/77	38.292	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1131	10/21/77	38.308	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1144	10/22/77	38.308	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1161	10/25/77	38.292	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1176	10/25/77	38.304	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1182	10/27/77	38.301	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1189	10/27/77	38.301	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1209	10/28/77	38.257	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1212	10/28/77	38.257	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1228	10/31/77	38.290	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1241	11/02/77	38.306	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1257	11/03/77	38.300	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 66: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	38.301	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1292	11/07/77	38.272	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1308	11/09/77	38.297	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1322	11/10/77	38.291	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1337	11/10/77	38.291	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1354	11/14/77	38.239	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1364	11/14/77	38.239	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1368	11/14/77	38.283	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1381	11/16/77	38.279	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1398	11/17/77	38.274	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1440	11/28/77	38.265	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1455	11/29/77	38.263	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1466	11/29/77	38.263	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1483	12/02/77	38.293	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00
1502	12/03/77	38.277	-.975000E+01	-.689705E-01	.479337E+01	-.797413E-04	.491312E-04	.100000E+01	.324000E+00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 68: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	15.618	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
218	01/24/77	15.634	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
227	01/25/77	15.693	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
244	01/28/77	15.616	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
250	01/29/77	15.617	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
252	01/30/77	15.585	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
257	01/30/77	15.585	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
261	01/31/77	15.695	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
272	01/31/77	15.715	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
282	02/01/77	15.689	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
290	02/02/77	15.689	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
295	02/02/77	15.657	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
298	02/08/77	15.619	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
303	02/09/77	15.595	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
321	02/11/77	15.595	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
328	02/14/77	15.732	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
340	02/16/77	15.645	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
365	02/21/77	15.645	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
372	02/22/77	15.576	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
385	02/23/77	15.721	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
391	03/02/77	15.570	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
400	03/03/77	15.621	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
407	03/03/77	15.621	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
410	03/03/77	15.682	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
435	03/10/77	15.646	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
440	03/10/77	15.660	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
466	03/14/77	15.599	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
490	03/16/77	15.809	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
501	03/18/77	15.671	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 68: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.685	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
519	03/21/77	15.695	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
536	03/23/77	15.556	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
545	03/23/77	15.710	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
567	03/28/77	15.539	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
574	03/29/77	15.667	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
599	04/01/77	15.573	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
614	04/05/77	15.609	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
620	04/06/77	15.632	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
634	04/28/77	15.812	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
645	04/28/77	15.661	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
658	05/09/77	15.598	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
667	05/10/77	15.569	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
685	05/11/77	15.623	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
693	05/12/77	15.580	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
714	05/17/77	15.648	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
735	05/19/77	15.602	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
758	05/20/77	15.626	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
774	05/20/77	15.595	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
792	05/23/77	15.544	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
827	05/25/77	15.576	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
838	05/25/77	15.690	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM
INSTRUMENT NO. 68: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.558	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
882	09/22/77	15.629	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
895	09/29/77	15.656	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
927	10/03/77	15.601	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
955	10/04/77	15.649	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
968	10/05/77	15.677	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1000	10/11/77	15.627	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1103	10/14/77	15.625	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1109	10/20/77	15.694	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1131	10/21/77	15.632	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1144	10/22/77	15.697	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1161	10/25/77	15.643	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1176	10/25/77	15.611	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1182	10/27/77	15.603	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1189	10/27/77	15.603	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1209	10/28/77	15.622	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1212	10/28/77	15.622	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1228	10/31/77	15.589	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1241	11/02/77	15.753	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1257	11/03/77	15.784	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.830	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1292	11/07/77	15.675	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1308	11/09/77	15.707	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1322	11/10/77	15.663	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1337	11/10/77	15.666	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1354	11/14/77	15.612	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1364	11/14/77	15.612	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1368	11/14/77	15.722	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1381	11/16/77	15.698	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1398	11/17/77	15.660	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1440	11/28/77	15.662	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1455	11/29/77	15.648	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1466	11/29/77	15.648	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1483	12/02/77	15.674	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01
1502	12/03/77	15.667	0.	-.741056E-02	.393187E+00	-.532904E-05	.355183E-05	.100000E+01	.217500E-01

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
207	01/20/77	0.000	0.	0.	0.	0.	0.	0.	0.
218	01/24/77	0.000	0.	0.	0.	0.	0.	0.	0.
227	01/25/77	0.000	0.	0.	0.	0.	0.	0.	0.
244	01/28/77	0.000	0.	0.	0.	0.	0.	0.	0.
250	01/29/77	0.000	0.	0.	0.	0.	0.	0.	0.
252	01/30/77	0.000	0.	0.	0.	0.	0.	0.	0.
257	01/30/77	0.000	0.	0.	0.	0.	0.	0.	0.
261	01/31/77	0.000	0.	0.	0.	0.	0.	0.	0.
272	01/31/77	0.000	0.	0.	0.	0.	0.	0.	0.
282	02/01/77	0.000	0.	0.	0.	0.	0.	0.	0.
290	02/02/77	0.000	0.	0.	0.	0.	0.	0.	0.
295	02/02/77	0.000	0.	0.	0.	0.	0.	0.	0.
298	02/08/77	16.000	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
303	02/09/77	15.609	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
321	02/11/77	15.609	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
328	02/14/77	15.706	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
340	02/16/77	15.759	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
365	02/21/77	15.759	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
372	02/22/77	15.727	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
385	02/23/77	15.713	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
391	03/02/77	15.697	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
400	03/03/77	15.707	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
407	03/03/77	15.707	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
410	03/03/77	15.725	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
435	03/10/77	15.755	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
440	03/10/77	15.769	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
466	03/14/77	15.720	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
490	03/16/77	15.773	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
501	03/18/77	15.756	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00

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ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
509	03/21/77	15.894	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
519	03/21/77	15.907	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
536	03/23/77	15.923	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
545	03/23/77	15.905	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
567	03/28/77	15.912	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
574	03/29/77	15.947	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
599	04/01/77	15.744	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
614	04/05/77	16.133	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
620	04/06/77	16.066	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
634	04/28/77	16.185	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
645	04/28/77	16.156	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
658	05/09/77	16.059	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
667	05/10/77	16.077	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
685	05/11/77	16.019	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
693	05/12/77	16.079	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
714	05/17/77	15.996	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
735	05/19/77	16.010	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
758	05/20/77	16.148	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
774	05/20/77	16.134	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
792	05/23/77	16.082	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
827	05/25/77	16.029	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
838	05/25/77	15.998	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00

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INSTRUMENT NO. 69: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
855	09/20/77	15.853	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
882	09/22/77	15.845	0.	.279612E-01	.802556E+00	.188584E-04	.160610E-05	.100000E+01	.102750E+00
895	09/29/77	15.393	0.	-.719724E-01	.157752E+01	0.	0.	.100000E+01	.174276E+00
927	10/03/77	15.727	0.	-.719724E-01	.157752E+01	0.	0.	.100000E+01	.174276E+00
955	10/04/77	15.338	0.	-.719724E-01	.157752E+01	0.	0.	.100000E+01	.174276E+00
968	10/05/77	15.377	0.	-.719724E-01	.157752E+01	0.	0.	.100000E+01	.174276E+00
1000	10/11/77	15.592	0.	-.719724E-01	.157752E+01	0.	0.	.100000E+01	.174276E+00
1103	10/14/77	15.046	0.	-.719724E-01	.157752E+01	0.	0.	.100000E+01	.174276E+00
1109	10/20/77	16.171	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1131	10/21/77	16.101	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1144	10/22/77	16.160	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1161	10/25/77	16.111	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1176	10/25/77	16.167	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1182	10/27/77	15.982	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1189	10/27/77	15.982	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1209	10/28/77	16.070	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1212	10/28/77	16.070	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1228	10/31/77	16.083	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1241	11/02/77	16.026	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1257	11/03/77	16.069	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01

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INSTRUMENT NO. 69: CONVERSION CONSTANT HISTORY

ZERO FILE	DATE	ZERO (MV)	C(1,N)	C(2,N)	C(3,N)	C(4,N)	C(5,N)	C(6,N)	C(7,N)
1272	11/04/77	15.989	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1292	11/07/77	15.998	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1308	11/09/77	16.028	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1322	11/10/77	16.005	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1337	11/10/77	16.033	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1354	11/14/77	16.044	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1364	11/14/77	16.044	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1368	11/14/77	16.042	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1381	11/16/77	16.028	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1398	11/17/77	16.060	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1440	11/28/77	16.055	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1455	11/29/77	16.054	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1466	11/29/77	16.054	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1483	12/02/77	16.017	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01
1502	12/03/77	16.057	0.	.925882E-02	.156529E+01	.306213E-04	.166379E-04	.100000E+01	.769300E-01

Section 3

STEADY-STATE DATA REDUCTION METHODS

Section 3

CONTENTS

CONTENTS (Cont'd.)

ILLUSTRATIONS

TABLES

3.1 INTRODUCTION

This section details the processing methods used with the steady-state test data.

The data scanner system described in Volume VII, Test Facility Description, was used to record steady-state data during the testing program. The raw data, plus appropriate calibration conversion constants, provided the input for the Steady-State Data Reduction (SSDR) Code. This code converted the data to engineering units and produced a 10-page and/or 1-page summary of reduced data for each test.

The Pump Steady-State Review (PSSR) Code further processed and simplified the reduced data by calculating pump performance parameters. The supplementary Summary Table Code was used to extract certain results obtained by the PSSR code. Detailed and summary parameter listings produced by the PSSR and the Summary Table Code were referenced by C-E personnel to draw the steady-state plots presented in the Steady-State Tests volume.

Discussion of the computer programs and the various outputs are included in the following subsections.

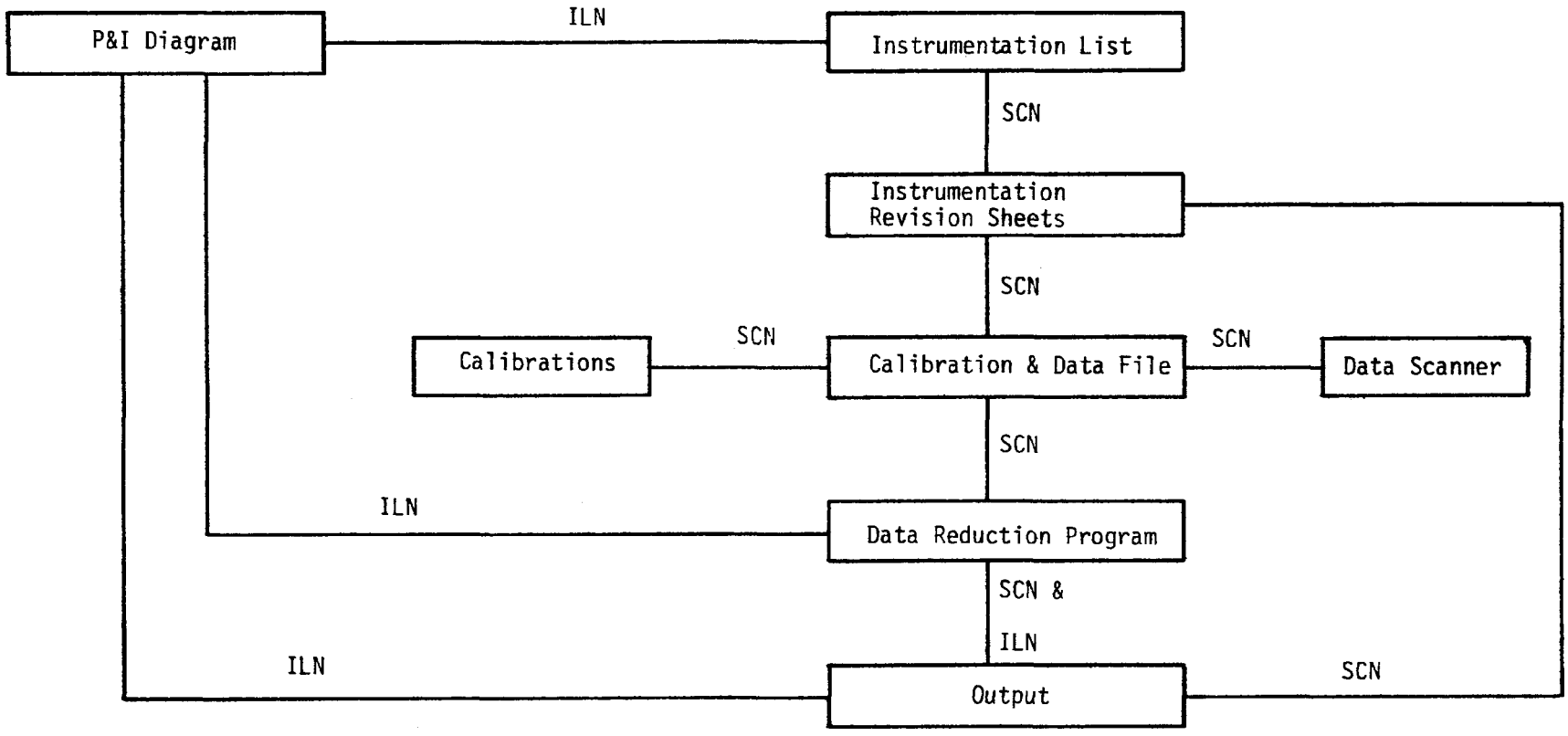
3.2 STEADY-STATE DATA REDUCTION PROCESS

3.2.1 Data Reduction Process Description

The method used in steady-state data reduction is shown in Figure 3.2-1. It consists of a matrix of interconnected units between which information is transferred. Two devices are used to maintain the consistency of this information transfer. These are:

1. The Instrumentation Location Number (ILN), and
2. The Data Scanner Channel Number (SCN).

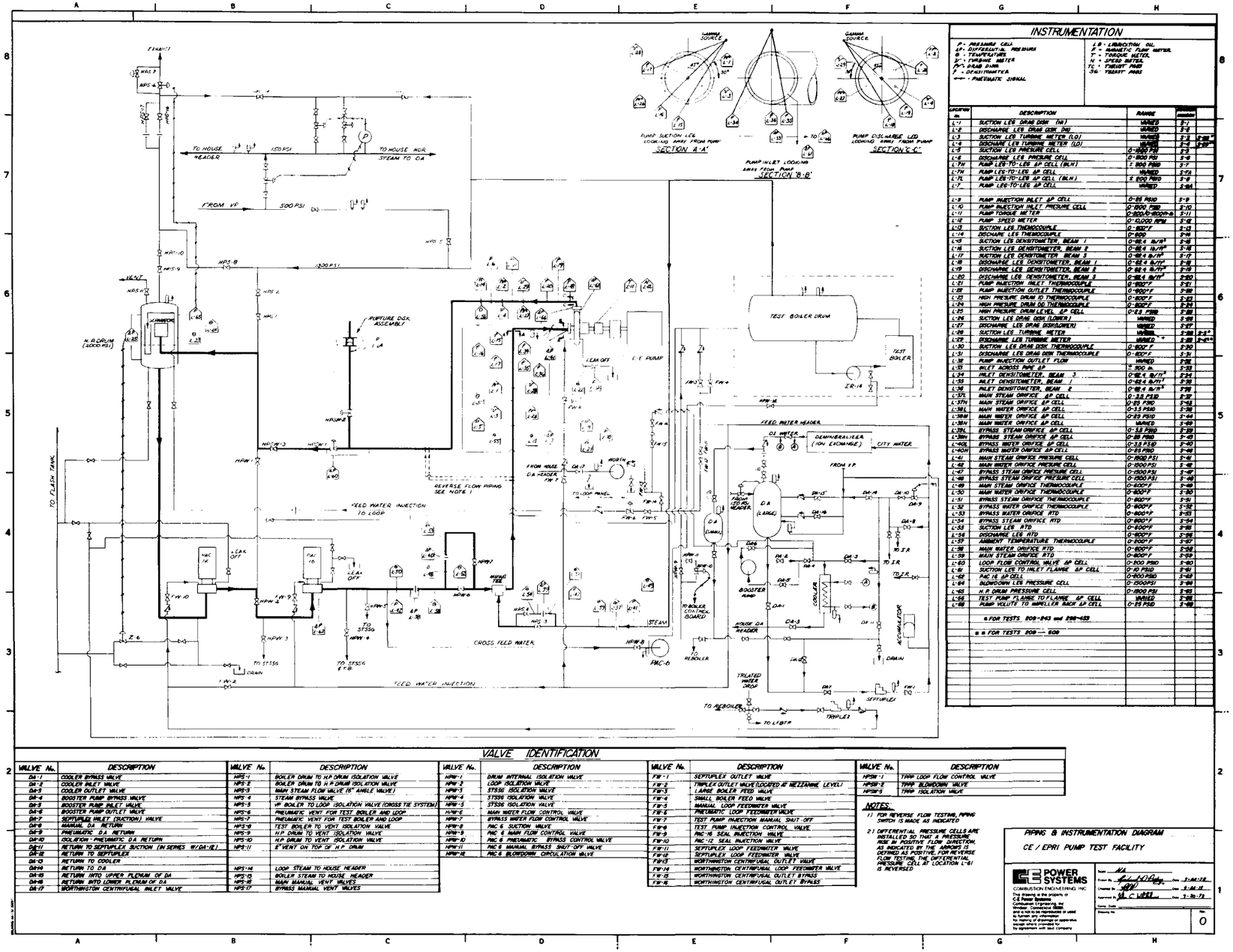
The Instrument Location Number (ILN) defines the physical location of a measuring point and the primary source of this information is the Piping and Instrumentation Diagram (P&ID), Figure 3.2-2. The Data Scanner Channel Number (SCN) defines the data scanner channel to which a particular instrument is connected. The primary source of the SCN is the Instrumentation List, Table 3.2-1. The correlation between the ILN's and the SCN's, which defines the location of each instrument, is also contained in the Instrumentation List.



ILN = Instrument Location Number

SCN = Scanner Channel Number

Figure 3.2-1. Interconnections of the Various Components of the Steady State Data Reduction Process



LOCATION No.	DESCRIPTION	RANGE	REFERENCE DRAWING	
L-1	SUCTION LEG DRAG DISK (NH)	VARIED	5-1	
L-2	DISCHARGE LEG DRAG DISK (NH)	VARIED	5-2	
L-3	SUCTION LEG TURBINE METER (LO)	VARIED	5-3	5-66 *
L-4	DISCHARGE LEG TURBINE METER (LO)	VARIED	5-4	5-66 *
L-5	SUCTION LEG PRESSURE CELL	0-1500 PSI	5-5	
L-6	DISCHARGE LEG PRESSURE CELL	0-1500 PSI	5-6	
L-7H	PUMP LEG-TO-LEG ΔP CELL (BLH)	± 200 PSID	5-7	
L-7A	PUMP LEG-TO-LEG ΔP CELL	VARIED	5-7A	
L-7L	PUMP LEG-TO-LEG ΔP CELL (BLH)	± 200 PSID	5-9	
L-7	PUMP LEG-TO-LEG ΔP CELL	VARIED	5-8A	
L-9	PUMP INJECTION INLET ΔP CELL	0-25 PSID	5-9	
L-10	PUMP INJECTION INLET PRESSURE CELL	0-1000 PSIG	5-10	
L-11	PUMP TORQUE METER	0-2500 FT-LBS/IN-LBS	5-11	
L-12	PUMP SPEED METER	0-10,000 RPM	5-12	
L-13	SUCTION LEG THERMOCOUPLE	0-600°F	5-13	
L-14	DISCHARGE LEG THERMOCOUPLE	0-600	5-14	
L-15	SUCTION LEG DENSITOMETER, BEAM 1	0-68.4 lb/ft³	5-16	
L-16	SUCTION LEG DENSITOMETER, BEAM 2	0-68.4 lb/ft³	5-16	
L-17	SUCTION LEG DENSITOMETER, BEAM 3	0-68.4 lb/ft³	5-17	
L-18	DISCHARGE LEG DENSITOMETER, BEAM 1	0-68.4 lb/ft³	5-18	
L-19	DISCHARGE LEG DENSITOMETER, BEAM 2	0-68.4 lb/ft³	5-19	
L-20	DISCHARGE LEG DENSITOMETER, BEAM 3	0-68.4 lb/ft³	5-20	
L-21	PUMP INJECTION INLET THERMOCOUPLE	0-600°F	5-21	
L-22	PUMP INJECTION OUTLET THERMOCOUPLE	0-600°F	5-22	
L-23	HIGH PRESSURE DRUM 1D THERMOCOUPLE	0-600°F	5-23	
L-24	HIGH PRESSURE DRUM OD THERMOCOUPLE	0-600°F	5-24	
L-25	HIGH PRESSURE DRUM LEVEL ΔP CELL	0-2.5 PSIG	5-25	
L-26	SUCTION LEG DRAG DISK (LOWER)	VARIED	5-26	
L-27	DISCHARGE LEG DRAG DISK(LOWER)	VARIED	5-27	
L-28	SUCTION LEG TURBINE METER	VARIED	5-28	5-67 *
L-29	DISCHARGE LEG TURBINE METER	VARIED *	5-28	5-67 *
L-30	SUCTION LEG DRAG DISK THERMOCOUPLE	0-600°F	5-30	
L-31	DISCHARGE LEG DRAG DISK THERMOCOUPLE	0-600°F	5-31	
L-32	PUMP INJECTION OUTLET FLOW	VARIED	5-32	
L-33	INLET ACROSS PIPE ΔP	± 100 in.	5-33	
L-34	INLET DENSITOMETER, BEAM 3	0-68.4 lb/ft³	5-34	
L-35	INLET DENSITOMETER, BEAM 1	0-68.4 lb/ft³	5-35	
L-36	INLET DENSITOMETER, BEAM 2	0-68.4 lb/ft³	5-36	
L-37L	MAIN STEAM ORIFICE ΔP CELL	0-2.5 PSID	5-37	
L-37H	MAIN STEAM ORIFICE ΔP CELL	0-10 PSID	5-37	
L-38L	MAIN WATER ORIFICE ΔP CELL	0-2.5 PSID	5-38	
L-38M	MAIN WATER ORIFICE ΔP CELL	0-10 PSID	5-44	
L-38H	MAIN WATER ORIFICE ΔP CELL	VARIED	5-69	
L-39L	BYPASS STEAM ORIFICE ΔP CELL	0-2.5 PSID	5-39	
L-39H	BYPASS STEAM ORIFICE ΔP CELL	0-10 PSID	5-40	
L-40L	BYPASS WATER ORIFICE ΔP CELL	0-2.5 PSID	5-40	
L-40H	BYPASS WATER ORIFICE ΔP CELL	0-10 PSID	5-48	
L-41	MAIN STEAM ORIFICE PRESSURE CELL	0-2500 PSI	5-41	
L-42	MAIN WATER ORIFICE PRESSURE CELL	0-1500 PSI	5-42	
L-47	BYPASS STEAM ORIFICE PRESSURE CELL	0-1500 PSI	5-47	
L-48	BYPASS STEAM ORIFICE PRESSURE CELL	0-1500 PSI	5-48	
L-49	MAIN STEAM ORIFICE THERMOCOUPLE	0-600°F	5-49	
L-50	MAIN WATER ORIFICE THERMOCOUPLE	0-600°F	5-50	
L-51	BYPASS STEAM ORIFICE THERMOCOUPLE	0-600°F	5-51	
L-52	BYPASS WATER ORIFICE THERMOCOUPLE	0-600°F	5-52	
L-53	BYPASS WATER ORIFICE RTD	0-600°F	5-53	
L-54	BYPASS STEAM ORIFICE RTD	0-600°F	5-54	
L-55	SUCTION LEG RTD	0-600°F	5-55	
L-56	DISCHARGE LEG RTD	0-600°F	5-56	
L-57	AMBIENT TEMPERATURE THERMOCOUPLE	0-200°F	5-57	
L-58	MAIN WATER ORIFICE RTD	0-600°F	5-58	
L-59	MAIN STEAM ORIFICE RTD	0-600°F	5-59	
L-60	LOOP FLOW CONTROL VALVE ΔP CELL	0-100 PSID	5-60	
L-61	SUCTION LEG TO INLET FLANGE ΔP CELL	0-10 PSID	5-61	
L-62	PAC 12 ΔP CELL	0-100 PSID	5-62	
L-64	BLOWDOWN LEG PRESSURE CELL	0-2000PSI	5-64	
L-65	H.P. DRUM PRESSURE CELL	0-1500 PSI	5-65	
L-66	TEST PUMP FLANGE TO FLANGE ΔP CELL	VARIED	5-66	
L-68	PUMP VOLUTE TO IMPELLER BACK ΔP CELL	0-15 PSID	5-68	
	6 FOR TESTS 209-243 and 256-433			
	8 FOR TESTS 209 — 508			

VALVE No.	DESCRIPTION	VALVE No.	DESCRIPTION	VALVE No.	DESCRIPTION	VALVE No.	DESCRIPTION	VALVE No.	DESCRIPTION
DA-1	COOLER BYPASS VALVE	HPS-1	BOILER DRUM TO H.P. DRUM ISOLATION VALVE	HPW-1	DRUM INTERNAL ISOLATION VALVE	FW-1	SEPTUPLEX OUTLET VALVE	HPSW-1	TRAP LOOP FLOW CONTROL VALVE
DA-2	COOLER INLET VALVE	HPS-2	BOILER DRUM TO H.P. DRUM ISOLATION VALVE	HPW-2	LOOP ISOLATION VALVE	FW-2	SEPTUPLEX OUTLET VALVE(LOCATED AT MEZZANINE LEVEL)	HPSW-2	TRAP BLOWDOWN VALVE
DA-3	COOLER OUTLET VALVE	HPS-3	MAIN STEAM FLOW VALVE (6" ANGLE VALVE)	HPW-3	S7556 ISOLATION VALVE	FW-3	LARGE BOILER FEED VALVE	HPSW-3	TRAP ISOLATION VALVE
DA-4	BOOSTER PUMP BYPASS VALVE	HPS-4	STEAM BYPASS VALVE	HPW-4	S7556 ISOLATION VALVE	FW-4	SMALL BOILER FEED VALVE		
DA-5	BOOSTER PUMP INLET VALVE	HPS-5	I.P. BOILER TO LOOP ISOLATION VALVE (CROSS TIE SYSTEM)	HPW-5	S7556 ISOLATION VALVE	FW-5	MANUAL LOOP FEEDWATER VALVE		
DA-6	BOOSTER PUMP OUTLET VALVE	HPS-6	PNEUMATIC VENT FOR TEST BOILER AND LOOP	HPW-6	MAIN WATER FLOW CONTROL VALVE	FW-6	PNEUMATIC LOOP FEEDWATER VALVE		
DA-7	SEPTUPLEX INLET (SUCTION) VALVE	HPS-7	PNEUMATIC VENT FOR TEST BOILER AND LOOP	HPW-7	BYPASS WATER FLOW CONTROL VALVE	FW-7	TEST PUMP INJECTION MANUAL SHUT-OFF		
DA-8	MANUAL D.A. RETURN	HPS-8	TEST BOILER TO VENT ISOLATION VALVE	HPW-8	PAC 6 SUCTION VALVE	FW-8	TEST PUMP INJECTION CONTROL VALVE		
DA-9	PNEUMATIC D.A. RETURN	HPS-9	H.P. DRUM TO VENT ISOLATION VALVE	HPW-9	PAC 6 MAIN FLOW CONTROL VALVE	FW-9	PAC-16 SEAL INJECTION VALVE		
DA-10	ISOLATION - PNEUMATIC D.A. RETURN	HPS-10	H.P. DRUM TO VENT ISOLATION VALVE	HPW-10	PAC 6 PNEUMATIC BYPASS CONTROL VALVE	FW-10	PAC-12 SEAL INJECTION VALVE		
DA-11	RETURN TO SEPTUPLEX SUCTION (IN SERIES W/DA-1&2)	HPS-11	2" VENT ON TOP OF H.P. DRUM	HPW-11	PAC 6 MANUAL BYPASS SHUT-OFF VALVE	FW-11	SEPTUPLEX LOOP FEEDWATER VALVE		
DA-12	RETURN TO SEPTUPLEX			HPW-12	PAC 6 BLOWDOWN CIRCULATION VALVE	FW-12	SEPTUPLEX LOOP FEEDWATER VALVE		
DA-13	RETURN TO COOLER					FW-13	WORTHINGTON CENTRIFUGAL OUTLET VALVE		
DA-14	RETURN TO D.A.	HPS-14	LOOP STEAM TO HOUSE HEADER			FW-14	WORTHINGTON CENTRIFUGAL LOOP FEEDWATER VALVE		
DA-15	RETURN INTO UPPER PLENUM OF DA	HPS-15	BOILER STEAM TO HOUSE HEADER			FW-15	WORTHINGTON CENTRIFUGAL OUTLET BYPASS		
DA-16	RETURN INTO LOWER PLENUM OF DA	HPS-16	MAIN MANUAL VENT VALVES			FW-16	WORTHINGTON CENTRIFUGAL OUTLET BYPASS		
DA-17	WORTHINGTON CENTRIFUGAL INLET VALVE	HPS-17	BYPASS MANUAL VENT VALVES						

NOTES:
1) FOR REVERSE FLOW TESTING, PIPING SWITCH IS MADE AS INDICATED
2) DIFFERENTIAL PRESSURE CELLS ARE INSTALLED SO THAT A PRESSURE RISE IN POSITIVE FLOW DIRECTION, AS INDICATED BY THE ARROWS IS DEFINED AS POSITIVE. FOR REVERSE FLOW TESTING, THE DIFFERENTIAL PRESSURE CELL AT LOCATION L-61 IS REVERSED

PIPING & INSTRUMENTATION DIAGRAM
CE / EPRI PUMP TEST FACILITY

POWER SYSTEMS
COMBUSTION ENGINEERING, INC.
Windsor, Connecticut

Figure 3.2-2. Piping and Instrumentation Diagram

Changes of the instrumentation are documented by means of the Instrument History (see Section 2.4). The ILN is used to tie the final results to the loop from which they were obtained, whereas the SCN is used in the management and quality assurance of data during acquisition and reduction. In this way the ILN ties together the P&ID, the Instrumentation List, the Steady-State Data Reduction Program (Section 3.2.3) and the Output. The SCN ties together the Instrumentation List, the Instrument History, the Calibrations, the Calibration and Data File, the Data Scanner, the Steady-State Data Reduction Program, and the Output.

The process made up of these components enables the test data acquired by the data scanner during testing and the calibration data acquired, using National Bureau of Standards traceable standards prior to testing, to be converted into useful results. These results show the performance of the test pump under a multiplicity of conditions. Further details of the behavior of the pump can be derived by use of the test results in concert with the P&ID.

Table 3.2-1

TWO PHASE PUMP PERFORMANCE PROGRAM

INSTRUMENTATION LIST

STEADY STATE

Scanner Channel Number	Instrument Location Number	Description	Range	Other Readouts[a]
0		Short for DVM		
1	L-1	Pump Suction Drag Disc	0-200,000 lb/ft-sec^2 0-300,000 lb/ft-sec^2 0-400,000 lb/ft-sec^2	P-0
2	L-2	Pump Discharge Drag Disc	0-200,000 lb/ft-sec^2 0-400,000 lb/ft-sec^2 0-600,000 lb/ft-sec^2	
3 or 28[b]	L-3	Pump Suction Turbine Meter	0-300 ft/sec, 0-90 ft/sec	
4 or 29[c]	L-4	Pump Discharge Turbine Meter	0-300 ft/sec, 0-90 ft/sec	
5	L-5	Pump Suction Pressure Cell	0-1500 psi	P-1, mvG-1
6	L-6	Pump Discharge Pressure Cell	0-1500 psi	mvG-2
7	L-7H	Pump D/P Cell (Hi) (Leg-to-leg)	0-$\pm$ 500 psid (BLH)	mvG-3
7A	L-7H	Pump D/P Cell (Hi) (Leg-to-leg)	0-200 psid -100/0/200 psid	mvG-3
8	L-7L	Pump D/P Cell (Lo) (Leg-to-leg)	0-$\pm$200 psid (BLH)	mvG-3
8A	L-7L	Pump D/P Cell (Lo) (Leg-to-leg)	0-25 psid -8/0/+16 psid	mvG-3
9	L-9	Pump Inlet Injection D/P Cell	0-25 psid	mvG-4
10	L-10	Pump Inlet Injection Pressure Cell	0-1500 psid	
11	L-11	Pump Torque Meter	0-1200 ft-lb 0-2000 in-lb	mvG-6, P-2
12	L-12	Pump Speed Meter	0-10,000 RPM	T, mvG-7, P-3
13	L-13	Pump Suction Thermocouple	0-600°F	TG-1

Table 3.2-1 (Cont'd.)

TWO PHASE PUMP PERFORMANCE PROGRAM

INSTRUMENTATION LIST

STEADY STATE

Scanner Channel Number	Instrument Location Number	Description	Range	Other Readouts[a]
14	L-14	Pump Discharge Thermocouple	0-600°F	TG-2
15	L-15	Pump Suction Densitometer, Lower Beam 1	0-62.4 lb/ft^3	
16	L-16	Pump Suction Densitometer, Center Beam 2	0-62.4 lb/ft^3	
17	L-17	Pump Suction Densitometer, Upper Beam 3	0-62.4 lb/ft^3	
18	L-18	Pump Discharge Densitometer, Lower Beam 1	0-62.4 lb/ft^3	
19	L-19	Pump Discharge Densitometer, Center Beam 2	0-62.4 lb/ft^3	
20	L-20	Pump Discharge Densitometer, Upper Beam 3	0-62.4 lb/ft^3	
21	L-21	Pump Inlet Injection Flow Thermocouple	0-600°F	TG-3
22	L-22	Pump Outlet Injection Flow Thermocouple	0-600°F	TG-4, A
23	L-23	High Pressure Drum ID Thermocouple	0-600°F	TG-5
24	L-24	High Pressure Drum OD Thermocouple	0-600°F	TG-6
25	L-25	High Pressure Water Level D/P Cell	0-2.5 psid	mvG-8, P-4
26	L-26	Pump Suction Drag Disc	120,000 $lb/ft\text{-}sec^2$ 400,000 $lb/ft\text{-}sec^2$ 600,000 $lb/ft\text{-}sec^2$ 1,000,000 $lb/ft\text{-}sec^2$	
27	L-27	Pump Discharge Drag Disc	120,000 $lb/ft\text{-}sec^2$ 400,000 $lb/ft\text{-}sec^2$ 600,000 $lb/ft\text{-}sec^2$ 1,000,000 $lb/ft\text{-}sec^2$	
28 or 3[b]	L-28	Pump Suction Turbine Meter	0-90 ft/sec, 0-300 ft/sec	
29 or 4[c]	L-29	Pump Discharge Turbine Meter	0-300 ft/sec, 0-300 ft/sec	

Table 3.2-1 (Cont'd.)

TWO PHASE PUMP PERFORMANCE PROGRAM

INSTRUMENTATION LIST

STEADY STATE

Scanner Channel Number	Instrument Location Number	Description	Range	Other Readouts[a]
30	L-30	Pump Suction DD Thermocouple	0-600°F	TG-16
31	L-31	Pump Discharge DD Thermocouple	0-600°F	TG-17
32	L-32	Pump Injection Outlet Flow (Magn. F.M.)	0-50 GPM 0-100 GPM	
33	L-33	Pump Suction D/P BLH (Inlet/Across Pipe - 90°)	0-$\pm$ inches H_2O	
34	L-34	AECL Densitometer, Outer Beam 3	0-62.4 lb/ft^3	
35	L-35	AECL Densitometer, Inner Beam 1	0-62.4 lb/ft^3	
36	L-36	AECL Densitometer, Center Beam 2	0-62.4 lb/ft^3	
37	L-37	Main Steam Orifice DP Cell (Lo)	0-3.5 psid	
38	L-38L	Main Water Orifice DP Cell (LO)	0-3.5 psid	
39	L-39L	Bypass Steam Orifice DP CEll (Lo)	0-3.5 psid	
40	L-40L	Bypass Water Orifice DP Cell (Lo)	0-3.5 psid	
41	L-41	Main Steam Orifice Pressure Cell	0-1500 psi	mvG-9
42	L-42	Main Water Orifice Pressure Cell	0-1500 psi	mvG-10
43	L-37H	Main Steam Orifice DP Cell (Hi)	0-25 psid	mvG-11, P-5
44	L-38M	Main Water Orifice DP Cell (Mid)	0-25 psid	mvG-12, P-6
45	L-39H	Bypass Steam Orifice DP Cell (Hi)	0-25 psid	mvG-5, P-7
46	L-40H	Bypass Water Orifice DP Cell (Hi)	0-25 psid	mvG-13, P-8
47	L-47	Bypass Steam Orifice Pressure Cell	0-1500 psi	
48	L-48	Bypass Water Orifice Pressure Cell	0-1500 psi	

Table 3.2-1 (Cont'd)

TWO PHASE PUMP PERFORMANCE PROGRAM

INSTRUMENTATION LIST

STEADY STATE

Scanner Channel Number	Instrument Location Number	Description	Range	Other Readouts[a]
49	L-49	Main Steam Orifice Thermocouple	0-600°F	TG-7
50	L-50	Main Water Orifice Thermocouple	0-600°F	TG-8
51	L-51	Bypass Steam Orifice Thermocouple	0-600°F	TG-14
52	L-52	Bypass Water Orifice Thermocouple	0-600°F	TG-15
53	L-53	Bypass Water Orifice RTD	0-600°F	mvG-18
54	L-54	Bypass Steam Orifice RTD	0-600°F	mvG-19
55	L-55	Pump Suction RTD	0-600°F	mvG-16
56	L-56	Pump Discharge RTD	0-600°F	mvG-17
57	L-57	Ambient Temperature	0-200°F	TG-13
58	L-58	Main Water Orifice RTD	0-600°F	mvG-14,P-9
59	L-59	Main Steam Orifice RTD	0-600°F	mvG-15
60	L-60	Loop Flow Control Valve DP Cell	0-200 psid	
61	L-61	Pump Suction (Inlet Leg-to-Flange)	0-10 psid	
62	L-62	PAC-16 Pump DP Cell	0-200 psid	
63		Not Used		
64	L-64	Blowdown Leg Pressure Cell	0-1500 psi	
65	L-65	H.P. Drum Pressure Cell	0-1500 psi	
66	L-66	Pump Flange-to-Flange DP Cell	0-200 psid -100/0/200 psid	
67		Blowdown Sequence Indicator		
68	L-68	Pump Impeller (Front-to-Back) D/P	0-25 psid	

Table 3.2-1 (Cont'd.)

TWO PHASE PUMP PERFORMANCE PROGRAM

INSTRUMENTATION LIST

STEADY STATE

Scanner Channel Number	Instrument Location Number	Description	Range	Other Readouts[a]
69	L-38H	Main Water Orifice D/P (Hi)	0-100 psid 0-50 psid	

[a] Legend — Other readouts:
- P: Panel Meter
- T: Trip Function
- A: Alarm
- mvG: Speedomax Millivolt Recorder
- TG: Speedomax Temperature Recorder

[b] L-3 was read by scanner port S-28 for tests 209-243 and 298-453. L-28 was read by S-3 for the same tests. At all other times L-3 was read by S-3 and L-28 by S-28.

[c] L-4 was read by scanner port S-29 for tests 209-609. L-29 was read by S-4 for the same tests. At all other times L-4 was read by S-4 and L-29 by S-29.

3.2.2 Calibration and Data Files

Each steady-state test conducted during the program resulted in the creation of a test data file consisting of five complete scans of all instruments. This file was utilized by the Steady-State Data Reduction (SSDR) code along with the appropriate steady-state conversion constant file to produce reduced output in engineering units. In practice, the conversion constant file and all related test data files were combined into a single conversion constant and data file for use by the SSDR code.

A complete set of combined conversion constant and data files for all steady-state tests is available in EPRI files. Also included in this archive is a detailed key to the format used for the files.

The origin of the conversion constant portion of the combined conversion constant files is addressed in Section 2. The origin of the data portion is addressed in Section 4 of Volume VII, Test Facility Description.

3.2.3 Steady-State Data Reduction Program

The base program is made up of a series of 16 subsections or units interconnected by a decision tree as shown in Figure 3.2-5. Permanently attached to the program are the five subroutines discussed in Section 3.2.3.7. Also required for execution of the program are the test data file, the ASME Steam Tables, an output file for forward flow and an output file for reverse flow.

A listing of the SSDR program is provided in APPENDIX 3.2A. A sample ten-page output is given in Figure 3.2-3 and a sample one-page printout is provided in Figure 3.2-4. One-page outputs were produced by the same code as the ten page printouts with the only difference being the statements used to print the output. Since the calculational routines are identical, the following discussion refers to the ten-page output version of the SSDR code. A description of the one-page output format may be found in Volume V, Steady-State Data. A description of the nomenclature used in the SSDR program is provided in Table 3.2-2.

Figure 3.2-3

Sample Ten Page Output of
the Steady-State Data Reduction Program

TEST NO 406 DATE 3/ 3/77 TIME1300.00 PAGE 0

S/N	DEVICE	OUTPUT	VALUE	STD.DEV.
13	THERMOCOUPLE	.089147	544.543	.109
14	THERMOCOUPLE	.088853	543.258	.119
21	THERMOCOUPLE	.002627	161.236	.104
22	THERMOCOUPLE	.003990	167.144	.109
23	THERMOCOUPLE	.088801	539.592	.147
24	THERMOCOUPLE	.088844	541.454	.044
30	THERMOCOUPLE	.089071	544.212	.137
31	THERMOCOUPLE	.089289	545.162	.124
49	THERMOCOUPLE	.088943	545.762	.184
50	THERMOCOUPLE	.088652	533.056	.069
51	THERMOCOUPLE	.088923	544.906	.183
52	THERMOCOUPLE	.088388	521.556	.385
57	THERMOCOUPLE	-.001393	88.895	.223
5	PRESSURE CELL	.056904	978.033	.958
6	PRESSURE CELL	.057810	995.526	.665
10	PRESSURE CELL	.074391	1424.143	5.812
41	PRESSURE CELL	.058641	1011.293	.924
42	PRESSURE CELL	.062828	1037.029	.415
47	PRESSURE CELL	.015575	14.782	.000
64	PRESSURE CELL	.057200	982.822	.745
65	PRESSURE CELL	.056586	982.992	.755
48	PRESSURE CELL	.063197	1100.945	2.045
7	D. P. CELL	.035199	9.361	.324
8	D. P. CELL	.011375	9.279	.171
9	D. P. CELL	.051117	13.960	.105
25	D. P. CELL	.043822	1.343	.001
43	D. P. CELL	.019772	1.402	.025
44	D. P. CELL	.017017	.422	.004
45	D. P. CELL	.015867	.016	.001
46	D. P. CELL	.019938	.018	.001
60	D. P. CELL	.016227	.667	.015
61	D. P. CELL	.018666	.479	.033
66	D. P. CELL	.036432	8.576	.394
37	D. P. CELL	.043794	1.509	.029
38	D. P. CELL	.022354	.425	.004
39	D. P. CELL	.016029	-.000	.000
40	D. P. CELL	.016056	-.000	.000
62	D. P. CELL	.008122	-23.938	.006
33	D. P. CELL	.049476	-.311	.081
68	D. P. CELL	.023927	3.282	.101
69	D. P. CELL	.016211	.453	.058
58	R. T. D.	.089214	533.186	.055
59	R. T. D.	.089972	545.381	.111
53	R. T. D.	.086528	515.954	.038
54	R. T. D.	.091514	545.963	.087
55	R. T. D.	.090923	542.860	.118
56	R. T. D.	.091271	543.932	.114
11	TORQUE METER	-.011485	-.565	.814
1	DRAG DISC	.000027	-11279.390	1560.314
2	DRAG DISC	-.001019	3000.814	919.096
26	DRAG DISC	.004671	66005.423	678.920

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program

12	SPEED METER	.022261	-2226.120	3.956
15	DENSITOMETER	.052762	13.518	.766
16	DENSITOMETER	.045774	11.443	2.347
17	DENSITOMETER	.075944	3.021	.764
18	DENSITOMETER	.053115	16.704	1.149
19	DENSITOMETER	.054974	8.715	.502
20	DENSITOMETER	.047536	2.466	.648
34	DENSITOMETER	.039607	20.014	4.521
35	DENSITOMETER	.059330	11.724	.952
36	DENSITOMETER	.059697	8.714	.327
32	MAG FLOW METER	.083892	53.041	.158

GAMMA DENSITOMETER DENSITIES		MIX TEE DENSITY
SUCT LEG BEAM 1	13.52	10.68
SUCT LEG BEAM 2	11.44	10.68
SUCT LEG BEAM 3	3.02	10.68
DISCH LEG BEAM 1	16.70	11.46
DISCH LEG BEAM 2	8.72	11.46
DISCH LEG BEAM 3	2.47	11.46
AECL BEAM 1	11.72	10.68
AECL BEAM 2	8.71	10.68
AECL BEAM 3	20.01	10.68

	TC	RTD	TSAT	PRESSURE
SUCT LEG	544.5	542.9	541.9	978.
DISCH LEG	543.3	543.9	544.0	996.
WATER ORIF	533.1	533.2	533.2	909.
STEAM ORIF	545.8	545.4	545.9	1011.
H P DRUM	539.6		542.5	983.

SUCT LEG NORMALIZED HYD TORQUE	.262
PUMP DP (LEG-LEG) (PSI)	9.3
DISCHARGE P - SUCTION P (PSI)	17.5
LEG-FLANGE + F-F DP (PSI)	8.1
INJECT OUT TEMP (DEG F)	167.1
INJECT FLOW (OUT-IN) (LB/HR)	3345.

MIXING TEE-	SUCT LEG	DISCH LEG
VELOCITY	30.8	29.2
MOMENTUM FLUX	10137.6	9743.5

THERMODYNAMIC PROPERTIES BASED ON LOOP PARAMETERS

PARAMETER-	T-SAT	P-SAT	SAT-DENSITY LIQ	VAPOR
SUCT -TC	-	999.7	46.32	2.24
-RTD	-	985.9	46.43	2.21
-P	541.9	-	46.49	2.19
DISCH-TC	-	989.1	46.40	2.22
-RTD	-	994.7	46.36	2.23
-P	544.0	-	46.35	2.23

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program (Cont'd)

20 21 22 23 24

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 406 DATE 3/ 3/77 TIME1300.00 PAGE 1

PUMP PERFORMANCE BASED ON SUCTION LEG CONDITIONS

	SET POINT	ACTUAL POINT (AVG)	SPEC. DIFF.	ACTUAL CONDITIONS ACTUAL DIFF.	SPEC. DRIFT /MIN	ACTUAL DRIFT /MIN	INST. UNCTY	DATA STD. DEV.
PRESSURE(PSIA) L-5		978.				1.	0.	1.
VOL FLOW(GPM)		-2504.				0.	38.	23.
VOID FRACTION								
ORIF		.808				.000	.003	.002
GD		.791				.003	.000	.053
SPEED (RPM) L-12		-2226.				4.	5.	2.
PUMP HEAD								
GD(FT)		122.0				6.1	.2	32.0
ORIF(FT)		125.2				.5	1.5	2.3
DP(PSI) L-7		9.3				.02	.01	.17
PUMP TORQUE(FTLB)								
HYDRAULIC		13.8				.5	2.3	.7
FRICTION		-14.4				.0	2.0	.0
SHAFT L-11		-.6				.6	1.2	.7

PUMP PERFORMANCE BASED ON DISCHARGE LEG CONDITIONS

PRESSURE(PSIA) L-6	1000.	996.	15.	4.	10.	1.	0.	0.
VOL FLOW(GPM)	-2450.	-2370.	123.	80.	24.	3.	35.	21.
VOID FRACTION								
ORIF	.800	.791	.017	.009	.008	.000	.003	.002
GD		.853				.003	.000	.011
SPEED (RPM) L-12	-2250.	-2226.	45.	24.	22.	4.	5.	2.
PUMP HEAD								
GD(FT)		153.6				1.4	.3	7.5
ORIF(FT)		116.6				.3	1.4	2.2
DP(PSI) L-7		9.3				.02	.01	.17
PUMP TORQUE(FTLB)								
HYDRAULIC		13.8				.5	2.3	.7
FRICTION		-14.4				.0	2.0	.0
SHAFT L-11		-.6				.6	1.2	.7

CONV CONST FILE ZERO 400 03/03/77 0415
DATA REDUCED 15.15.19. 79/06/06.

WATER ORIFICE = MAIN : STEAM ORIFICE = MAIN

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program (Cont'd)

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 406 DATE 3/ 3/77 TIME1300.00 PAGE 2

PUMP PERFORMANCE BASED ON SUCTION AND DISCHARGE LEG AVERAGE

	ACTUAL POINT (AVG)	ACTUAL CONDITIONS ACTUAL DRIFT /MIN	INST. STD. DEV.	DATA STD. DEV.
PRESSURE(PSIA) L-5+6	987.	1.	0.	1.
VOL FLOW(GPM)	-2434.	2.	31.	22.
VOID FRACTION				
ORIF	.800	.000	.002	.002
GD	.822	.000	.000	.021
SPEED (RPM) L-12	-2226.	4.	5.	2.
PUMP HEAD				
GD(FT)	133.6	1.4	.2	14.7
ORIF(FT)	120.8	.4	1.0	2.3
DP(PSI) L-7	9.3	.02	.01	.17
PUMP TORQUE(FTLB)				
HYDRAULIC	13.8	.5	2.3	.7
FRICTION	-14.4	.0	2.0	.0
SHAFT L-11	-.6	.6	1.2	.7

PUMP PERFORMANCE NORMALIZED VALUES

	SUCTION	DISCHARGE	AVERAGE
PUMP HEAD			
GAMMA DENSITOMETER	.484	.610	.530
ORIFICE	.497	.463	.479
VOLUMETRIC FLOW			
ORIFICE	-.715	-.677	-.696
SET POINT	-.700	-.700	-.700
VOID FRACTION (PERCENT)			
ORIFICE	80.8	79.1	80.0
GAMMA DENSITOMETER	79.1	85.3	82.2
SET POINT	80.0	80.0	80.0
PUMP SPEED			
ACTUAL	-.495	-.495	-.495
SET POINT	-.500	-.500	-.500
PUMP HYDRAULIC TORQUE			
GAM DEN	.254	.321	.288
ORIFICES	.262	.244	.253

SUPERFICIAL VELOCITIES	SUCT LEG	DISCH LEG (FT/SEC)
WATER	5.90	6.10
STEAM	24.91	23.06

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program (Cont'd)

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 406 DATE 3/ 3/77 TIME1300.00 PAGE 3

	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP PRESSURES (PSIA)						
HIGH PRES DRUM L-65	983.8	983.2	981.9	982.7	983.4	.02
STEAM ORIFICE L-41/47	1012.6	1011.6	1010.7	1010.2	1011.3	.01
WATER ORIFICE L-42/48	908.9	909.1	909.5	909.6	909.9	.02
SUCTION LEG L-5	979.5	977.9	977.4	977.0	978.4	.05
SAT PRES	987.2	986.5	985.5	984.8	985.5	0.00
DISCHARGE LEG L-6	996.5	995.8	995.2	994.8	995.2	.01
SAT PRES	995.9	995.3	994.4	993.5	994.2	0.00
LOOP TEMPERATURE (F)						
SUCTION LEG-RTD L-55	543.0	542.9	542.8	542.7	542.8	0.00
SUCTION LEG-TC L-13	544.7	544.6	544.5	544.4	544.6	.66
SAT TEMP	542.1	541.9	541.8	541.8	541.9	.01
DISCHARGE LEG-RTD L-56	544.1	544.0	543.9	543.8	543.9	0.00
DISCHARGE LEG-TC L-14	543.3	543.3	543.3	543.1	543.3	.66
SAT TEMP	544.2	544.1	544.0	544.0	544.0	.01
WATER ORIF.-RTD L-53/58	533.1	533.1	533.2	533.2	533.2	0.00
WATER ORIF.-TC L-50/52	533.1	533.1	533.1	533.0	533.0	.68
STEAM ORIF.-RTD L-54/59	545.5	545.5	545.4	545.3	545.3	0.00
STEAM ORIF.-TC L-49/51	545.9	546.0	545.7	545.6	545.6	.66
PUMP INJ IN-TC L-21	161.4	161.2	161.2	161.2	161.3	2.23
PUMP INJ OUT-TC L-22	167.3	167.1	167.1	167.0	167.3	2.15
HP DRUM ID-TC L-23	539.7	539.7	539.6	539.5	539.4	.67
HP DRUM OD-TC L-24	541.5	541.5	541.5	541.4	541.4	.66
AMBIENT-TC L-57	88.9	88.7	89.1	88.7	89.2	4.05
SUCTION LEG OD-TC L-30	544.4	544.2	544.1	544.1	544.3	.66
DISCH. LEG OD-TC L-31	545.3	545.2	545.1	545.0	545.2	.66
LOOP PRESSURE DROPS (PSI)						
FLOW CNTROL VLV L-60	.7	.7	.7	.7	.7	25.65
SUCT LEG-FLANGE L-61	.5	.5	.5	.5	.5	2.54
PAC16 DP L-62	-23.9	-23.9	-23.9	-23.9	-23.9	.60
ACROSS ELBOW DP L-33	-.3	-.2	-.2	-.4	-.4	40.07
VOLUTE-IMP BACK L-68	3.3	3.1	3.4	3.3	3.3	.66
HP DRUM LEVL DP L-25	1.3	1.3	1.3	1.3	1.3	3.35
PMP FLNGE-FLNGE L-66	8.3	9.0	8.3	9.0	8.2	3.78
LOOP FLOWRATES (LBM/SE)						
WATER FLOW	50.28	49.78	50.22	50.31	49.96	1.11
STEAM FLOW	10.34	10.37	10.53	10.31	10.27	1.20
SEAL INJ IN L-9	6.28	6.28	6.22	6.27	6.26	1.03
SEAL INJ OUT L-32	7.18	7.19	7.18	7.17	7.23	.09
PUMP SPEED(RPM) L-12	-2232.	-2227.	-2224.	-2222.	-2225.	.2
SHAFT TORQUE(FTLB) L-11	-.8	-1.8	.4	-.5	-.1	216.9
PUMP DP(PSI) L-7	9.3	9.0	9.4	9.4	9.2	.2

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program (Cont'd)

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 406 DATE 3/ 3/77 TIME1300.00 PAGE 4

		POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP SPECIFIC VOLUMES (FT3/LBM)							
MIXING TEE							
SUCTION		.09294	.09391	.09477	.09312	.09363	1.16
DISCHARGE		.08672	.08759	.08820	.08693	.08700	1.16
GAMMA DENSITOMETER							
SUCTION LEG							
BEAM 1	L-15	.07135	.06900	.07402	.07703	.07943	.01
BEAM 2	L-16	.09244	.08124	.07324	.13042	.07833	.01
BEAM 3	L-17	.45238	.28995	.42180	.29066	.26330	.02
DISCHARGE LEG							
BEAM 1	L-18	.05821	.05633	.06054	.05792	.06754	.01
BEAM 2	L-19	.11282	.11932	.12133	.10515	.11655	.01
BEAM 3	L-20	.29616	.36214	.41918	.44918	.44884	.01
AECL							
BEAM 1	L-35	.08292	.08202	.09813	.07893	.08689	.01
BEAM 2	L-36	.10967	.11921	.11735	.11721	.11100	.01
BEAM 3	L-34	.05530	.03574	.05378	.05353	.05977	.04
FLUID VELOCITY							
MIXING TEE(FT/SEC)							
SUCTION		30.7	30.7	31.3	30.7	30.7	.30
DISCHARGE		29.0	29.1	29.6	29.1	28.9	.30
MIX TEE-GAM DEN(FT/SEC)							
SUCTION		30.5	26.6	24.2	43.0	25.6	.19
DISCHARGE		37.8	39.6	40.7	35.2	38.8	.19
HI TURBINE METER (MANUF CAL)							
SUCT LEG	L-3	-0.	-0.	-0.	-0.	-0.	
DISCH LEG	L-4	-0.	-0.	0.	0.	0.	
LO TURBINE METER (MANUF CAL)							
SUCT LEG	L-28	-0.	-0.	-0.	-0.	-0.	
DISCH LEG	L-29	-0.	-0.	-0.	-0.	-0.	
MOMENTUM FLUX							
MIXING TEE(LBM/FT-SEC2)							
SUCTION		10116.	10056.	10343.	10139.	10034.	.65
DISCHARGE		9728.	9670.	9937.	9751.	9632.	.65
MIX TEE-GAM DEN(LBM/FT-SEC2)							
SUCTION		10061.	8700.	7993.	14201.	8394.	.38
DISCHARGE		12655.	13173.	13670.	11795.	12903.	.38
HI DRAG DISC (MANUF CAL)							
SUCT LEG	L-1	-9786.	-10577.	-12656.	-13235.	-10142.	
DISCH LEG	L-2	2348.	2026.	4077.	3865.	2688.	
LO DRAG DISC (MANUF CAL)							
SUCT LEG	L-26	65484.	66740.	65630.	66749.	65424.	
DISCH LEG	L-27	0.	0.	0.	0.	0.	

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program (Cont'd)

1 2 3 ... 22 23 24 25

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 406 DATE 3/ 3/77 TIME1300.00 PAGE 5

PUMP PERFORMANCE BASED ON SUCTION LEG CONDITIONS

	SET POINT	ACTUAL POINT (AVG)	SPEC. DIFF.	ACTUAL CONDITIONS ACTUAL DIFF.	SPEC. DRIFT /MIN	ACTUAL DRIFT /MIN	INST. UNCTY	DATA STD. DEV.
PRESSURE(BAR) L-5		67.				0.	0.	0.
VOL FLOW(M3/S)		-.1579				.0000	.0024	.0014
VOID FRACTION								
ORIF		.808				.000	.003	.002
GD		.791				.003	.000	.053
SPEED (RPM) L-12		-2226.				4.	5.	2.
PUMP HEAD								
GD(M)		37.2				1.8	.1	9.7
ORIF(M)		38.2				.1	.5	.7
DP(BAR) L-7		.6				.00	.00	.01
PUMP TORQUE(NM)								
HYDRAULIC		18.7				.7	3.1	.9
FRICTION		-19.5				.0	2.7	.0
SHAFT L-11		-.8				.8	1.7	.9

PUMP PERFORMANCE BASED ON DISCHARGE LEG CONDITIONS

PRESSURE(BAR) L-6	69.	69.	1.	0.	1.	0.	0.	0.
VOL FLOW(M3/S)	-.1545	-.1495	.0077	.0051	.0015	.0002	.0022	.0013
VOID FRACTION								
ORIF	.800	.791	.017	.009	.008	.000	.003	.002
GD		.853				.003	.000	.011
SPEED (RPM) L-12	-2250.	-2226.	45.	24.	30.	4.	5.	2.
PUMP HEAD								
GD(M)		46.8				.4	.1	2.3
ORIF(M)		35.6				.1	.4	.7
DP(BAR) L-7		.6				.00	.00	.01
PUMP TORQUE(NM)								
HYDRAULIC		18.7				.7	3.1	.9
FRICTION		-19.5				.0	2.7	.0
SHAFT L-11		-.8				.8	1.7	.9

CONV CONST FILE ZERO 400 03/03/77 0415
DATA REDUCED 15.15.20. 79/06/06.

WATER ORIFICE = MAIN : STEAM ORIFICE = MAIN

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program (Cont'd)

2 3 4 5 6 7 8 9 10 20 21 22 23 24 25

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 406 DATE 3/ 3/77 TIME1300.00 PAGE 6

PUMP PERFORMANCE BASED ON SUCTION AND DISCHARGE LEG AVERAGE

	ACTUAL POINT (AVG)	ACTUAL CONDITIONS ACTUAL DRIFT /MIN	INST. STD. DEV.	DATA STD. DEV.
PRESSURE(BAR) L-5+6	68.	0.	0.	0.
VOL FLOW(M3/S)	-.1536	.0001	.0019	.0014
VOID FRACTION				
ORIF	.800	.000	.002	.002
GD	.822	.000	.000	.021
SPEED (RPM) L-12	-2226.	4.	5.	2.
PUMP HEAD				
GD(M)	40.7	.4	.1	4.5
ORIF(M)	36.8	.1	.3	.7
DP(BAR) L-7	.6	.00	.00	.01
PUMP TORQUE(NM)				
HYDRAULIC	18.7	.7	3.1	.9
FRICTION	-19.5	.0	2.7	.0
SHAFT L-11	-.8	.8	1.7	.9

PUMP PERFORMANCE NORMALIZED VALUES

	SUCTION	DISCHARGE	AVERAGE
PUMP HEAD			
GAMMA DENSITOMETER	.484	.610	.530
ORIFICE	.497	.463	.479
VOLUMETRIC FLOW			
ORIFICE	-.715	-.677	-.696
SET POINT	-.700	-.700	-.700
VOID FRACTION (PERCENT)			
ORIFICE	80.8	79.1	80.0
GAMMA DENSITOMETER	79.1	85.3	82.2
SET POINT	80.0	80.0	80.0
PUMP SPEED			
ACTUAL	-.495	-.495	-.495
SET POINT	-.500	-.500	-.500
PUMP HYDRAULIC TORQUE			
GAM DEN	.254	.321	.288
ORIFICES	.262	.244	.253

SUPERFICIAL VELOCITIES	SUCT LEG	DISCH LEG (M/SEC)
WATER	1.80	1.86
STEAM	7.59	7.03

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program (Cont'd)

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 406 DATE 3/ 3/77 TIME1300.00 PAGE 7

	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP PRESSURES (BAR)						
HIGH PRES DRUM L-65	67.8	67.8	67.7	67.8	67.8	.02
STEAM ORIFICE L-41/47	69.8	69.7	69.7	69.7	69.7	.01
WATER ORIFICE L-42/48	62.7	62.7	62.7	62.7	62.7	.02
SUCTION LEG L-5	67.5	67.4	67.4	67.4	67.5	.05
SAT PRES	68.1	68.0	68.0	67.9	67.9	0.00
DISCHARGE LEG L-6	68.7	68.7	68.6	68.6	68.6	.01
SAT PRES	68.7	68.6	68.6	68.5	68.6	0.00
LOOP TEMPERATURE (C)						
SUCTION LEG-RTD L-55	283.9	283.8	283.8	283.7	283.8	0.00
SUCTION LEG-TC L-13	284.8	284.8	284.7	284.7	284.8	.66
SAT TEMP	283.4	283.3	283.2	283.2	283.3	.01
DISCHARGE LEG-RTD L-56	284.5	284.4	284.4	284.3	284.4	0.00
DISCHARGE LEG-TC L-14	284.1	284.1	284.0	283.9	284.1	.66
SAT TEMP	284.5	284.5	284.4	284.4	284.4	.01
WATER ORIF.-RTD L-53/58	278.4	278.4	278.4	278.5	278.5	0.00
WATER ORIF.-TC L-50/52	278.4	278.4	278.4	278.3	278.3	.68
STEAM ORIF.-RTD L-54/59	285.3	285.3	285.2	285.1	285.2	0.00
STEAM ORIF.-TC L-49/51	285.5	285.6	285.4	285.3	285.4	.66
PUMP INJ IN-TC L-21	71.9	71.8	71.8	71.8	71.9	2.23
PUMP INJ OUT-TC L-22	75.1	75.0	75.1	75.0	75.1	2.15
HP DRUM ID-TC L-23	282.1	282.1	282.0	281.9	281.9	.67
HP DRUM OD-TC L-24	283.1	283.1	283.0	283.0	283.0	.66
AMBIENT-TC L-57	31.6	31.5	31.7	31.5	31.8	4.05
SUCTION LEG OD-TC L-30	284.7	284.6	284.5	284.5	284.6	.66
DISCH. LEG OD-TC L-31	285.2	285.1	285.0	285.0	285.1	.66
LOOP PRESSURE DROPS (BAR)						
FLOW CNTROL VLV L-60	.0	.0	.0	.0	.0	25.65
SUCT LEG-FLANGE L-51	.0	.0	.0	.0	.0	2.54
PAC16 DP L-62	-1.7	-1.7	-1.7	-1.7	-1.7	.60
ACROSS ELBOW DP L-33	-.0	-.0	-.0	-.0	-.0	40.07
VOLUTE-IMP BACK L-68	.2	.2	.2	.2	.2	.66
HP DRUM LEVL DP L-25	.1	.1	.1	.1	.1	3.35
PMP FLNGE-FLNGE L-66	.6	.6	.6	.6	.6	3.78
LOOP FLOWRATES (KG/SEC)						
WATER FLOW	22.81	22.58	22.78	22.82	22.66	1.11
STEAM FLOW	4.69	4.70	4.78	4.68	4.66	1.20
SEAL INJ IN L-9	2.85	2.85	2.82	2.85	2.84	1.03
SEAL INJ OUT L-32	3.26	3.26	3.26	3.25	3.28	.09
PUMP SPEED(RPM) L-12	-2232.	-2227.	-2224.	-2222.	-2225.	.2
SHAFT TORQUE(NM) L-11	-1.1	-2.4	.5	-.7	-.1	216.9
PUMP DP(BAR) L-7	.6	.6	.6	.7	.6	.2

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program (Cont'd)

1 2 3 4 5 6 7 8 9 10 11 12

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 406 DATE 3/ 3/77 TIME1300.00 PAGE 8

	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP SPECIFIC VOLUMES (M3/KG)						
MIXING TEE						
SUCTION	.00580	.00586	.00592	.00581	.00585	1.16
DISCHARGE	.00541	.00547	.00551	.00543	.00543	1.16
GAMMA DENSITOMETER						
SUCTION LEG						
BEAM 1 L-15	.00445	.00431	.00462	.00481	.00496	.01
BEAM 2 L-16	.00577	.00507	.00457	.00814	.00489	.01
BEAM 3 L-17	.02824	.01810	.02633	.01815	.01644	.02
DISCHARGE LEG						
BEAM 1 L-18	.00363	.00352	.00378	.00362	.00422	.01
BEAM 2 L-19	.00704	.00745	.00757	.00656	.00728	.01
BEAM 3 L-20	.01849	.02261	.02617	.02804	.02802	.01
AECL						
BEAM 1 L-35	.00518	.00512	.00613	.00493	.00542	.01
BEAM 2 L-36	.00685	.00744	.00733	.00732	.00693	.01
BEAM 3 L-34	.00345	.00223	.00336	.00334	.00373	.04
FLUID VELOCITY						
MIXING TEE(M/SEC)						
SUCTION	9.3	9.4	9.5	9.4	9.3	.30
DISCHARGE	8.9	8.9	9.0	8.9	8.8	.30
MIX TEE-GAM DEN(M/SEC)						
SUCTION	9.3	8.1	7.4	13.1	7.8	.19
DISCHARGE	11.5	12.1	12.4	10.7	11.8	.19
HI TURBINE METER (MANUF CAL)						
SUCT LEG L-3	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-4	-0.	-0.	0.	0.	0.	
LO TURBINE METER (MANUF CAL)						
SUCT LEG L-28	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-29	-0.	-0.	-0.	-0.	-0.	
MOMENTUM FLUX						
MIXING TEE(KG/M-SEC2)						
SUCTION	15052.	14963.	15390.	15087.	14931.	.65
DISCHARGE	14475.	14389.	14786.	14510.	14332.	.65
MIX TEE-GAM DEN(KG/M-SEC2)						
SUCTION	14971.	12946.	11893.	21131.	12490.	.38
DISCHARGE	18831.	19602.	20341.	17551.	19200.	.38
HI DRAG DISC (MANUF CAL)						
SUCT LEG L-1	-14562.	-15738.	-18833.	-19694.	-15092.	
DISCH LEG L-2	3494.	3015.	6066.	5752.	3999.	
LO DRAG DISC (MANUF CAL)						
SUCT LEG L-26	97440.	99309.	97658.	99323.	97351.	
DISCH LEG L-27	0.	0.	0.	0.	0.	

Figure 3.2-3. Sample Ten Page Output of the Steady-State Data Reduction Program (Cont'd)

C-E/EPRI 1/5 SCALE PRIMARY COOLANT PUMP TESTS

STEADY STATE TEST RESULTS FOR TEST 406 DATE 3/ 3/77 TIME 1300.00

PERFORMANCE DATA

PARAMETER	UNITS	SUCTION VALUE	SUCTION DRIFT/MIN	SUCTION STD. DEV.	DISCHARGE VALUE	DISCHARGE DRIFT/MIN	DISCHARGE STD. DEV.
PPRESSURE	PSIA-BAR	978./67.44	1./ .04	1./ .06	996./68.64	1./ .05	0./ .02
VOLUME FLOW	GPM-M3/S	-2504./-.1579	0./.0000	23./.0014	-2370./-.1495	3./.0002	21./.0013
VOID-ENERGY BAL		.808/ .808	.000/.000	.002/.002	.791/ .791	.000/.000	.002/.002
VOID-GAMMA DENS		.791/ .791	.003/.003	.053/.053	.853/ .853	.003/.003	.011/.011
SPEED	RPM-RPM	-2226./-2226.	4./ 4.	2./ 2.	-2226./-2226.	4./ 4.	2./ 2.
L-L HEAD-EGY BAL	FT-M	125.2/ 38.2	.5/ .1	2.3/ .7	116.6/ 35.6	.3/ .1	2.2/ .7
L-L HEAD-GAMMA D	FT-M	122.0/ 37.2	6.1/ 1.8	32.0/ 9.7	153.6/ 46.8	1.4/ .4	7.5/ 2.3
HYDRAULIC TORQUE	FTLB-NM	13.8/ 18.7	.5/ .7	.7/ .9	13.8/ 18.7	.5/ .7	.7/ .9
FRICTION TORQUE	FTLB-NM	-14.4/ -19.5	.0/ .0	.0/ .0	-14.4/ -19.5	.0/ .0	.0/ .0
TEMPERATURE	DEG F-DEG C	542.9/ 283.8	.1/ .1	.1/ .0	543.9/ 284.4	.1/ .1	.1/ .0
EGY BAL DENSITY	LB/FT3-KG/M3	10.676/ .6655	.014/ .0009	.082/ .0051	11.457/ .7142	.002/ .0002	.079/ .0049
MOMENTUM FLUX	LB/FTS2-KG/MS2	10138./ 15085.	16./ 24.	122./ 181.	9744./ 14498.	22./ 33.	117./ 174.
VELOCITY	FT/S2-M/S2	30.82/ 9.39	.00/ .00	.28/ .08	29.16/ 8.89	.04/ .01	.25/ .08
TOTAL MASS FLOW	LB/S-KG/S	60./ 27.	0./ 0.	0./ 0.	60./ 27.	0./ 0.	0./ 0.

PARAMETER	UNITS	VALUE	DRIFT/MIN	STD. DEV.
ORIFICE WATER FLOW	LB/S - KG/S	50.11/ 22.73	.02/ .01	.23/ .11
ORIFICE STEAM FLOW	LB/S - KG/S	10.36/ 4.70	.04/ .02	.09/ .04
SEAL INJECTION IN	LB/S - KG/S	6.26/ 2.84	.01/ .00	.02/ .01
SEAL INJECTION OUT	LB/S - KG/S	7.19/ 3.26	.01/ .01	.02/ .01

DEVICE	UNITS	LOC	VALUE	LOC	VALUE	LOC	VALUE	LOC	VALUE
THERMOCOUPLE	DEG F-DEG C	L-13	544.5/284.7	L-14	543.3/284.0	L-21	161.2/ 71.8	L-22	167.1/ 75.1
THERMOCOUPLE	DEG F-DEG C	L-23	539.6/282.0	L-24	541.5/283.0	L-30	544.2/284.6	L-31	545.2/285.1
THERMOCOUPLE	DEG F-DEG C	L-49	545.8/285.4	L-50	533.1/278.4	L-51	544.9/284.9	L-52	521.6/272.0
THERMOCOUPLE	DEG F-DEG C	L-57	88.9/ 31.6						
PRESSURE CELL	PSIA-BAR	L-5	978.0/67.44	L-6	995.5/68.64	L-10	1424.1/ 98.19	L-41	1011.3/69.73
PRESSURE CELL	PSIA-BAR	L-42	1037.0/71.50	L-47	14.8/ 1.02	L-48	1100.9/75.91	L-64	982.8/67.77
PRESSURE CELL	PSIA-BAR	L-65	983.0/67.78						
D. P. CELL	PSID-BAR	L-7H	9.36/ .645	L-7L	9.28/ .640	L-9	13.96/ .963	L-25	1.343/ .0926
D. P. CELL	PSID-BAR	L-33	-.311/ -.0214	L-37L	1.509/ .1040	L-38L	.425/ .0293	L-39L	-.000/ -.0000
D. P. CELL	PSID-BAR	L-40L	-.000/ -.0000	L-37H	1.402/ .0967	L-38M	.422/ .0291	L-39H	.016/ .0011
D. P. CELL	PSID-BAR	L-40H	.018/ .0012	L-60	.67/ .046	L-61	.479/ .0330	L-62	-23.94/ -1.651
D. P. CELL	PSID-BAR	L-66	8.576/ .5913	L-68	3.28/ .226	L-38H	.453/ .0312		
R. T. D.	DEG F-DEG C	L-53	516.0/268.9	L-54	546.0/285.5	L-55	542.9/283.8	L-56	543.9/284.4
R. T. D.	DEG F-DEG C	L-58	533.2/278.4	L-59	545.4/285.2				
TURQUE METER	FTLB-NM	L-11	-.6/ -.8						
DRAG DISC	LB/FTS2-KG/MS2	L-1	-11279./ -16784.	L-2	3001./ 4465.	L-26	66005./ 98216.	L-27	********/********
TURBINE METER	FT/S-M/S	L-3	********/*****	L-4	********/*****	L-28	********/*****	L-29	********/*****
SPEED METER	RPM-RPM	L-12	-2226.1/-2226.1						
DENSITOMETER	LB/FT3-KG/M3	L-15	13.518/ 216.5	L-16	11.443/ 183.3	L-17	3.021/ 48.4		
DENSITOMETER	LB/FT3-KG/M3	L-18	16.704/ 267.6	L-19	8.715/ 139.6	L-20	2.466/ 39.5		
DENSITOMETER	LB/FT3-KG/M3	L-34	20.014/ 320.6	L-35	11.724/ 187.8	L-36	8.714/ 139.6		
MAG FLOW METER	GPM-M3/HR	L-32	53.0/ 12.0						

Figure 3.2-4. Sample One-Page Output of the Steady-State Data Reduction Program

Table 3.2-2

NOMENCLATURE USED IN SSDR PROGRAM

A, A_2, etc.	-	Linear Dimensions (inches, feet)
C	-	Carryover (dimensionless)
D	-	Any Diameter (inches, feet)
F_1, F_2, F_3	-	Orifice Coefficients
H	-	Head (inches, feet)
K	-	Channel Number
L	-	Vertical Length of Instrumentation Lines Effecting a Pressure or Differential Pressure Cell (inches)
L_s	-	Length of Steam Line (inches, feet)
L_w	-	Length of Water Line (inches, feet)
N	-	Rotational Speed (rpm)
P	-	Pressure ($lb/in.^2$)
Q	-	Volumetric Flow (ft^3/sec)
V	-	Voltage (volts)
U_s	-	Steam Line Heat Loss Coefficient (Btu/hr-ft)
U_w	-	Water Line Heat Loss Coefficient (Btu/hr-ft)
W	-	Mass Flow (lbm/hr)
W_c	-	Mass Flow of Carryover (lbm/hr)
W_g	-	Mass Flow of Dry Steam (lbm/hr)
W_s	-	Mass Flow of Wet Steam (lbm/hr)
W_w	-	Mass Flow of Water (lbm/hr)
X	-	Quality
Z_P	-	Latest Zero for a Pressure Cell (millivolts)
Z_{DP}	-	Latest Zero for a Differential Pressure Cell (millivolts)
Z_{DD}	-	Latest Zero for a Drag Disc (millivolts)

Table 3.2-2 (Cont'd.)

NOMENCLATURE USED IN SSDR PROGRAM

Z_T	-	Latest Zero for a Turbine Meter (millivolts)
Z_{SM}	-	Latest Zero for the Speed Meter (millivolts)
Z_{TM}	-	Latest Zero for the Torque Meter (millivolts)
Z_{MF}	-	Latest Zero for the Magnetic Flow Meter (millivolts)
h	-	Enthalpy (Btu/lbm)
h_g	-	Enthalpy of Saturated Steam (Btu/lbm)
h_ℓ	-	Enthalpy of Saturated Water (Btu/lbm)
h_m	-	Enthalpy of Mixture (Btu/lbm)
h_s	-	Enthalpy of Mixture in Steam Line (Btu/lbm)
h_w	-	Enthalpy of Subcooled Water (Btu/lbm)
r	-	Radius (inches, feet)
s	-	Sample Standard Deviation
t	-	Time (seconds)
v	-	Velocity (ft/sec)
Δ	-	Differential Value
Δh	-	$h_g - h_\ell$ (Btu/lbm)
ΔP	-	Differential Pressure ($lbf/in.^2$)
$\Delta\rho$	-	$\rho_g - \rho_\ell$ (lbm/ft^3)
τ	-	Torque (ft/lbs)
α	-	Void Fraction
γ	-	Gamma (γ - Densitometer)
ε	-	Error
θ	-	Temperature (°F)
θ_c	-	Temperature (°C)
θ_∞	-	Ambient Temperature (°F)
ξ	-	Uncertainty

Table 3.2-2 (Cont'd.)

NOMENCLATURE USED IN SSDR PROGRAM

ρ - Density (lbm/ft^3)

ρ_g - Density of Saturated Steam (lbm/ft^3)

ρ_ℓ - Density of Saturated Water (lbm/ft^3)

ρ_m - Density of Mixture (lbm/ft^3)

ρ_s - Density of Mixture in Steam Line (lbm/ft^3)

ρ_w - Density of Subcooled Water (lbm/ft^3)

ρ_γ - Density Obtained from γ Densitometer (lbm/ft^3)

σ - Population Standard Deviation

3.2.3.1 Overall Flow Chart. The overall flow chart - Figure 3.2-5 shows the sixteen (16) basic units into which the program is divided, together with the loops and decisions interconnecting them.

The program commences with setting up the system and reading basic data - Unit A. It then accesses the data file to read the instrument identification numbers, zeros and calibration constants - Unit B. After this, the test number is read from the data file - Unit C - and a decision is made. If an "EOF" is encountered, it means that the end of the data file has been reached and a decision is made to go to the end of the program and terminate. If an EOF is not found, then the program continues to Unit D, where the rest of the manually inputted data for that test point is read.

The next three Units are enclosed in a "DO" loop and are associated with the five scans of test data taken at thirty (30) second intervals. As a result, a decision is made prior to entering Unit E. If this entry would be the sixth successive entry, then Unit E through G are bypassed and the program is continued at Unit H. If the entry to Unit E is less than the sixth, then the program continues through Units E, F, and G.

Unit E consists of the actual reading of scanned instrument outputs, the data scanner zero and data scanner status information. The program then continues to Unit F, the conversion of the instrument outputs to engineering units and Unit G, the calculation of derived parameters and the associated uncertainties. After Unit G, the program returns to the decision point prior to Unit E. When the sequence of Units E through G has been completed five times, this decision point, as described above, sends the program to Unit H. At this unit, the actual operating conditions, averaged over the five scans, the standard deviation of those five scans and the drift during data acquisition are calculated.

The next unit, Unit I, calculates the allowable deviations from the test plan requirements and the operating conditions.

The program continues on to Unit J where the parameter uncertainties for all five scans are averaged and converted into percentages. Unit K then determines the mean normalized pump parameters.

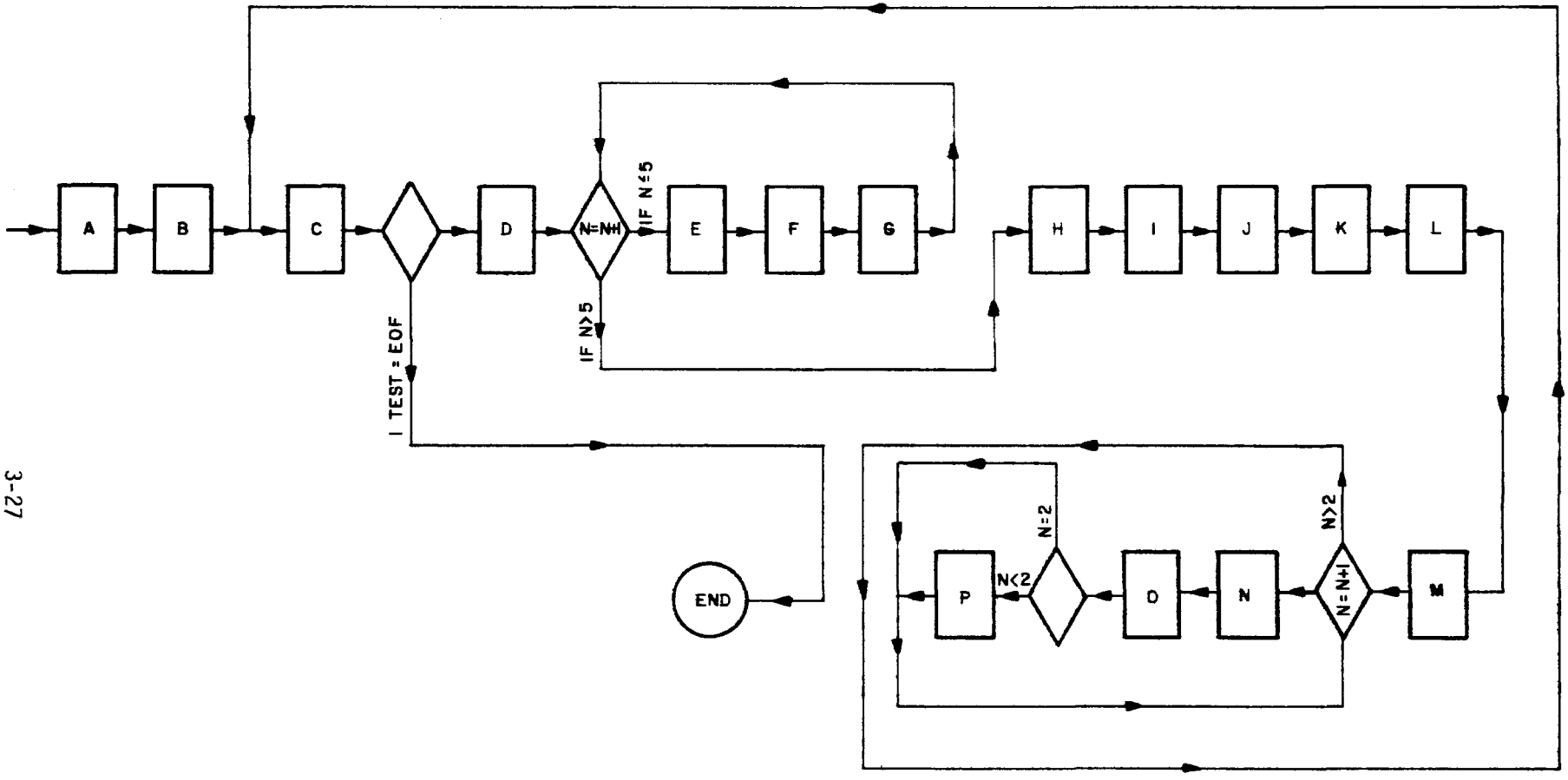


FIGURE 3.2-5. OVERALL FLOW CHART

At this point, the first output from the program is made. All outputs are duplicated, in that the results are printed out and are also written without headings into a computer file. Two files are used for recording results. If the volumetric flow is positive, then the results are written into Tape 10 whereas if the volumetric flow is negative, Tape 11 is used. The first unit where any output is created is Unit L. In this, all instrument outputs, in millivolts, and the converted values, in engineering units, are averaged. Standard deviations of the converted values, over the five scans, are calculated. These three values are printed out and written into the file for each of the instruments. This is also done for some other instrument comparison data. This output is the basic measured data and was used during testing to evaluate instrument and system performance.

The next unit, M, performs some minor calculations and conversions required for the final output of the reduced test data.

At this point in the program a decision is made. Units N through P are in a loop which is indexed by the integer $\bar{N}$. If $\bar{N}$ is equal to one (1), then this is the major output in English units, and Unit N is entered. Unit N, with $\bar{N}$ equals 1, sets up the labels for English units and Unit O prints out the results and writes them into the computer file. At this point, another decision is made based on the index $\bar{N}$. Since in this case the index is one (1) the program continues to Unit P where the data is converted into metric units. The program then returns to the decision point between Units M and N. At this point, the index $\bar{N}$ is increased to two (2) and the decision is made to continue to Unit N. This time, since N equals 2, metric labels are selected and in Unit O the metric results are printed and written into the computer file. The decision point between Units O and P now causes the program to bypass Unit P, since the conversion to metric is no longer needed. The program again returns to the decision point between Unit M and N where $\bar{N}$ is increased to three (3). Since $\bar{N}$ is now greater than two (2), Units N through P are bypassed. This completes the data reduction program for one data point.

Immediately after Unit P, the program is directed to go back and re-enter the sequence at a point between Units B and C. The cycle from Units C to Unit P is repeated until an EOF is read in Unit C. When an EOF is read all data points associated with the instrument data, read in Unit B, have been reduced and the program is directed to go immediately to its end and terminate.

3.2.3.2 Detailed Flow Charts. Figures 3.2-6 through 3.2-12 are the detailed flow charts for the steady-state data reduction program. In these are contained all of the logical decisions. The first part of the identification given to each unit consists of one of the letters A through P. This signifies which of the major units it belongs to in the overall flow chart (Figure 3.2-5). The second part of the identification is a sequential number indicating the unit's position within the major block. Each identification used in the flow charts appears in the program. These identifications provide the cross-reference between the overall flow chart, the detailed flow chart and the data reduction program listing (APPENDIX 3.2A).

3.2.3.3 Assumptions Made in Data Reduction. The presence of significant uncertainties (5-10 psi) in the suction (L-5) and discharge (L-6) pressure measurements raises some difficulties in determining whether subcooled, saturated or superheated conditions exist in the test sections. The assumptions made in determining the condition of the fluid are given below. If it is determined that the fluid is in a saturated condition at any point in the system, then the thermodynamic properties used are those obtained from the 1967 ASME Steam Tables using the local RTD temperature. Otherwise the effective local pressure (defined below) and the RTD temperature are used.

Orifices:

1. Conditions at the water orifice are saturated liquid at the local RTD temperature.

2. Conditions at the steam orifice are 99.95% quality at the local RTD temperature.

3.2.3.3.1 Upstream test section. Quality is calculated from the energy of the water at the water orifice plus the energy of the steam at the steam orifice minus the heat loss between the orifices and the suction test section. Heat loss is calculated by using fluid temperature, pipe length and thermal conductivity of the pipe insulation. The local conditions are defined as:

1. Superheated Condition ($X \geq 1$)

   In this case, if the measured upstream pressure is greater or equal to the saturation pressure, based on the local RTD temperature, then it is replaced by the saturation pressure minus 0.001 psi. The void fraction is defined as being equal to unity.

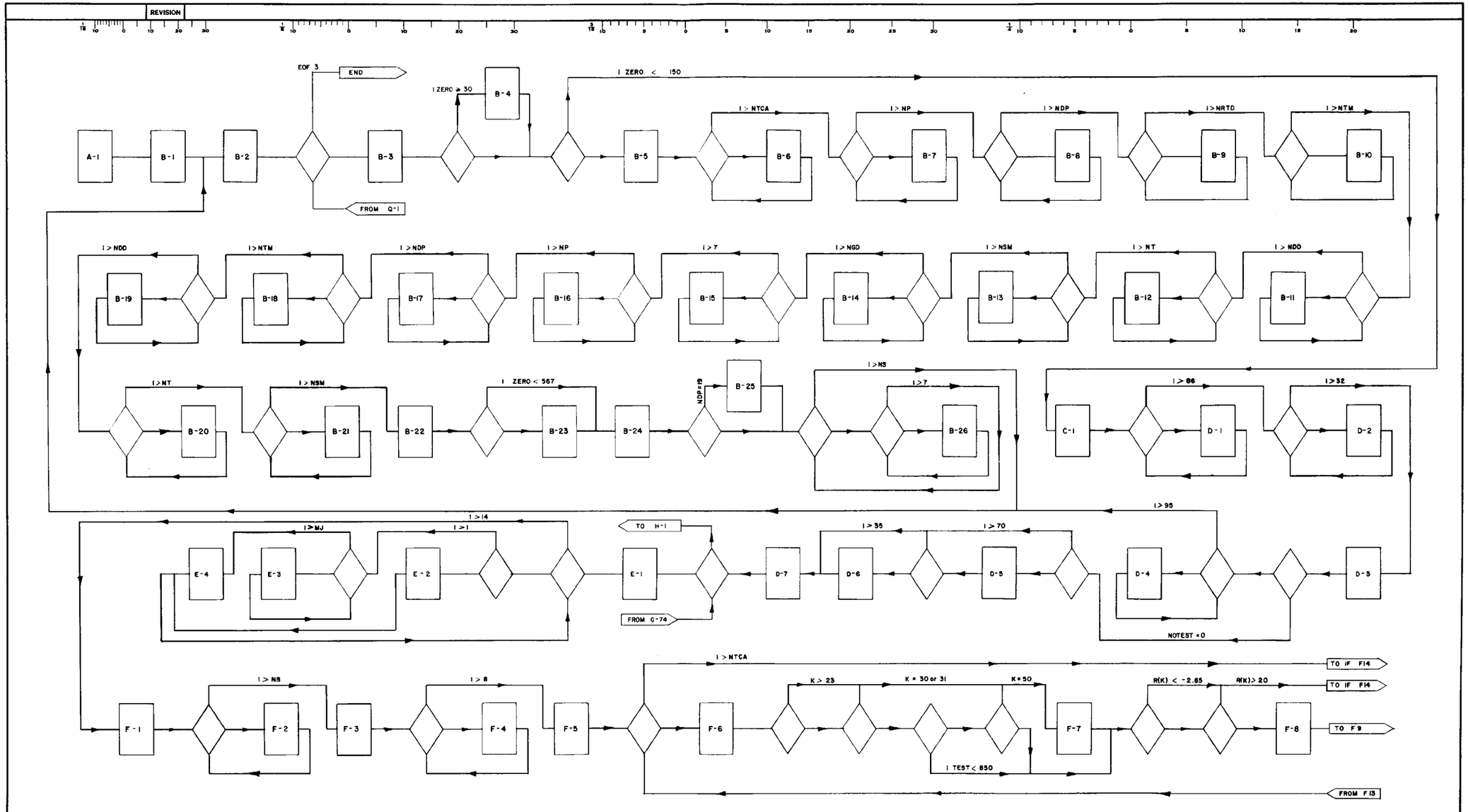


FIGURE 3.2-6. DETAILED FLOW CHART, BLOCKS A THRU F

DRAWN BY Richard D Ruby CHECKED RDR

DATE 11-15-78 APPROVED

C-E POWER SYSTEMS
COMBUSTION ENGINEERING, INC.

SCALE

DWG. NO.

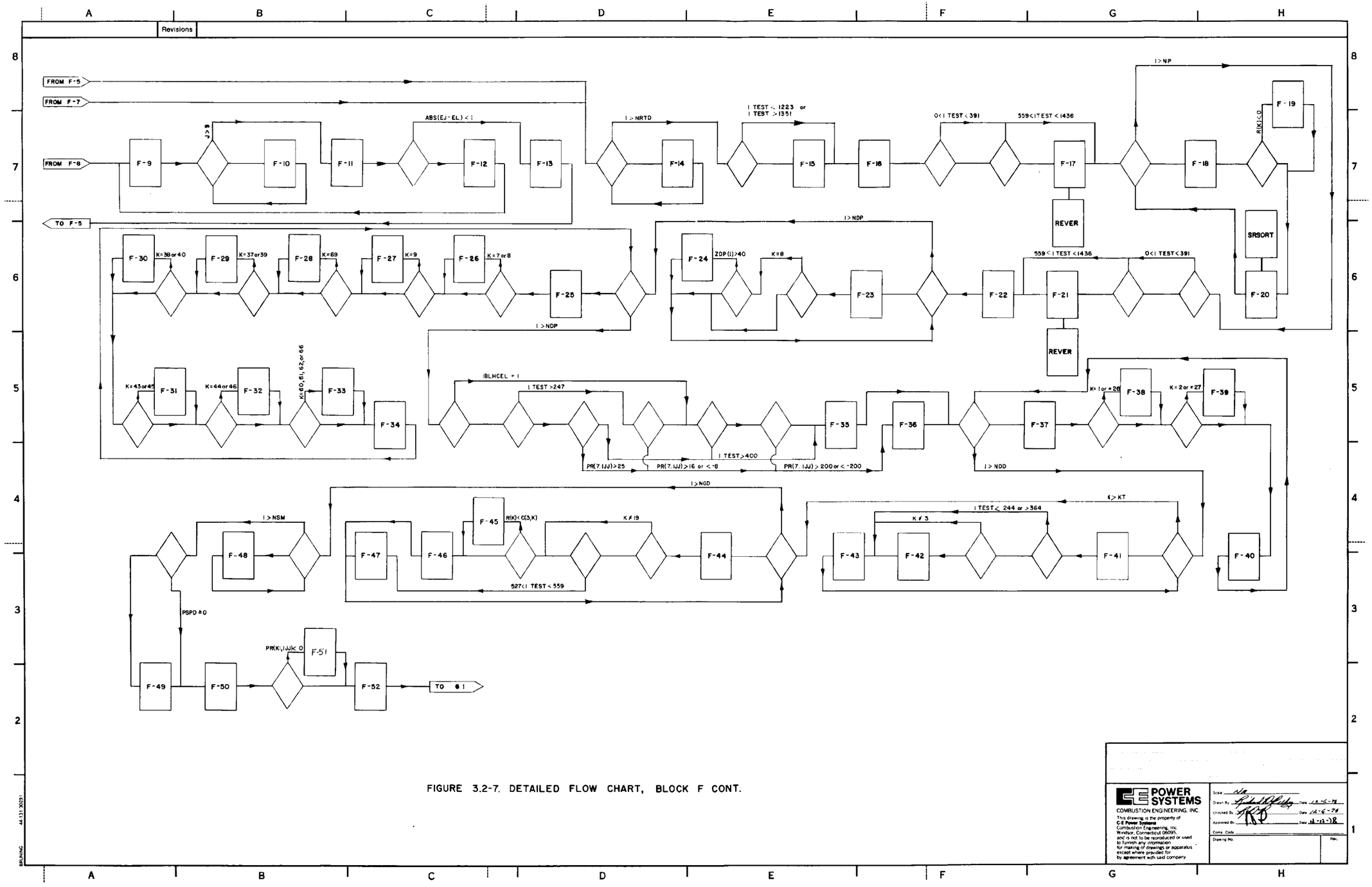


FIGURE 3.2-7. DETAILED FLOW CHART, BLOCK F CONT.

Scale: n/a
Drawn By: Date 12-6-78
Checked By: Date 12-6-78
Approved By: Date 12-13-78
Comp. Code
Drawing No. Rev.

BRUNING 44 131 3023

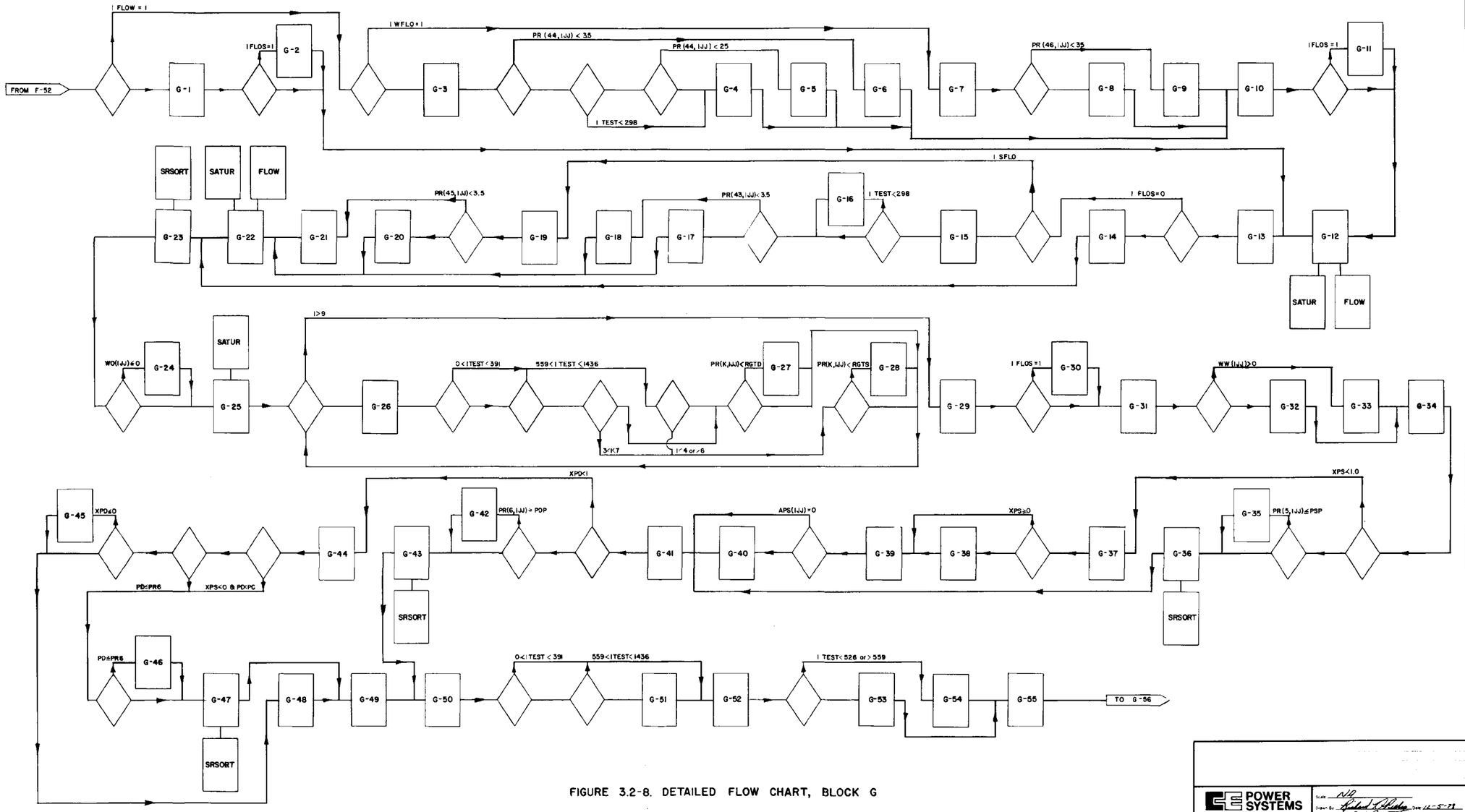


FIGURE 3.2-8. DETAILED FLOW CHART, BLOCK G

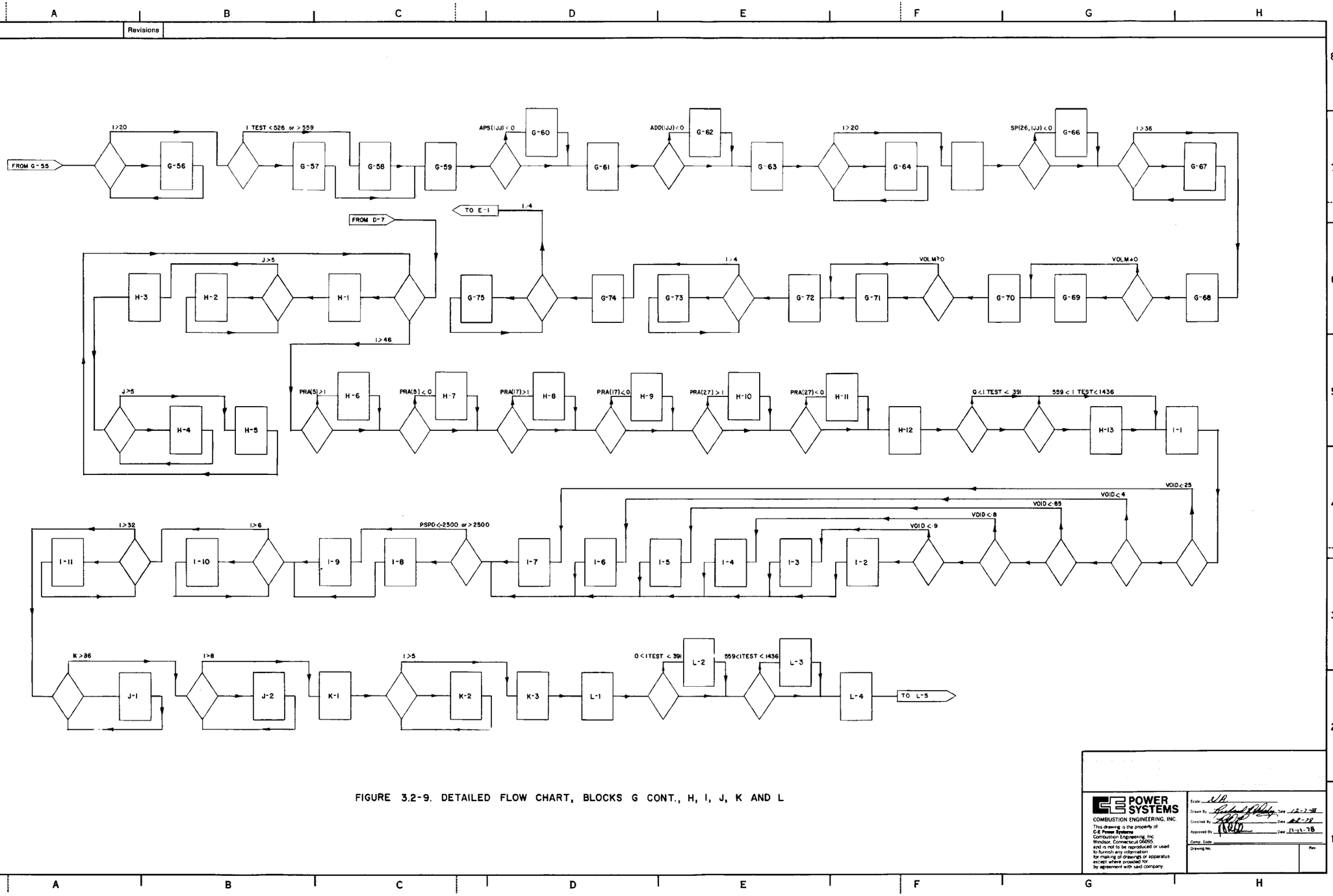


FIGURE 3.2-9. DETAILED FLOW CHART, BLOCKS G CONT., H, I, J, K AND L

Scale: NA
Drawn By: [illegible] Date 12-7-78
Checked By: [illegible] Date 12-7-78
Approved By: [illegible] Date 12-13-78
Comp. Code
Drawing No. | Rev.

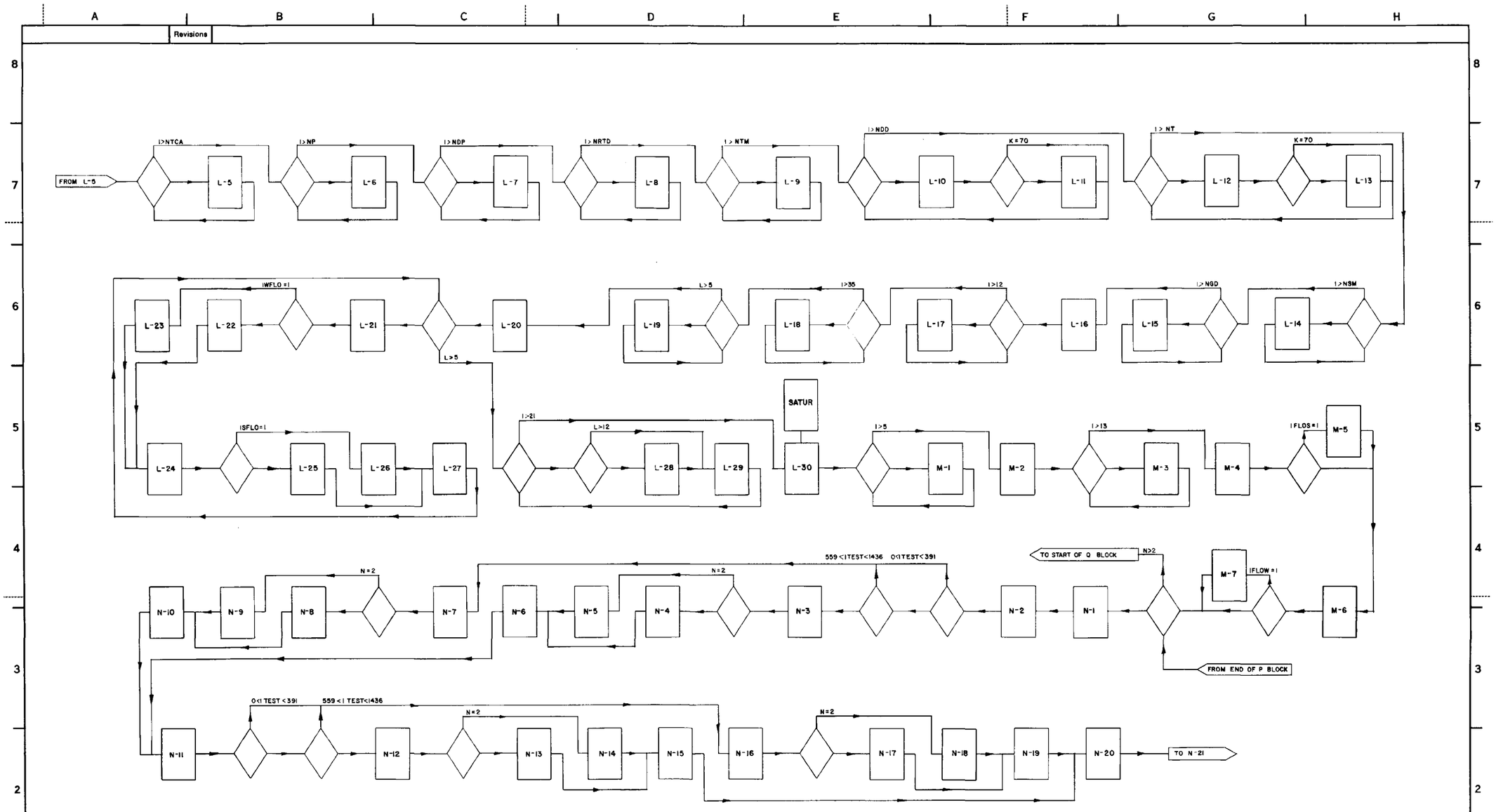


FIGURE 3.2-10. DETAILED FLOW CHART, BLOCKS L CONT., M AND N

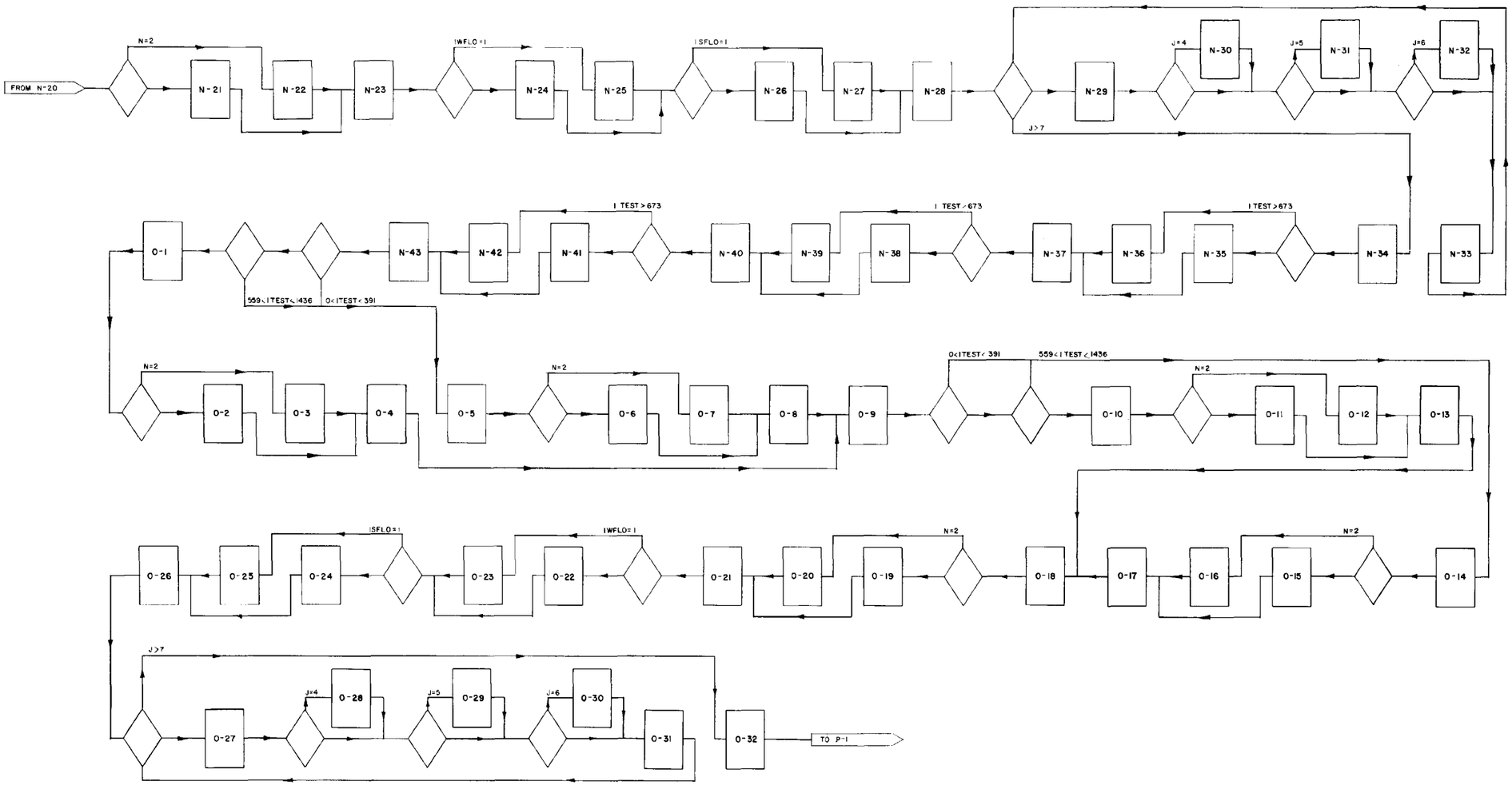


FIGURE 3.2-11. DETAILED FLOW CHART, BLOCKS N CONT., AND O

Scale NA
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Checked By [illegible] Date 12-11-78
Approved By [illegible] Date 12-12-78
Comp. Date
Drawing No.
Rev.

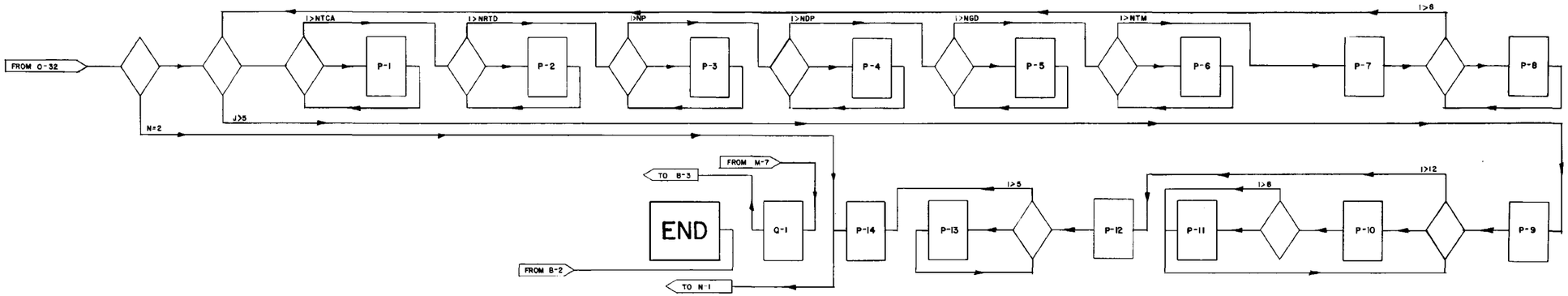

FIGURE 3.2-12. DETAILED FLOW CHART, BLOCKS P AND Q

Scale NA
Drawn By [signature] Date 12-12-78
Checked By [signature] Date 12-28-78
Approved By [signature] Date 11-13-78
Comp. Code
Drawing No. Rev.

2. Saturated Condition ($0<X<1$)

In this case the measured upstream pressure is replaced by the saturation pressure based on the local RTD temperature. Void fraction is calculated on the basis of quality.

3. Subcooled Condition ($X\leq 0$)

In this case, the measured upstream pressure is replaced by the saturation pressure based on the local RTD measurement. Void fraction is defined as being equal to zero.

3.2.3.3.2 Downstream test section. On passing through the test pump, energy and mass are added to the fluid by the incoming seal injection fluid and subtracted by the outgoing seal injection fluid. Energy is also added by the work done on the fluid by the test pump. Downstream quality is calculated from this total energy and the discharge RTD temperature. A problem arises in certain cases where the uncertainties associated with the energy balance cause a lack of definition in the boundary between subcooled and saturated conditions. This is particularly a problem where a change of condition occurs through the pump. A set of parameters has been chosen to differentiate between the subcooled and saturated states. Although these parameters are somewhat arbitrary, they are consistent and maintain a high level of agreement between the void fraction obtained from the energy balance and that measured by the gamma densitometer. Using these parameters, the local conditions are defined as:

1. Superheated Condition ($X\geq 1$)

In this case, the downstream quality obtained from the energy balance is greater or equal to unity. If the measured downstream pressure is greater than or equal to the saturation pressure, based on the local RTD temperature, then it is replaced by the saturation pressure minus 0.001 psi. The void fraction is defined as being equal to unity.

2. Saturated Condition ($0<X<1$)

This is a complicated definition. The condition occurs if 1) the downstream quality, evaluated from the energy balance, is less than unity, and 2) the saturation pressure, based on the local RTD temperature, is greater than the measured downstream pressure minus 20 psi, and 3) if either, a) the upstream quality, evaluated from the energy balance, is greater than zero, or b) the upstream quality is less than or equal to zero and the downstream saturation pressure is greater than or equal to the effective upstream pressure plus the measured pressure rise across the test pump. The measured downstream pressure is replaced by the saturation pressure based on the local RTD temperature. The void fraction is then calculated on the basis of quality.

3. Subcooled Condition ($X \leq 0$)

This is another complicated definition. The easiest way to explain it is that the condition occurs if the downstream quality evaluated from the energy balance, is less than or equal to unity and if the other requirements, given under the definition of Saturated Condition, above, do not exist. In this case, the measured downstream pressure is replaced by the greater of a) the saturation pressure based on the local RTD temperature, or b) the measured downstream pressure minus 20 psi. The void fraction is by definition equal to zero.

These assumptions are consistent throughout the program with the single exception that, for tests 1223 through 1351, the suction RTD was inoperative and the temperature measured by the upstream thermocouple was used in its place.

3.2.3.4 Data Scanner Output to Engineering Unit Conversion. The output of the data scanner is a voltage. This is converted to the true millivolt output of any transducer by subtracting the inherent zero of the data scanner and multiplying the result by one thousand.

$$\bar{V} = (V - \text{data scanner zero})\ 1000$$

The detailed conversion for each of the devices are given below. In these, K is the channel number of the device, C(1,K) through C(6,K) are calibration constants and C(7,K) is the uncertainty obtained from the calibration.

1. Thermocouples

The temperature in °C (θ_c) is the solution of:

$$\sum_{J=1}^{9} PAC(J)\ \theta_c^{(J-1)} + 125\ e^{-\frac{1}{2}\left[\frac{\theta_c - 127}{65}\right]^2} = 1000\ [\bar{V} + 2.6621]$$

Where PAC(J) is a standard data pack contained within the program. This equation comes from page 141 of NBS 125.

2. Resistance Temperature Devices

$$\theta_c = C(2,K) + C(3,K)\ \bar{V} - C(1,K) + C(4,K)\ \bar{V} - C(1,K)^2$$

3. Pressure Cells

$$P = C(1,K)\rho + C(2,K) + C(3,K)\ (\bar{V} - Z_P) + C(4,K)\ (\bar{V} - Z_P)^2 + P_{abs}$$

where P_{abs} is the atmospheric pressure, C(1,K)=L, ρ is the density of the fluid in the instrument line, and L is the vertical length on the instrument line effecting the pressure cell.

4. Differential Pressure Cells

$$\Delta P = C(1,K)\rho + [C(2,K) + C(4,K)P + (C(3,K) + C(5,K)P)\ (\bar{V} - Z_{DP})]\ C(6,K)$$

Where P is the operating pressure

5. Drag Discs

$$\rho v^2 = C(1,K) + C(2,K)\ [\bar{V} - Z_{DD} - C(3,K)\ (\theta_L - 525)]$$

Where θ_L is the local temperature in °F

6. Turbine Meters

$$v = C(1,K) + C(3,K)\ (\bar{V} - Z_T)$$

7. Gamma Densitometer

$$\rho = \frac{C(1,K) - \ln[\bar{V} - C(3,K)]}{C(2,K)}$$

8. Speedmeter

$$N = C(2,K)\ C(4,K)\ (\bar{V} - Z_{SM})$$

9. Torque Meter

$$\tau = - \frac{C(2,K)\left[\bar{V} - Z_{TM} - C(3,K)\right]}{12}$$

10. Magnetic Flow Meter

$$Q = C(1,32)\ (\bar{V} - Z_{MF})$$

3.2.3.5 Derived Parameters And Their Uncertainties.

1. Mass Flow (G1 - G24) on Flow Chart)

This is evaluated using the standard orifice equation.

$$W = 1890\ F_1 \cdot F_2 \cdot F_3 \cdot D^2\ (\Delta P \cdot \rho)^{1/2}$$

1a. Water Mass Flow

For water, $F_3 = 1$

Therefore,

$$W_w = 1890\ F_1 F_2\ D_w^2\ (\Delta P_w \cdot \rho_w)^{1/2}$$

and $$\xi_w = W_w \left[\left(\frac{\xi F_1}{F_1}\right)^2 + \left(\frac{\xi F_2}{F_2}\right)^2 + \left(\frac{2\xi D_w}{D_w}\right)^2 + \left(\frac{\xi \Delta P_w}{2\Delta P_w}\right)^2 + \left(\frac{\xi \rho_w}{2\rho_w}\right)^2 \right]^{1/2}$$

1b. Steam Mass Flow

For steam, $F_3 \neq 0$

Therefore,

$$W_s = 1890\ F_1 F_2 F_3\ D_s^2\ (\Delta P_s \rho_s)^{1/2}$$

and

$$\xi W_s = W_s \left[\left(\frac{\xi F_1}{F_1}\right)^2 + \left(\frac{\xi F_2}{F_2}\right)^2 + \left(\frac{\xi F_3}{F_3}\right)^2 + \left(\frac{2\xi D_s}{D_s}\right)^2 + \left(\frac{\xi W P_s}{2\Delta P_s}\right)^2 + \left(\frac{\xi p_s}{2\rho_s}\right)^2 \right]^{1/2}$$

1c. Water Injection Mass Flow (In)

$$W_I = 1890\ F_1 F_2\ D_I^2\ (\Delta P_I \cdot \rho_{W_I})^{1/2}$$

$$\varepsilon W_I = W_I \left[\left(\frac{\varepsilon F_1}{F_1}\right)^2 + \left(\frac{\varepsilon F_2}{F_2}\right)^2 + \left(\frac{2\varepsilon D_I}{D_I}\right)^2 + \left(\frac{\varepsilon \Delta P_I}{2\Delta P_I}\right)^2 + \left(\frac{\varepsilon \rho_{W_I}}{2\rho_I}\right)^2 \right]^{1/2}$$

1d. Water Injection Mass Flow (Out)

$$W_O = \frac{60\rho_{W_O}}{7.4805}$$

$$\varepsilon W_O = .05\ W_O$$

1e. Total Upstream Flow

G23 on Flow Chart

$$W_T = W_W + W_S$$

$$\varepsilon W_T = (\varepsilon W_W^2 + \varepsilon W_S^2)^{1/2}$$

1f. Net Injection Flow

G24 on Flow Chart

$$W_L = W_O - W_I$$

$$\varepsilon W_L = (\varepsilon W_O^2 + \varepsilon W_I^2)^{1/2}$$

2. Quality

2a. Upstream Quality Using Mixing Tee Data

G31 - G34 on Flow Chart

$$X_U = 1 - \frac{W_w(h_g-h_w) + W_s(h_g-h_s) + (\theta-\theta_\infty)\ (U_sL_s + U_wL_w)}{(W_w + W_s)\ (\Delta h)}$$

where $\Delta h = h_g - h_\ell$

$$\xi X_U = \frac{1}{(W_w + W_s)\Delta h}\left[W_w^2\ \xi h_w^2 + W_s^2\ \xi h_s^2 + (W_w + W_s)^2\ \xi h_g^2 + \right.$$

$$(U_sL_s + U_wL_w)^2\ (\xi\theta^2 + \xi\theta_\infty^2) +$$

$$(\theta-\theta_\infty)^2\ \ U_s^2L_s^2\ [(\frac{\xi U_s}{U_s})^2 + (\frac{\xi L_s}{L_s})^2] + U_w^2L_w^2\ [(\frac{\xi U_w}{U_w}^2 + (\frac{\xi L_w}{L_w})^2] +$$

$$[W_w(h_g-h_w) + W_s(h_g-h_s) + (\theta-\theta_\infty)\ (U_sL_s + U_wL_w)]^2\ (\frac{\xi\Delta h}{\Delta h})^2 +$$

$$[(h_w-h_g) + \frac{W_w(h_g-h_w)+W_s(h_g-h_s)+(\theta-\theta_\infty)(U_sL_s+U_wL_w)}{W_w + W_s}]^2 \quad (\xi W_w^2) \quad +$$

$$\left.[(h_s-h_g) + \frac{W_w(h_g-h_w)+W_s(h_g-h_s)+(\theta-\theta_\infty)(U_sL_s+U_wL_w)}{W_w + W_s}]^2\ (\xi W_s)^2\right]^{1/2}$$

2b. Downstream Quality Using Mixing Tee Data

G48 - G80 on Flow Chart

$$X_D = \frac{h_{mD} - h_{\ell D}}{h_{gD} - h_{\ell D}}$$

$$\xi X_D = \frac{1}{h_{gD} - h_{\ell D}}\ [(\xi h_{mD}^2 + (1-X_D)^2\ \xi h_{\ell D}^2 + X_D^2\ \xi h_{gD}^2)]^{1/2}$$

3. Void Fraction

3a. Void Fraction Using Mixing Tee Data

G35 - G37 and G41 - G43 on Flow Chart

$$\alpha = \frac{1}{1 + \frac{\rho_g}{\rho_\ell}\left(\frac{1}{X} - 1\right)}$$

$$\xi\alpha = \frac{\rho_g \rho_\ell \, X(1-X)}{[\rho_\ell X + \rho_g(1-X)]^2} \left[\left(\frac{\xi\rho_\ell}{\rho_\ell}\right)^2 + \left(\frac{\xi\rho_g}{\rho_g}\right)^2 + \left(\frac{\xi X}{X(1-X)}\right)^2\right]^{1/2}$$

3b. Void Fraction Using Gamma Desitometer Data

G48 - G61 on Flow Chart

$$\alpha = \frac{\rho_\ell - \rho_\gamma}{\Delta\rho}$$

where $\Delta\rho = \rho_\ell - \rho_g$

$$\xi\alpha = \frac{1}{\Delta\rho}\left(\xi\rho_\ell^2 + \xi\rho_\gamma^2 + \alpha^2 \, \xi\Delta\rho^2\right)^{1/2}$$

3c. Average Void Fraction

G44 - G46 and G62 - G64 on Flow Chart

$$\alpha = \frac{\rho_{\ell_{ave}} - \rho_{ave}}{\Delta\rho_{ave}}$$

where $\Delta\rho_{ave} = \rho_{\ell_{ave}} - \rho_{g_{ave}}$

and

$$\xi\alpha = \frac{1}{\Delta\rho_{ave}}\left(\xi\rho_{\ell_{ave}}^2 + \xi\rho_{ave}^2 + \alpha^2 \, \xi\Delta\rho_{ave}^2\right)^{1/2}$$

4. Volumetric Flow

G69 - G74 on Flow Chart

4a. Upstream Volumetric Flow

$$Q_U = \frac{W_T}{\rho_U}$$

$$\xi Q_U = Q_U \left[\left(\frac{\xi W_T}{W_T}\right)^2 + \left(\frac{\xi \rho_U}{\rho_U}\right)^2\right]^{1/2}$$

4b. Downstream Volumetric Flow

$$Q_D = \frac{W_T - W_L}{\rho_D}$$

$$\xi Q_D = Q_D \left[\frac{\xi W_T^2 + \xi W_L^2}{(W_T - W_L)^2} + \left(\frac{\xi \rho_D}{\rho_D}\right)^2\right]^{1/2}$$

4c. Average Volumetric Flow

$$Q_{ave} = \frac{W_T - .5\ W_L}{\rho_{ave}}$$

$$\xi Q_{ave} = Q_{ave} \left[\frac{\xi W_T^2 + (.5\ \xi W_L)^2}{(W_T - .5\ W_L)^2} + \left(\frac{\xi \rho_{ave}}{\rho_{ave}}\right)^2\right]^{1/2}$$

5. Pump Head

G66 - G68 on Flow Chart

$$H = \frac{\Delta P}{\rho}$$

$$\xi_H = H\left[\left(\frac{\xi\ \Delta P}{\Delta P}\right)^2 + \left(\frac{\xi \rho}{\rho}\right)^2\right]^{1/2}$$

6. Friction Torque

F47 - F48 on Flow Chart

$$\tau_F = [-.018\ (P-P_{abs}) + .0000305\ (P-P_{abs})^2 + .080197\bar{N}$$

$$-3.5856 \times 10^{-6}\ \bar{N}^2]/12$$

$$\xi\tau_F = 1.96\ \text{ft/lbs}$$

7. Hydraulic Torque
F50 on Flow Chart

$$\tau_H = \tau_S - \tau_F$$

$$\xi\tau_H = (\xi\tau_S^2 + \xi\tau_F^2)^{1/2}$$

3.3.3.6 Averages, Drifts And Standard Deviation.

1) Arithmetic Mean and Standard Deviation about that Mean.

(L4-L13 on Flow Chart)

$$\text{Average } \bar{Y} = \frac{\sum_{J=1}^{n} Y}{n}$$

$$\text{Standard Deviation} = s = \left[\frac{\sum_{J=1}^{n} Y^2 - n\bar{Y}^2}{(n-1)}\right]^{1/2}$$

(n-1) rather than (n) is in the denominator because of the small sample size.

2) Drift, Average and Standard Deviation (H4-H8 on Flow Chart)

For this case, the data is assumed to vary linearly with time. A straight line is therefore fitted to the data. The slope of this straight line is the drift. The value the straight line has at the midpoint in time is the average and the standard deviation is computed about this line.

$$\text{Drift (d)} = \frac{n \sum_{J=1}^{n} [Y(J) \cdot (J-1)\Delta t] - \sum_{J=1}^{n} Y(J) \cdot \sum_{J=1}^{n} [(J-1)\Delta t]}{n \sum_{J=1}^{n} [(J-1)\Delta t]^2 - \left[\sum_{J=1}^{n} (J-1)Wt\right]^2}$$

$$\text{Average (a)} = \frac{\sum_{J=1}^{n} Y(J) - [d \cdot \sum_{J=1}^{n} (J-1)\Delta t]}{n} + \frac{n-1}{2} \Delta t \cdot d$$

$$\text{Standard Deviation } s = \left[\frac{\sum_{J=1}^{n} \left[\frac{\sum_{J=1}^{n} Y(J) - [d \cdot \sum_{J=1}^{n}(J-1)\Delta t]}{n} + (J-1) \cdot d \cdot \Delta t - Y(J) \right]^2}{n-1} \right]^{1/2}$$

3.2.3.7 Subroutines. Five subroutines are attached to the steady-state data reduction code. They are (1) REVER - reverse flow subroutine, (2) FLOW - orifice flow measurement subroutine, (3) VISC - viscosity of steam and water subroutine, (4) SRSORT - steam table management subroutine and (5) SATUR - saturated conditions steam table management subroutine. Each of these is discussed separately below with flow charts where applicable. Complete listings of the subroutines are found with the listing of the Steady-State Data Reduction Code in APPENDIX 3.2A.

1. SUBROUTINE REVER

   This subroutine simply exchanges two values. It is used when the direction of flow is reversed. Because of its simplicity, no flow chart is given.

2. SUBROUTINE "FLOW"

   This subroutine calculates the volumetric flow measured by an orifice. It requires inputs from the main program of pressure drop, pressure, temperature, line diameter, orifice diameter, specific volume of the fluid and an index defining whether it is a steam or a water orifice. It also requires the subroutine "VISC". Returned to the main program are the mass flow and the orifice coefficients used in calculating that flow. The calculation procedures used are derived from Power Test Code 19.5; 4-1959, Part 5, Chapter 4, published by the American Society of Mechanical Engineers.

   A flow chart for the subroutine is given in Figure 3.2-13.

3. SUBROUTINE "VISC"

   This subroutine simply accesses the correct portion of the steam tables for the determination of fluid viscosity. It is used as a subroutine of subroutine "FLOW" and requires the inputs of pressure, temperature and an

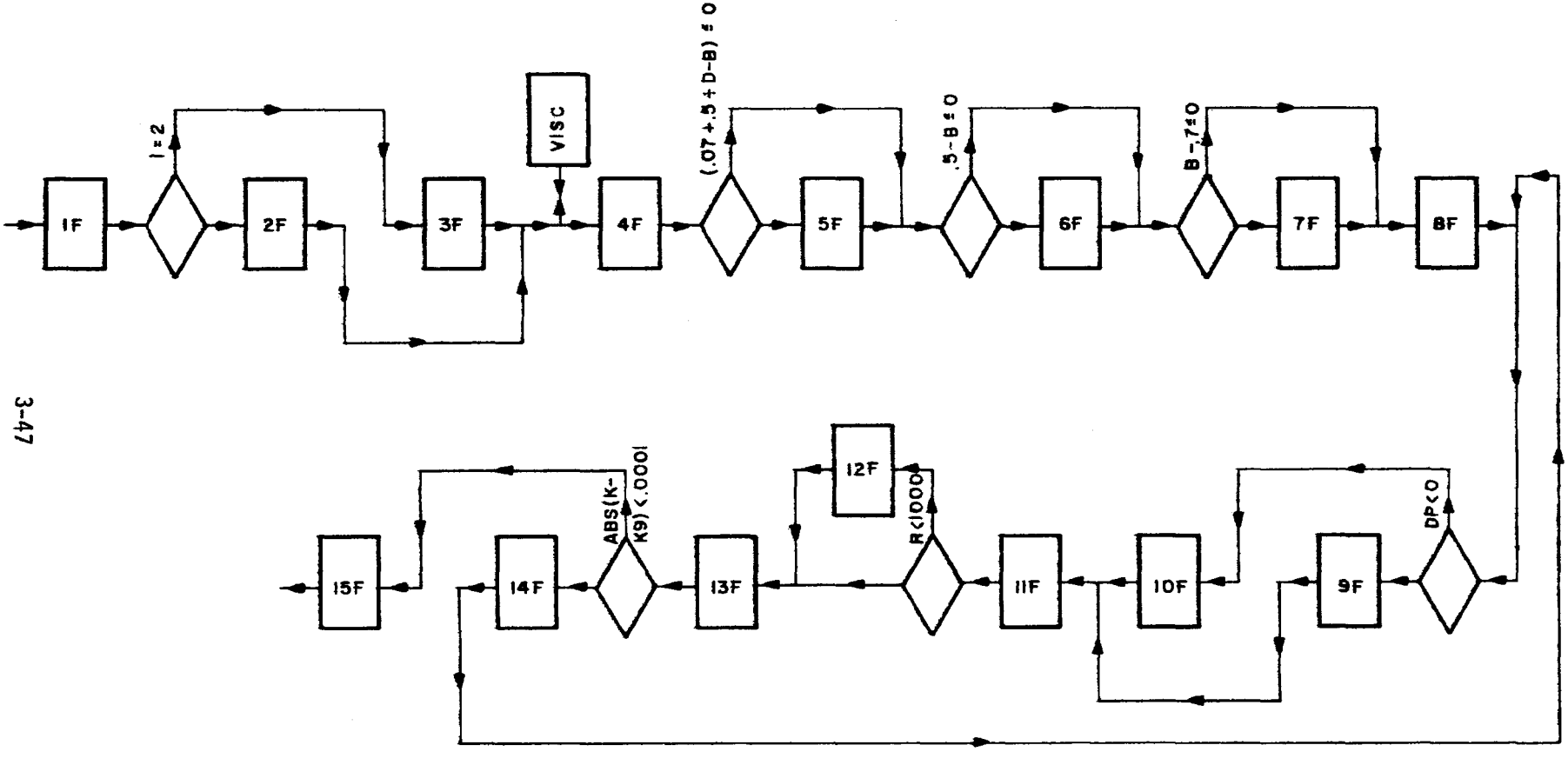

FIGURE 3.2-13. FLOW CHART FOR SUBROUTINE "FLOW"

index defining whether steam or water is the fluid being considered. It returns to "FLOW" the required viscosity. Because of its simplicity no flow chart is given.

4. SUBROUTINE "SRSORT"

   This subroutine is used in the management of the 1967 ASME Steam Tables. It directs the program to the required region of these tables or if saturation values are required it directs the program to the subroutine "SATUR". It requires the inputs of pressure, temperature and returns the values of specific volume and enthalpy. If conditions are saturated, then it accesses the subroutine "SATUR" and returns to the main program the specific volumes and enthalpies of both saturated liquid and vapor. A flow chart is given in Figure 3.2-14.

5. SUBROUTINE "SATUR"

   This manages the 1967 ASME Steam Tables when conditions are on the saturation line. It requires the inputs of pressure and/or temperature and an index defining whether pressure, temperature or both are given. Returned are the specific volumes and enthalpies for saturated liquid and vapors.

   A flow chart is given in Figure 3.2-15.

3.2.4 Steady-State Output Description

The output from the data reduction program consists of computer printout pages numbered zero (0) through eight (8). Page zero (0) is in fact two pages. It lists all test measurements in millivolts and engineering units. Details are given in Section 3.2.4.1.

Pages one (1) through four (4) are the test results in English units. These results are repeated in metric units on pages five (5) through (8).

Page one (1) gives the pump performance parameters based on both suction and discharge test section conditions. Details are given in Section 3.2.4.2.

The next page, page two (2) gives the pump performance parameters based on an arithmetic mean of the suction and discharge test section conditions. It also gives normalized pump performance parameters based on suction, discharge and mean conditions. Details are given in Section 3.2.4.3.

Pages three (3) and four (4) list various readings throughout the loop for each of the five (5) scans. Details of these are given in Section 3.2.4.4 and 3.2.4.5 respectively.

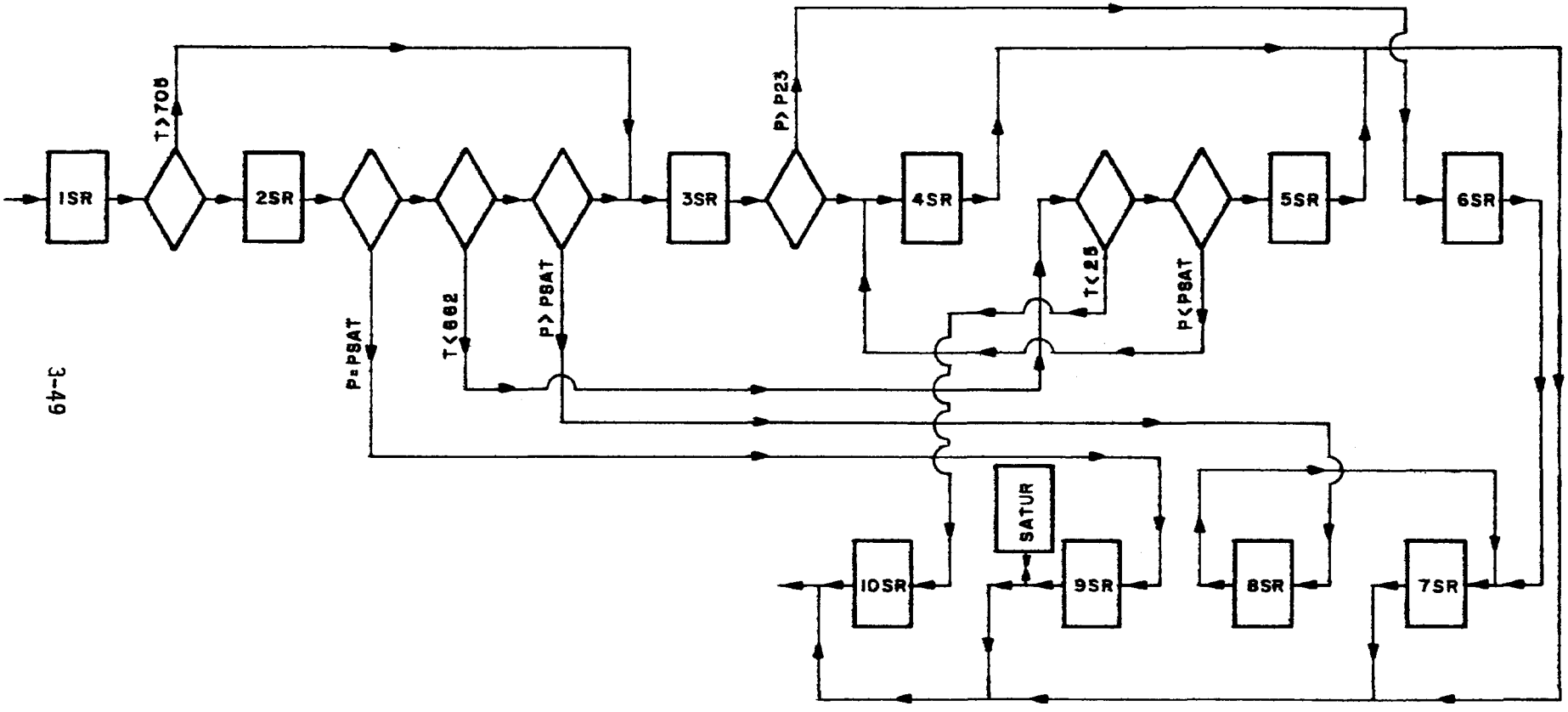

FIGURE 3.2-14. FLOW CHART FOR SUBROUTINE "SRSORT"

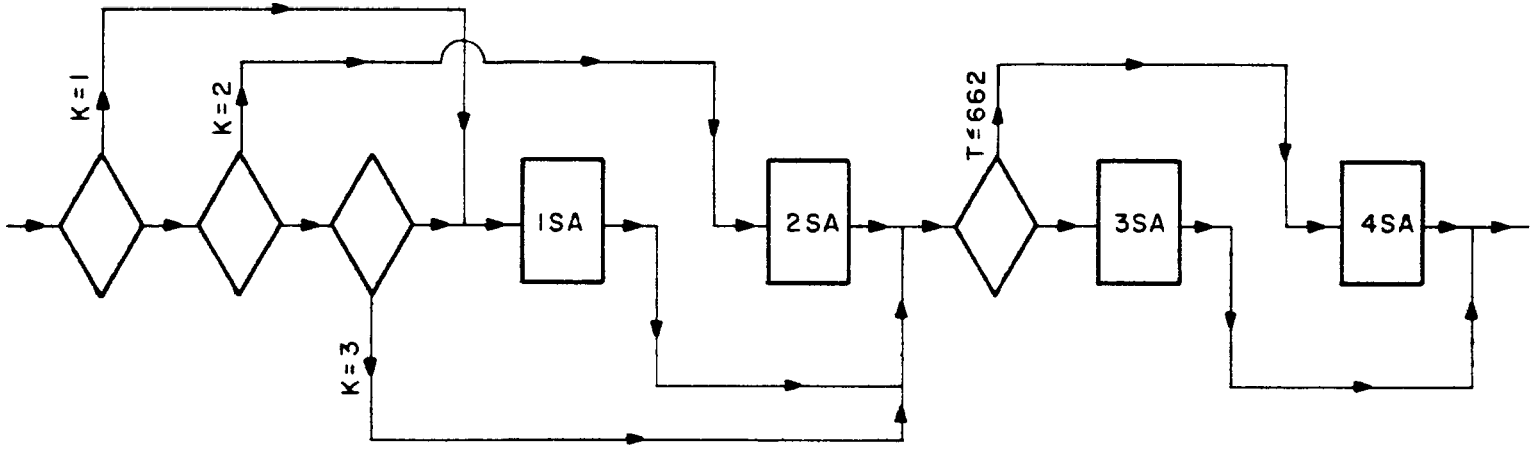

FIGURE 3.2-15. FLOW CHART FOR SUBROUTINE "SATUR"

As mentioned above, the last four (4) pages of the printout duplicate pages one (1) through four (4) except that the units are changed from English to metric. No separate description of these pages is given.

3.2.4.1 PAGE 0.

Line 1: Heading

Line 2: Headings - Scanner Number, Device Type, Output in Volts, Engineering Value, Standard Deviation of the Engineering Value About Its Mean.

The next block of data gives the mean values for thermocouples, pressure cells, differential pressure cells, resistance temperature devices, the torque meter, drag discs, turbine meters, the speed meter, gamma densitometers and the magnetic flow meter. Actual number of devices and therefore the number of lines varies from test to test.

Next Line 1A: Headings - Gamma densitometer density and mixing tee density.

Line 2A: Densities for suction leg - lower beam.

Line 3A: Densities for suction leg - center beam.

Line 4A: Densities for suction leg - upper beam.

Line 5A: Densities for discharge leg - lower beam.

Line 6A: Densities for discharge leg - center beam

Line 7A: Densities for discharge leg - upper beam

Line 8A: Densities for AECL gamma densitometer position - outer beam

Line 9A: Densities for AECL gamma densitometer position - center beam

Line 10A: Densities for AECL gamma densitometer position - inner beam

Line 11A: Headings - Thermocouple, Resistance Temperature Device, Saturation Pressure and Effective Pressure.

Line 12A: Readings at the Suction Leg

Line 13A: Readings at the Discharge Leg

Line 14A: Readings at the Water Orifice

Line 15A: Readings at the Steam Orifice

Line 16A: Readings at the High Pressure Drum

Line 17A: Hydraulic Torque, Normalized Based on orifice based Suction Leg Density.

Line 18A: Pump Pressure Rise - Leg-to-Leg

Line 19A: Pressure Difference - (Discharge - Suction)

Line 20A: Pump Pressure Rise - Inlet Leg to Discharge Flange

Line 21A: Injection Outlet Temperature

Line 22A: Net Test Pump Injection Flow Out of the Loop

Line 23A: Headings Reading, based on Mixing Tee Mass Flow, Heat Balance, Pump Work and Injection Flows for the Suction and Discharge Legs

Line 24A: Velocity Values

Line 25A: Momentum Flux Values

Line 26A: Headings Saturation Temperature, Saturation Pressure and Densities Based on Loop Measurements

Line 27A: Heading Continued

Line 28A: Headings Continued

Line 29A: Values Based on Suction Leg Thermocouple

Line 30A: Values Based on Suction Leg RTD

Line 31A: Values Based on Suction Leg Pressure Cell

Line 32A: Values Based on Discharge Leg Thermocouple

Line 33A: Values Based on Discharge Leg RTD

Line 34A: Values Based on Discharge Leg Pressure Cell

3.2.4.2 PAGE 1.

Line 1: Title

Line 2: Test Number, Date, Time and Page Numbers

Line 3: Sub-Heading - Suction is defined as being the normal suction side when the pump is in the forward pumping mode.

Lines 4-7: Headings

A) Set Point: The requested conditions from the test request.

B) Actual Point Average: The arithmetic mean value obtained from five scans of data at 30 second intervals.

C) Specified Difference: The allowed difference between the set point and the actual point average - specified in the test request.

D) Actual Difference: The absolute value of the difference between the set point and the actual point average.

E) Specified Drift: The maximum allowed value of the slope of a straight line least squares fit through the values obtained from the five scans of data in %/minute.

F) Actual Drift: The actual slope of a straight line least squares fit through the values obtained from the 5 scans of data.

G) Instrument Uncertainty: This is the uncertainty in the value, using the equations in Section 3.2.3, together with the actual instrument uncertainties obtained from calibration.

H) Data Standard Deviation: The standard deviation of the straight line least squares fit through the values obtained from the 5 scans of data.

Line 8: The pressure, in psia, obtained from the instrument at position L-5 on the P&ID. (i.e., suction instrument section)

Line 9: The volumetric flow obtained from the orifices and a heat balance down to the suction instrument section, together with the effects of test pump injection water and pump work, if relevant.

Line 10: Heading

Line 11: The void fraction using densities obtained from the orifices and a heat balance down to the suction instrument section.

Line 12: The void fraction using the density obtained from the center beam of the suction side gamma densitometer and the suction temperature and pressure conditions.

Line 13: The pump speed, in RPM, obtained from the speed meter (L-12 in the P&ID - Figure 3.2-2).

Line 14: Heading

Line 15: The pump head, in feet of fluid, obtained from the differential pressure measured from instrument section to instrument section, together with the density measured by the center beam of the suction gamma densitometer (L-16 for forward flow and L-19 for reverse flow). This is positive if the discharge pressure is higher than the suction pressure.

Line 16: Same as Line 15 above, except that the density used is that obtained from the orifices and the heat balance.

Line 17: The differential pressure, in psi, measured from instrument section to instrument section (positive if the discharge pressure is higher than the suction pressure). (L-7 or L-8 on the P&ID - Figure 3.2-2).

Line 18: Heading

Line 19: The calculated pump hydraulic torque in ft-lb.

Line 20: The calculated pump friction torque in ft-lb.

Line 21: The measured pump shaft torque in ft-lb, obtained using the torque meter (L-11 in the P&ID - Figure 3.2-2).

Line 22: Sub-Heading - Discharge is defined as being the normal discharge side when the pump is in the forward pumping mode.

Line 23: The discharge pressure, in psia, obtained from the instrument at position L-6 in the P&ID - Figure 3.2-2 (i.e., discharge instrument section).

Line 24: The volumetric flow, in GPM, obtained from the orifices and a heat balance together with the effects of test pump injection water, if relevant.

Line 25: Heading

Line 26: The void fraction obtained using the mass flows from the orifices, the volumetric flow in Line 24 above, and the discharge thermal conditions.

Line 27: The void fraction using the density obtained from the center beam of the discharge side gamma densitometer and the discharge thermal conditions.

Line 28: As Line 13 above.

Line 29: Heading

Line 30: The pump head, in feet of fluid, obtained from the differential pressure measured from instrument section to instrument section, together with the density measured by the center beam of the discharge gamma densitometer. (L-19 is forward flow and L-16 in reverse flow.)

Line 31: Same as Line 30 above, except that the density is that obtained from the orifices and the heat balance.

Line 32: As Line 17 above.

Line 33: Heading

Line 34: The calculated pump hydraulic torque in ft/lb.

Line 35: The calculated pump friction torque in ft/lb.

Line 36: As Line 21 above.

Line 37: Conversion Constant File Identification.

Line 38: Time and Date of Data Reduction.

Line 39: Status of Water and Steam Orifices.

3.2.4.3 PAGE 2.

Line 1: Title

Line 2: Test Number, Date, Time and Page Number of Output

Line 3: Subheading

Lines 4-7: Headings - As in A-H on Page 1.

Line 8: The arithmetic mean of Lines 8 and 23 on Page 1.

Line 9: The arithmetic mean of Lines 9 and 24 on Page 1.

Line 10: Subheading

Line 11: The arithmetic mean of Lines 11 and 26 on Page 1.

Line 12: The arithmetic mean of Lines 12 and 27 on Page 1.

Line 13: As Line 13 on Page 1.

Line 14: Subheading

Line 15: The arithmetic mean of Lines 15 and 30 on Page 1.

Line 16: The arithmetic mean of Lines 16 and 31 on Page 1.

Line 17: As Line 17 on Page 1.

Line 18: Subheading

Line 19: The pump hydraulic torque in ft-lb.

Line 20: The pump friction torque in ft-lb.

Line 21: As Line 21 on Page 1.

Line 22: Subheading

Line 23: Subheading

A) Suction - values based on suction conditions.

B) Discharge - Values based on discharge conditions.

C) Average-values based on average conditions.

Line 24: Subheading

Line 25: Normalized pump head using gamma densitometer center beam density.

Line 26: Normalized pump head using density from orifice flows and local thermal conditions.

Line 27: Subheading

Line 28: Normalized volumetric flow measured by orifices.

Line 29: Normalized requested volumetric flow.

Line 30: Subheading

Line 31: Percent void fraction based on orifice flows and local thermal conditions.

Line 32: Percent void fraction based on gamma densitometer center beam density and local thermal conditions.

Line 33: Requested percent void fraction.

Line 34: Subheading

Line 35: Normalized pump speed.

Line 36: Normalized requested pump speed.

Line 37: Subheading

Line 38: Normalized hydraulic torque, density corrected using the gamma densitometer center beam density.

Line 39: Normalized hydraulic torque, density corrected using a density obtained from the orifice flows and the local thermal conditions.

Line 40: Subheading

Line 41: Superficial velocities of water in both the suction and discharge legs.

Line 42: Superficial velocities of steam in both the suction and discharge legs.

3.2.4.4 PAGE 3.

Line 1: Heading

Line 2: Sub-Heading

Line 3: Headings for each scan and mean percent uncertainty.

Line 4: Sub-Heading

Line 5: High pressure drum pressure (L-65)

Line 6: Steam orifice pressure (L-41 or L-47)

Line 7: Water orifice pressure (L-42 or L-48)

Line 8: Suction leg pressure (L-5)

Line 9: Saturation pressure on suction leg

Line 10: Discharge leg pressure (L-6)

Line 11: Saturation pressure on discharge leg

Line 12: Sub-Heading

Line 13: Suction leg temperature (RTD) (L-55)

Line 14: Suction leg temperature (thermocouple) (L-13)

Line 15: Saturation temperature of suction leg

Line 16: Discharge leg temperature (RTD) (L-56)

Line 17: Discharge leg temperature (thermocouple) (L-14)

Line 18: Saturation temperature

Line 19: Water orifice temperature (RTD) (L-53 or L-58)

Line 20: Water orifice temperature (thermocouple) (L-50 or L-52)

Line 21: Steam orifice temperature (RTD) (L-54 or L-59)

Line 22: Steam orifice temperature (thermocouple) (L-49 or L51)

Line 23: Pump injection inlet temperature (L-21)

Line 24: Pump injection outlet temperature (L-22)

Line 25: High pressure drum inside wall temperature (L-23)

Line 26: High pressure drum outside wall temperature (L-24)

Line 27: Ambient temperature (L-67)

Line 28: Suction leg drag disc temperature (L-30)

Line 29: Discharge leg drag disc temperature (L-31)

Line 30: Sub-Heading

Line 31: Flow control valve pressure drop (L-60)

Line 32: Suction leg to flange pressure drop (L-61)

Line 33: PAC16 pressure drop (L-62)

Line 34: Pressure drop across inlet elbow (L-33)

Line 35: Pressure differential from volute to back of impeller (L-68)

Line 36: High pressure drum level DP (L-25)

Line 37: Pressure rise pump flange to flange (L-66)

Line 38: Sub-Heading

Line 39: Water flow

Line 40: Steam flow

Line 41: Seal injection flow in

Line 42: Seal injection flow out (L-32)

Line 43: Pump speed (L-12)

Line 44: Shaft torque (L-11)

Line 45: Pump DP - leg to leg (L-7 or L-8)

Line 46: Momentum flux in discharge leg using low drag disc (L-27)

3.3 STEADY-STATE REVIEW CODE AND SUMMARY TABLE CODE

The purpose of this subsection is to document (1) the Pump Steady-State Review (PSSR) code which was developed to access the reduced steady-state data files and further process the data for review of data consistency and examination of performance results, and (2) the Summary Table Code which was developed to summarize key output of the PSSR code. Two versions of the PSSR code were developed: one for processing forward flow steady-state test data, and the other for reverse flow tests. The detailed description is provided in the following pages for the PSSR forward flow version. Explanations are added within, wherever applicable, to clarify for the reverse flow version. The Summary Table Code is described later in the section on Output.

The PSSR code is structured to calculate:

a. homologous ratios for the pump-developed static and total heads,

b. homologous ratio for the pump hydraulic torque,

c. homologous ratios of pump flow and speed,

d. pressure drops based on handbook K-factors, and actual K-factors based on measured pressure drops for flow of fluid in the pump suction and discharge legs, and

e. mechanical, hydraulic and total efficiencies of the pump.

The input to the code is taken from computer data files and is fully automated except to retain the flexibility by the user to analyze any desired test.

The output is in the form of a detailed review of significant test parameters and calculated values for each test. The supplemental Summary Table Code is used to extract certain results obtained by the PSSR code and to generate a comprehensive summary table which lists the key test parameters and calculated homologous ratios for all the tests.

3.3.1 Algebraic Relations Used in the Code

3.3.1.1 Dimensionless Quantities. The pump test parameters, expressed in dimensionless quantities, are given by:

$$\nu = \frac{Q}{Q_R} = \frac{\text{Pump Volumetric Flow Rate}}{\text{Rated Pump Volumetric Flow Rate}}$$

Flow is defined as positive in the normal flow direction.

$$\alpha_N = \frac{N}{N_R} = \frac{\text{Pump Speed}}{\text{Rated Pump Speed}}$$

Speed is positive in the normal direction of pump rotation.

$$h = \frac{H}{H_R} = \frac{\text{Pump Head}}{\text{Rated Pump Head}}$$

Head is positive when pressure at the normal discharge side of the pump is greater than at the normal suction side.

Several definitions for pump head are used, and corresponding calculations are performed by the PSSR Code. They are:

1. Pump head, static leg to leg, based on upstream leg specific volume
2. Pump head, static leg to leg, based on local specific volumes
3. Pump head, total leg to leg, based on local specific volumes
4. Pump head, static flange to flange, based on local specific volumes
5. Pump head, total flange to flange, based on local specific volumes

The value for pump head based on definition 1 is the one listed in the Summary Table and used in developing the initial pump performance maps.

The density-adjusted torque values in the initial data presentation are derived from:

$$\beta_h = \frac{T_h}{T_R}\frac{\rho_r}{1/v_{ave}} = \frac{\text{Pump Hydraulic Torque}}{\text{Rated Pump Torque}} \times \text{Rated Density} \times \text{Average Specified Volume}$$

$$\beta_{sh} = \frac{T_{sh}}{T_R}\frac{\rho_r}{1/v_{ave}} = \beta_h \frac{T_{sh}}{T_h} = \beta_h \frac{\text{Pump Shaft Torque}}{\text{Pump Hydraulic Torque}}$$

in which

1. T_{sh} is the shaft torque driving the pump, measured by the torque meter in the drive shaft between the gear box and the pump, and is positive in the normal direction of pump rotation,

2. T_h is the hydraulic torque, defined as the torque exerted by the impeller on fluid in the impeller passages, and equal to $T_{sh} - T_{f\&w}$ which is positive in the direction of normal rotation.

3. $T_{f\&w}$ is the torque required to overcome rotational friction and windage in the pump and is in the same direction as the pump rotation, and therefore has the same sign as the pump speed.

4. v_{ave} is the average specific volume given by:

   $v_{ave} = (1/2)\ (v_{upstream} + v_{downstream})$

The above dimensionless quantities ν, h, β_h and β_{sh} are evaluated for specific volumes derived (1) from gamma-densitometer measurements and (2) from orifice measurements combined with measurements in the suction and discharge pipe legs through an energy balance. Orifice-based upstream fluid properties are derived by way of an energy balance from water and steam orifice mass flow measurements, a calculated heat loss from the piping between the orifices and the upstream leg, the measured upstream leg pressure and/or temperature, and the supposition of homogeneous non-slip flow. Orifice-based downstream properties are derived from orifice measurements, heat loss along the way to the upstream leg, pump work, and downstream leg pressure and/or temperature.

The pump rated operating conditions, for maximum efficiency, obtained from the manufacturer's cold water tests (Reference 1) are as follows:

Rated Head, H_R = 252 ft of water

Rated Flow Rate, Q_R = 3500 gpm

Rated Torque, T_R = 308 ft-lbf

Rated Speed, N_R = 4500 rpm

Water Density, ρ_R = 62.3 lbm/ft^3

3.3.1.2 Homologous Ratios. The homologous ratios, defined on the basis of fluid dynamic similarity principles (Reference 2), are calculated by the PSSR code. They are:

$\frac{h}{\alpha_N^2}$ or $\frac{h}{\nu^2}$: homologous head ratio

$\frac{\beta_h}{\alpha_N^2}$ or $\frac{\beta_h}{\nu^2}$: homologous hydraulic torque ratio

$\frac{\nu}{\alpha_N}$ or $\frac{\alpha_N}{\nu}$: homologous ratio of flow and speed

Homologous head ratios are calculated in the code using all the head values defined. These calculations are detailed below.

For values of homologous flow-to-speed ratio greater than 1.0 ($\nu/\alpha_N > 1$) it is common to use the alternate homologous ratios with ν in the denominator and so all the ratios h/α_N^2, h/ν^2, β_h/α_N^2 and β_h/ν^2 are calculated. When the flow-to-speed ratio is less than or equal to 1($\nu/\alpha_N \leq 1$), the only similarity ratios calculated are h/α_N^2 and β_h/α_N^2.

3.3.1.3 Static and Total Head Calculations. The pressure drops and pressure rises were measured as shown in the schematic of the test loop (Figure 3.3-1). The pump heads defined above are calculated as follows:

Pump Head, Static Leg to Leg, Based on Upstream Leg Specific Volume

Here, "leg to leg" ΔP means ΔP in Psi between the pump suction instrumentation spool (SIS) and pump discharge instrumentation spool (DIS), which are designated in the code as Stations 1 and 2, respectively.

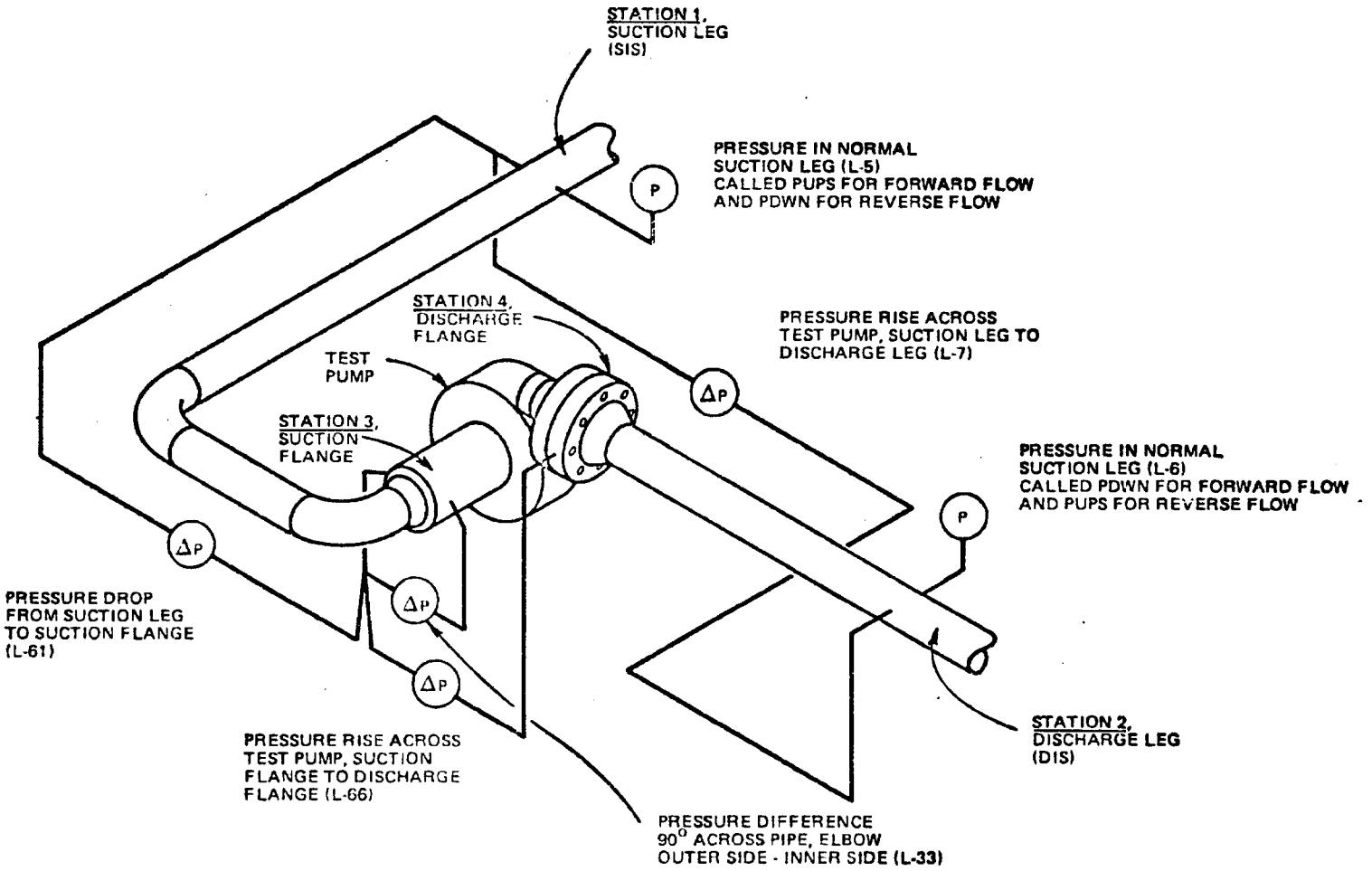

Figure 3.3-1. Test Loop Schematic

$$\left[H_S^{LL}\right]_{UPSv} = \Delta P_{12} \times v_1 \times 144 \times \frac{|g_s|}{g}, \text{ ft}$$

v_1: Representative specific volume at Station 1, ft^3/lbm

$|g_s|/g$ = lbm/lbf ≅ 1.

This calculated pump head is used in the head parameters listed in the Summary Table and in the preparation of the initial pump performance maps.

Pump Head, Static Leg to Leg, Based on Local Specific Volumes

$$\left[H_S^{LL}\right]_{local\ v} = \left[(P_1 + \Delta P_{12})\, v_2 - P_1 \times v_1\right] \times 144 \times \frac{|g_s|}{g}, \text{ ft}$$

where

v_2: Representative specific volume at Station 2, ft^3/lbm.

Pump Head, Total Leg to Leg, Based on Local Specific Volumes

Total hydraulic head at any station =

$$\frac{P_{static}}{\rho} \times 144 \times \frac{|g_s|}{g} + \text{velocity head} + \text{elevation head}.$$

Applying this between Stations 1 and 2,

$$\left[H_T^{LL}\right]_{local\ v} = \left[(P_1 + \Delta P_{12}) \times v_2 - P_1 \times v_1\right] \times 144 \times \frac{|g_s|}{g} + \frac{V_2^2 - V_1^2}{2g} + (Z_2 - Z_1), \text{ ft}$$

where

V_1 = Representative velocity of fluid at Station 1, ft/sec

V_2 = Representative velocity of fluid at Station 2, ft/sec

$(Z_2 - Z_1)$ = Difference in elevation between the normal discharge and suction lines of the test pump, 1.0 ft (actual).

Note that, in the above equation for H_T^{LL}, the absolute static pressure at Station 2 is referenced with respect to the value at Station 1 via ΔP_{12} even though the measured absolute at Station 2 is available. This is because, in general, the direct measurement of ΔP is more accurate than taking the relatively small difference between the two large measured absolute pressures. Note also that the total hydraulic head function does not account for thermodynamic energy such as that associated with changes in temperature and change of state.

Pump Head, Static Flange to Flange, Based on Local Specific Volumes

$$\left[H_S^{FF}\right]_{\text{local v}} = \left[(P_1 - \Delta P_{13} + \Delta P_{34}) \times v_4 - (P_1 - \Delta P_{13}) \times v_3\right] \times 144 \times \frac{|g_s|}{g}, \text{ ft}$$

where

v_4 = Representative specific volume at Station 4, (as first approximation assumed equal to v_2), ft^3/lbm

v_3 = Representative specific volume at Station 3, (assumed equal to v_1), ft^3/lbm

ΔP_{34} = Flange-to-flange pressure rise across the pump, psi

ΔP_{13} = Pressure drop between Stations 1 and 3, psi

For reverse flow, the equivalent equation is

$$\left[H_S^{FF}\right]_{\text{local v}} = \left[(P_1 + \Delta P_{31} + \Delta P_{34}) \times v_4 - (P_1 + \Delta P_{31}) \times v_3\right] \times 144 \times \frac{|g_s|}{g}, \text{ ft}$$

Pump Head, Total Flange to Flange, Based on Local Specific Volumes

$$\left[H_T^{FF}\right]_{\text{local v}} = \left[H_S^{FF}\right]_{\text{local v}} + \frac{V_4^2 - V_3^2}{2g} + (Z_4 - Z_3), \text{ ft}$$

where V_4 and V_3 are the representative velocities at Stations 4 and 3, approximated as equal to those at Stations 2 and 1 respectively (ft/sec).

3.3.1.4 K-Factor Calculations. The code calculates K-factor data from the static pressure drop measurements for single and two-phase fluid flows in the pump suction and discharge test section legs.

The relationship between K-factor and pressure drop is given by

$$\Delta P = K \times \frac{\rho V^2}{2|g_s| \times 144}$$

From this equation, K-factors are evaluated for the values of ΔP_{13} and ΔP_{42} derived from measurements:

$$K \text{ (for suction leg 1-3)} = \frac{\Delta P_{13} \times v_1 \ (2|g_s| \times 144)}{V_2^2}$$

$$K \text{ (for discharge leg 4-2)} = \frac{\Delta P_{42} \times v_2 \ (2|g_s| \times 144)}{V_2^2}$$

where,

$\Delta P_{42} = [(-\Delta P_{12}) - \Delta P_{13} - (-\Delta P_{34})]$ is the pressure drop due to mixing and friction between 4 and 2, psi.

For reverse flow steady state tests, the pressure drop ΔP_{24} is given by:

$$\Delta P_{24} = (\Delta P_{12} - \Delta P_{34} - \Delta P_{31}), \text{ psi}$$

Also, for comparison, ΔP's are calculated using handbook single-phase K values of 0.69 for the suction leg (1 to 3) and 0.15 for the discharge leg (4 to 2).

3.3.1.5 Efficiency Calculations. Pumping efficiency is defined in several forms. They are hydraulic efficiency, mechanical efficiency and total efficiency.

Hydraulic efficiency is given by:

$$\eta_h = \frac{WH}{T_h \omega}$$

where

W : weight flow rate, lbf/sec
H : head developed by the pump, ft
T_h: hydraulic torque, ft-lbf
ω : pump speed, radians/sec

Representing the above in terms of reduced data quantities Q (volumetric flow rate, gal/min), v (specific volume, ft^3/lbm), H (head, ft), T_h (hydraulic torque, ft-lbf), and N (pump speed, rpm).

$$\eta_h = \frac{\frac{Q[gpm]}{60[sec/min]} \times \frac{1}{7.48}\ \frac{ft^3}{gal} \times \frac{1}{(v)_{Q,\nu}}\ \frac{lbm}{ft^3} \times \frac{g}{|g_s|}\ \frac{lbf}{lbm} \times (H_{static} + H_{elev})\ [ft]}{T_h\ [ft\text{-}lbf] \times \frac{2\pi N}{60}\ \frac{rad}{rev}\ rpm\ \frac{min}{sec}}$$

Introducing the rated quantities Q_R, H_R, N_R, T_R and non dimensionalizing,

$$\eta_h = 0.84355\ \frac{v}{\alpha_N} \times \frac{h + \frac{1.0}{H_r}}{\beta_h} \times \frac{(v)_{\beta_h}}{(v)_{Q,v}} \qquad (4\text{-}1)$$

where

$$\beta_h = \frac{T_h}{T_R} \times (62.3) \times (v)_{\beta_h}$$

$$v \equiv \frac{Q}{Q_R},\ \alpha_N \equiv \frac{N}{N_R},\ h \equiv \frac{H}{H_R} \text{ and } \frac{g}{|g_s|} \simeq 1\ \frac{lbf}{lbm}, \text{ and}$$

$(v)_{\beta_h}$ and $(v)_{Q,\nu}$ should be the specific volumes used in deriving β_h and Q(or ν), respectively, which for the initial data presentation were v_{ave} and v_1, respectively. However the existing version of the PSSR code applied Equation 4-1 with $(v)_{Q,\nu}$ taken as v_{ave}, so the factor $(v)_{\beta_h}/(v)_{Q,\nu}$ was effectively unity. Efficiencies derived by either formulation were adequate for their use in checking consistency of test data.

Mechanical efficiency is the ratio of hydraulic to shaft torques:

$$\eta_{mech} = \frac{T_h}{T_{sh}}$$

Total efficiency or the overall efficiency is the product of hydraulic and mechanical efficiencies:

$$\eta_{total} = \eta_h \times \eta_{mech}$$

Turbining efficiencies are the inverse of the pumping efficiencies.

3.3.1.5.1 Modes of test pump operation. The test pump could operate in any of the following modes:

a. pumping

b. pumping dissipation

c. turbining

d. turbining dissipation

a. Pumping:

The pump is said to be in pumping mode when both the hydraulic torque and the speed are of the same sign.

b. Pumping Dissipation:

The pump is said to be in pumping dissipation mode when both of the following conditions are satisfied:

1. Hydraulic torque and speed are of the same signs.

2. Head and flow are of opposite signs.

c. Turbining:

The pump is said to be in turbining mode when the hydraulic torque and speed are of opposite signs.

d. Turbining Dissipation:

The pump is said to be in turbining dissipation mode when all of the following conditions are met:

1. Hydraulic torque and speed are of opposite signs.

2. Hydraulic and shaft torques are of opposite signs.

The recognition of these modes of the pump operation is done in the code by using the logic diagram as shown in Figure 3.3-2.

3.3.2 Code Versions

Two versions were developed: one to handle the steady-state forward flow tests and the other to handle the steady-state reverse flow tests. Listings of the two version are provided in Appendices 3.3A and 3.3B. A list of parameters used in the code are provided in Table 3.3-1.

Table 3.3-1

LIST OF PARAMETERS USED IN THE PSSR CODE

Fortran Symbol	Description	Units
NT	Test Number	
DATE(I), I=1,3	Test Date	
PRS	Setpoint Pressure, upstream leg[1]	psia
PRM	Measured Pressure, upstream leg	psia
FLWS	Setpoint upstream volume flow rate into the pump	GPM
FLWM(I), I=1,2[2]	Measured upstream volume flow rates into the pump	GPM
ALFS	Setpoint upstream void fraction	
ALFM(I),I=1,2	Measured upstream void fractions from γ-D and "orifice" values	
SPDS	Setpoint pump speed	RPM
SPDM	Measured pump speed	RPM

Table 3.3-1 (Cont'd.)

LIST OF PARAMETERS USED IN THE PSSR CODE

Fortran Symbol	Description	Units
PH(I),I=1,2	Pump head based on leg to leg static ΔP and upstream specific volume (DENUP (p.3-73)	ft
PHYTRQ	Pump hydraulic torque	ft-lb
TRQFM	Torque due to friction & windage	ft-lb
PSHTRQ	Shaft torque	ft-lb
PUPS(I),I=1,6[3]	Pressure upstream of pump	psia
PDWN(I),I=1,6	Pressure downstream of pump[4]	psia
DPUPTN(I),I=1,6	Pressure drop measurement from normal suction leg to the pump inlet (suction flange)	psia psi
AECLDP(I),I=1,6	Pressure difference across inlet pipe cross-section at suction flange near AECL γ-D, downstream of second elbow and 45°F below horizontal on each side. Positive if outside of elbow has higher P.	psi
PMDPIO(I),I=1,6	Static pressure rise measurement across the pump, flange to flange (i.e. from pump inlet to outlet)	psi
TOTWTR(I)I=1,6	Water flow rate through the pump test loop	lbm/sec
TOTSTM(I),I=1,6	Steam flow rate through the pump test loop	lbm/sec
SEALIN(I),I=1,6	Seal injection flow rate, in	lbm/sec
SEALOUT(I),I=1,6	Seal injection flow rate, out	lbm/sec
DPPMP(I),I=1,6	Pressure rise across the pump, leg to leg (measurement taken across stations 1 and 2 of Figure 3.3-1)	psi
SVMXUP(I),I=1,6	"Mixing tee" (or "orifice") fluid specific volume i.e. upstream leg value derived	cft/lbm

Table 3.3-1 (Cont'd.)

LIST OF PARAMETERS USED IN THE PSSR CODE

Fortran Symbol	Description	Units
	from the orifice flow and upstream leg pressure, temperature and heat loss measurements	
SVMXDN(I),I=1,6	"Mixing tee" fluid specific volume, downstream leg, derived as for upstream plus accounting for injection flow leakage	ft^3/lbm
UGD2(I),I=1,6	Gamma-D beam-2[5] fluid specific volume, downstream	ft^3/lbm
DGD2(I),I=1,6	Gamma-D beam-2 fluid specific volume, downstream	ft^3/lbm
VMXUP(I),I=1,6	"Mixing tee" fluid velocity, upstream	ft/sec
VMXDN(I),I=1,6	"Mixing tee" fluid velocity, downstream	ft/sec
VLNSUCG(I),I=1,6	Gamma-D beam-2 fluid velocity at normal suction	ft/sec
VLNDISG(I),I=1,6	Gamma-D beam-2 fluid velocity at normal discharge	ft/sec
NUS	Ratio of setpoint to the rated the rate pump flow rate (ν_s)	dimensionless
ALNS	Ratio of setpoint to the rated pump speed (α_{NS})	dimensionless
RATIS	Dynamic similarity flow-to-speed ratio for set point (ν_s/α_{NS})	dimensionless
OBRATIS	Inverse ratio, $1/(\frac{\nu_s}{\alpha_{NS}})$ for the setpoint	dimensionless
NUM(I),I=1,2	Ratio of measured to the rated pump flow rate, (ν)	dimensionless
ALNM	Ratio of measured to the rated pump speed (α_N)	dimensionless

Table 3.3-1 (Cont'd.)

LIST OF PARAMETERS USED IN THE PSSR CODE

Fortran Symbol	Description	Units
RATIM(I),I=1,2	Dynamic similarity flow-to-speed ratio for the measured point $(\frac{\nu}{\alpha_N})$	dimensionless
OBRATIM(I),I=1,2	Inverse ratio, $1/(\frac{\nu}{\alpha_N})$	dimensionless
DIFPR(I),I=1,6	Difference between the absolute pressures at downstream and upstream locations	psi
DPIOMLL(I),I=1,6	Sum of pressure drops in the two pipe sections (suction and discharge legs)=PMDPIO(I) - DPPMP(I)	psi
DPUPCAL	Calculated "geometry" and frictional pressure drop for the piping from Suction leg station to the pump inlet (location 1 to 3 of Figure 3.3-1) based on an assumed K-factor of 0.69	psi
DPDNCAL	Calculated mixing and frictional pressure drop from pump outlet flange to the discharge leg based on an assumed K-factor of 0.15	psi
RKUPMS	Calculated K-factor for the piping from the suction leg station to the pump normal inlet, based on the measured ΔP	
RKDNMS	Calculated K-factor for the discharge piping from pump normal outlet to the discharge leg, based on the ΔP derived from measurements	
SEALNT	Net balance in seal injection flow rates (indicating flow leaking into or out of the main loop flow)	lbm/sec
VELHGD	Velocity head difference between the normal discharge	ft

Table 3.3-1 (Cont'd.)

LIST OF PARAMETERS USED IN THE PSSR CODE

Fortran Symbol	Description	Units
	and suction legs, based on the Gamma-D beam-2 specific volumes	
VELHOR	Velocity head difference between the normal discharge and suction legs, based on the orifice-measured specific volumes	ft
PNH(I),I=1,2	Normalized static head developed by the pump from leg to leg (between locations 1 and 2 of Fig. 3.3-1) based on five-scan average of upstream specific volume DENUP (p.)	dimensionless
BTA1	Normalized hydraulic torque adjusted to the average of upstream and downstream Gamma-D beam-2 specific volumes	dimensionless
BAT2	Normalized hydraulic torque adjusted to the average of upstream and downstream orifice (mixing tee) specific volumes	dimensionless
BTASH1	Normalized shaft torque adjusted to the average of both Gamma-D beam-2 specific volumes as in BTA1	dimensionless
BTASH2	Normalized shaft torque adjusted to the average "orifice" specific volume as in BTA2	dimensionless
DENA1	Average density based on the average of upstream and downstream G-D beam-2 specific volumes	lbm/ft^3
DENA2	Average density based on the average of upstream and downstream mixing tee (orifice) specific volumes	lbm/ft^3

Table 3.3-1 (Cont'd.)

LIST OF PARAMETERS USED IN THE PSSR CODE

Fortran Symbol	Description	Units
DENUP	Upstream density based on the orifice (or mixing tee) measurements, inverse of specific volume averaged over five scans	lbm/ft^3
DELT1	Homologous ratio for head based on upstream γ-D beam-2 density and leg to leg ΔP, PNH(I), (p. 3-72)	(h/α_N^2)
DELT2	Homologous ratio for head based on upstream orifice density and leg to leg ΔP, PNH(I), (p. 3-72)	(h/α_N^2)
ZTA1	Homologous ratio for head based on upstream γ-D beam-2 density and leg to leg ΔP, alternate to DELT1	(h/ν^2)
ZTA2	Homologous ratio for head based on upstream orifice density and leg to leg ΔP values, alternate to DELT2	(h/ν^2)
EPS1	Homologous ratio for hydraulic torque adjusted to the average of upsteam and downstream γ-D beam-2 specific volumes	(β_1/α_N^2)
EPS2	Homologous ratio for hydraulic torque adjusted to the average of upstream and downstream orifice specific volumes	(β_2/α_N^2)
PSI1	Homologous ratio for hydraulic torque, alternate to EPS1	(β_1/ν^2)
PSI2	Homologous ratio for hydraulic torque, alternate to EPS2	(β_2/ν^2)
HSFF(I),I=1,2[2]	Normalized <u>static</u> head developed by the pump from <u>flange to flange</u> using the <u>local</u> specific volume averaged over five scans	

Table 3.3-1 (Cont'd.)

LIST OF PARAMETERS USED IN THE PSSR CODE

Fortran Symbol	Description	Units
HSLL(I),I=1,2	Normalized static head developed by the pump from leg to leg using the local specific volumes (five-scan averages)	
HTFF(I),I=1,2	Normalized total head developed by the pump from flange to flange using the local specific volumes (five-scan averages)	
HTLL(I),I=1,2	Normalized total head developed by the pump from leg to leg using the local specific volumes (five-scan averages)	
HSFA1,HSFA2	Homologous head ratio for flange to flange static head using HSFF(I)	(h_s/α_N^2)
HSLA1,HSLA2	Homologous head ratio for leg to leg static head using HSLL(I)	(h_s/α_N^2)
HTFA1,HTFA2	Homologous head ratio for flange to flange total head using HTFF(I)	(h_t/α_N^2)
HTLA1,HTLA2	Homologous head ratio for leg to leg total head using HTLL(I)	(h_t/α_N^2)
HSFN1,HSFN2	Alternate homologous head ratio for flange to flange static head using HSFF(I)	(h_s/ν^2)
HSLN1,HSLN2	Alternate homologous head ratio for leg to leg static head using HSLL(I)	(h_s/ν^2)
HTFN1,HTFN2	Alternate homologous head ratio for flange to flange total head using HTFF(I)	(h_t/ν^2)
HTNLN1,HTLN2	Alternate homologous head ratio for leg to leg total head using HTLL(I)	(h_t/ν^2)

Table 3.3-1 (Cont'd.)

LIST OF PARAMETERS USED IN THE PSSR CODE

Fortran Symbol	Description	Units
EFM	Mechanical efficiency of the pump	
EFH2,EFH1	Hydraulic efficiencies based on BTA2 and BTA1, respectively	
EFTOT2,EFTOT1	Total (or overall) efficiencies based on EFM and EFH2 or EFH1, respectively	

Note 1: Upstream of pump refers to normal suction leg for forward flow tests, whereas for reverse flow tests it is the normal discharge leg.

Note 2: I=1 referes to gamma densitometer derived (γ-D) value
I=2 refers to "orifice" value derived from orifice and upstream leg measurements.

Note 3: Dimensioned variables 1 through 5 refer to the five scan values. The sixth variable is the average of the five scans.

Note 4: Downstream of pump refers to normal discharge leg for forward flow tests and to normal suction leg for the reverse flow tests

Note 5: Beam 2 of the upstream and downstream gamma densitometers crosses through the center of the pipe

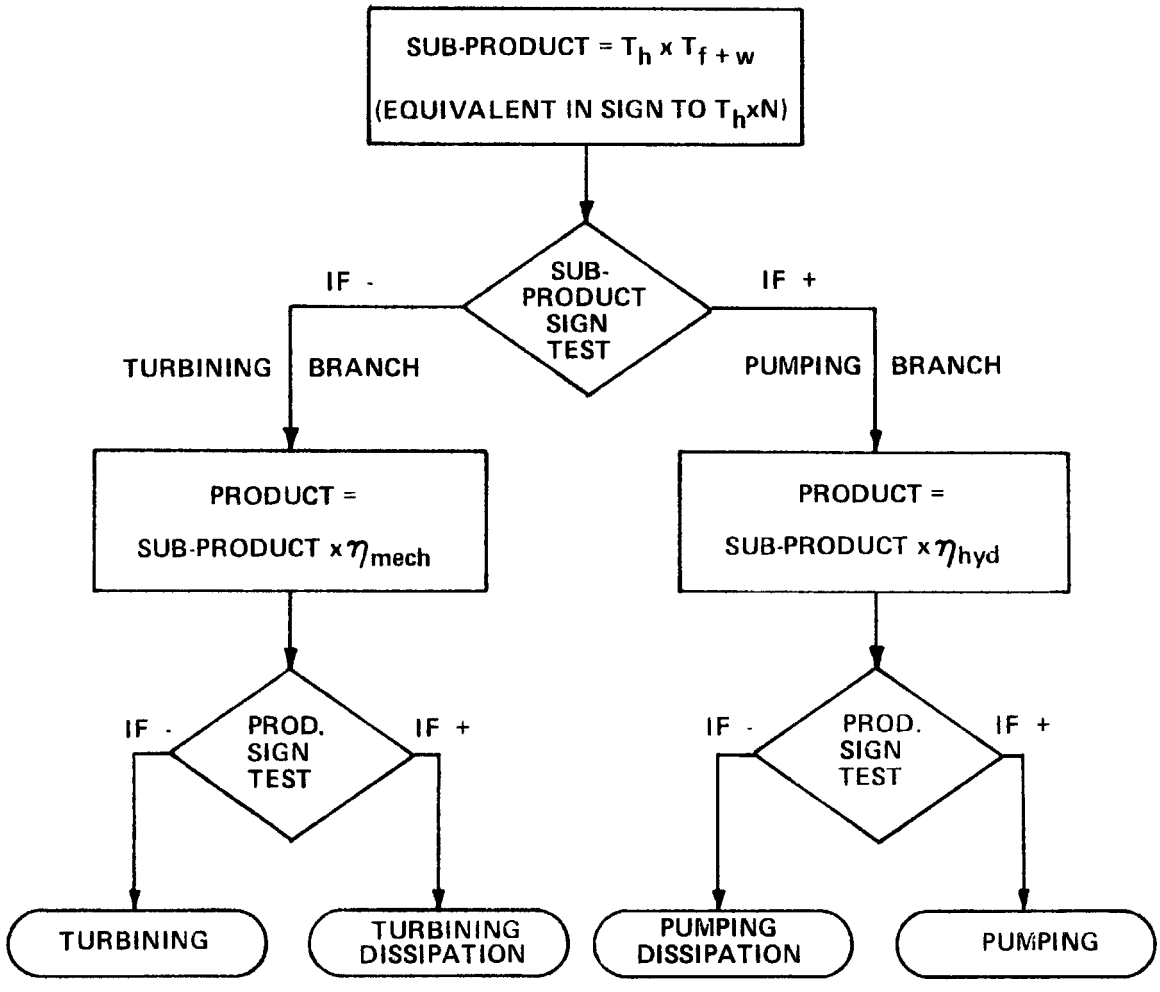

Figure 3.3-2. PSSR Code Logic Diagram for Test Pump Operating Modes

3.3.3 Input/Output Structure

3.3.3.1 Input Management. The input to the code is completely automated by directly accessing the reduced data file or files created for each test or a series of tests by the SSDR code. Appendices 3.3C and 3.3D present samples of the reduced data file versions which are accessed by the PSSR-FORWARD and PSSR-REVERSE code versions respectively.

In particular, after a series of tests are performed, the generated raw test data is reduced to engineering units (which is the ten-page output for each test containing both the U.S. and metric units) and the resulting reduced data is catalogued by the SSDR code as a permanent file in the CDC-7600 computer system. This file which contains the reduced data for the series of tests is then directly accessed by the PSSR code. The PSSR code then by use of appropriate format structure, selectively extracts for each test, only certain test quantities which are of particular interest for reviewing and analyzing the performance of the pump. An additional feature of flexibility built into the input management is that any one test or strings of tests contained in the file can be specified for processing because the input for running the code calls for listing the test number from which to begin and the test number to stop processing in each of a series of strings.

The following example demonstrates typical control and input cards for application of the codes:

```
Job card
Account card ATTACH(TAPE10, SSDRFØRWDTESTDATAFILEA, ID=JØHN)
ATTACH(FWD, PSSRFWDCODEECCSEPRIUSEABS15, ID=MURTHY)
FWD.
7/8/9 card
  230  255
  283  283          2I5 format
  324  246
   -1   -1
7/8/9 card
6/7/8/9 card
```

All cards start from the first column.

3.3.3.2 Output. The output from the PSSR code is in two forms: one is a 3-page detailed review of many test parameters for each steady-state test, and the other is a summary table of key test parameters for all the tests.

For each test, the PSSR output provides a detailed display of all the reduced test data parameters used as input, the code-calculated five-scan averages, K-factors, homologous ratios for head and torque and the pump efficiencies, as shown in APPENDIX 3.3E for a sample test.

After all the tests of interest have been processed, a summary table for those tests is generated by the Summary Table Code to include the key test parameters and the corresponding homologous ratios for pump flow-to-speed, head, and hydraulic torque. A sample page of the summary table is exhibited in Table 3.3-2. The one-line-per-test format results in a columnar array which facilitates rapid visual access, sorting, and extraction of results. Since the PSSR Code has different versions for forward and reverse flow tests, the summary tables have separate groups of tests for the forward and reverse flow.

The left portion of the columns list the pump operating conditions and associated pressure changes, while the remaining columns list the normalized performance parameters and homologous ratios, plus upstream density. Meanings of the individual column headings are listed in Table 3.3-3. Asterisks in a column signify a number too large to fit the alloted space in the table. A listing of the Summary Table Code is provided in Appendix 3.3F.

Table 3.3-2

SAMPLE STEADY-STATE DATA SUMMARY TABLE

TEST	DATE	TYP	RPS	VOID	DP	DP	DP	NU	ALN	NU/ALN	ALN/NU	NORMALIZED H	NORMALIZED HYTRQ*R	H/ALN2	H/NU2	R/ALN2	R/NU2	DENSITY
			DSTA	FRAC	(LI)	(FF)	(TS-NS)											UPSTRM
1091	10/13/77	FWD	58	1.000	-4.54	-3.68	.93	3.684	.220	16.734	.060	-20.488	-20.903	*******	-1.509	*******	-1.540	.127
1092	10/13/77	FWD	57	1.000	-4.96	-4.23	.24	3.858	.221	17.467	.057	-22.665	-20.445	*******	-1.522	*******	-1.373	.125
1093	10/13/77	FWD	59	1.000	-5.74	-4.93	.28	4.364	.552	7.910	.124	-25.285	-21.603	-83.068	-1.328	-70.972	-1.134	.130
1095	10/13/77	FWD	54	1.000	-.27	-.15	.12	1.503	.552	2.723	.367	-1.266	-5.589	-4.156	-.560	-18.341	-2.473	.121
1096	10/13/77	FWD	55	1.000	-1.25	-1.03	.16	2.570	.551	4.662	.215	-5.917	-7.252	-19.463	-.895	-23.854	-1.098	.120
1097	10/13/77	FWD	56	1.000	-1.83	-1.65	.19	3.029	.552	5.493	.182	-9.061	-14.285	-29.788	-.987	-46.964	-1.557	.122
1098	10/13/77	FWD	56	1.000	-2.55	-2.23	.21	3.409	.551	6.183	.162	-11.858	-13.615	-39.004	-1.020	-44.783	-1.171	.123
1099	10/13/77	FWD	60	1.000	-3.61	-3.18	.24	3.748	.552	6.830	.146	-15.746	-17.588	-51.740	-1.109	-57.767	-1.238	.131
1100	10/13/77	FWD	60	1.000	-5.44	-4.84	.33	4.826	.886	5.448	.184	-24.536	-20.043	-31.265	-1.053	-25.540	-.860	.131
1102	10/13/77	FWD	54	1.000	-1.11	-.85	.20	2.493	.998	3.000	.333	-5.328	-1.852	-5.352	-.595	-1.861	-.207	.119
1112	10/18/77	FWD	951	.266	22.84	35.85	6.04	1.077	1.007	1.069	.935	.376	.722	.371	.324	.711	.622	34.863
1113	10/18/77	FWD	934	.219	36.27	45.40	4.29	1.053	1.008	1.045	.957	.559	.730	.551	.505	.719	.659	37.051
1114	10/18/77	FWD	958	.203	40.21	50.54	4.49	1.045	1.007	1.038	.964	.610	.770	.602	.559	.759	.705	37.651
1115	10/18/77	FWD	955	.187	44.53	54.22	4.07	1.033	1.002	1.031	.970	.694	.901	.691	.650	.897	.844	38.344
1116	10/18/77	FWD	951	.187	44.41	54.49	4.13	1.036	1.001	1.036	.966	.669	.878	.668	.623	.876	.817	38.370
1118	10/20/77	FWD	45	1.000	-2.63	-2.19	.26	4.706	1.625	2.896	.345	-15.304	-4.956	-5.796	-.691	-1.877	-.224	.098
1119	1/20/77	FWD	50	1.000	-3.01	-2.46	.29	4.825	1.625	2.969	.337	-15.825	-5.431	-5.991	-.680	-2.056	-.233	.109
1120	10/20/77	FWD	51	1.000	-4.08	-3.58	.29	4.798	1.155	4.153	.241	-21.089	-13.069	-15.798	-.916	-9.790	-.568	.111
1121	10/20/77	FWD	45	1.000	-.34	-.17	.14	2.343	1.154	2.031	.492	-1.782	3.375	-1.339	-.325	2.535	.615	.109
1122	10/20/77	FWD	482	.999	1.65	1.78	.15	.917	.997	.920	1.087	.565	1.211	.569		1.219		1.572
1123	10/20/77	FWD	482	.998	-.36	-.14	.16	.883	.498	1.772	.564	-.124	.107	-.499	-.159	.429	.137	1.652
1124	10/20/77	FWD	483	.999	-1.83	-1.50	.20	1.130	.349	3.243	.308	-.682	-.412	-5.611	-.533	-3.391	-.322	1.536
1125	10/20/77	FWD	483	.991	-2.34	-1.93	.22	1.229	.348	3.527	.284	-.889	-.371	-7.323	-.589	-3.051	-.245	1.501
1126	10/20/77	FWD	484	.991	-2.38	-2.00	.22	1.219	.338	3.604	.271	-.903	-.491	-8.248	-.607	-4.508	-.330	1.508
1133	10/21/77	FWD	251	0.000	-7.63	-4.75	.69	.428	.186	2.300	.435	-.071	-.049	-2.058	-.389	-1.420	-.268	61.237
1134	10/21/77	FWD	308	0.000	-60.46	-55.57	2.47	.863	.192	4.504	.222	-.555	-.709	-15.389	-.758	-19.295	-.951	61.110
1135	10/21/77	FWD	225	0.000	40.40	58.91	7.14	1.495	1.054	1.378	.725	.379	.971	.323	.170	.826	.435	60.864
1136	10/21/77	FWD	211	.100	24.24	23.16	-1.37	-.009	.406	-.023	-44.274	.270	.135	1.642		.823		51.319
1137	10/21/77	FWD	171	0.000	-26.50	-19.64	2.42	.899	.409	2.200	.455	-.263	-.028	-1.578	-.326	-.168	-.035	57.504
1138	10/21/77	FWD	431	.041	25.05	21.95	-1.37	-.009	.406	-.021	-47.373	.283	.143	1.718		.865		50.515
1139	10/21/77	FWD	425	0.000	-31.41	-23.86	2.39	.949	.410	2.315	.432	-.346	-.072	-2.062	-.385	-.430	-.080	52.515
1140	10/21/77	FWD	914	0.000	22.24	20.20	-1.37	.013	.406	.031	31.794	.265	.149	1.613		.904		47.874
1141	10/21/77	FWD	917	0.000	-29.04	-23.63	2.36	.984	.409	2.405	.416	-.348	-.099	-2.081	-.360	-.591	-.102	47.615
1145	10/22/77	FWD	889	0.000	-26.55	-23.56	2.33	.979	.409	2.395	.417	-.317	-.082	-1.895	-.330	-.493	-.086	47.893
1146	10/22/77	FWD	863	0.000	39.15	56.94	5.69	1.501	1.164	1.290	.775	.471	1.167	.348	.209	.861	.518	47.515
1147	10/22/77	FWD	866	0.000	-7.76	-6.40	3.72	1.272	.794	1.603	.624	-.093	.459	-.147	-.057	.729	.284	47.742
1148	10/22/77	FWD	878	0.000	-6.69	-4.47	.63	.492	.221	2.225	.449	-.080	.013	-1.637	-.331	.262	.053	47.851
1149	10/22/77	FWD	883	0.000	-3.98	-3.90	.49	.430	.186	2.306	.434	-.048	.009	-1.370	-.258	.247	.046	47.824
1151	10/22/77	FWD	914	0.000	-14.45	-9.31	2.20	.941	.471	1.998	.501	-.178	.064	-.801	-.201	.288	.072	47.724
1152	10/22/77	FWD	876	0.000	27.21	38.73	3.33	1.209	.903	1.338	.747	.326	.736	.399	.223	.902	.504	47.755

TABLE 3.3-3

KEY TO SUMMARY TABLE COLUMN HEADINGS AND ABBREVIATIONS

Column Heading	Meaning
TEST	Steady-state test number
DATE	Date of test
TYP	Type of test FWD = forward flow test REV = reverse flow test
PRES PSIA	Upstream instrument spool static pressure, psia. L-5 for forward flow, L-6 for reverse flow
VOID FRAC	Upstream void fraction obtained from orifice measurements, upstream instrument measurements, and piping heat loss combined in an energy balance.
DP (LL)	Static ΔP, suction instrument spool (SIS) to discharge instrument spool (DIS), (psi).
DP (FF)	Static ΔP, suction flange to discharge flange, (psi).
DP (TS-NS)	Static ΔP, suction instrument spool to suction flange.
NU	$\equiv \nu$. Normalized upstream volumetric flow rate Q/Q_{rated} calculated from orifice-measured flow rate and orificebased upstream specific volume
ALN	Normalized pump speed, $\alpha_N = N/N_R$
NU/ALN	Homologous flow-to-speed ratio, ν/α_N
ALN/NU	Homologous speed-to-flow ratio, α_N/ν
NORMALIZED H	Normalized SIS to DIS static pump head, $h \equiv H/H_R$ feet of fluid having orifice-based upstream density.
NORMALIZED HYTRQ,B	Normalized hydraulic torque, $\beta_H = (T_h/T_R)(\rho_R \cdot V_{ave})$, including adjustment to average density across the pump which is evaluated as the reciprocal of average specific volume.
H/ALN2	Homologous head ratio, h/α_N^2 for $\nu/\alpha_N \leq 1$
H/NU2	Alternate homologous head ratio, h/ν^2 for $\nu/\alpha_N > 1$.
B/ALN2	Homologous hydraulic torque ratio, β_H/α_N^2 for $\nu/\alpha_N \leq 1$.

TABLE 3.3-3 (Cont'd.)

KEY TO SUMMARY TABLE COLUMN HEADINGS AND ABBREVIATIONS

Column Heading	Meaning
B/NU2	Alternate homologous hydraulic torque ratio, β_H/ν^2 for $\nu/\alpha_N > 1$.
DENSITY UPSTRM	Orifice-based upstream density derived as the reciprocal of the five-scan average of orifice-based upstream specific volume.

3.3.4 References

1. "Final Test Report for Combustion Engineering, Inc., 1:5 Model Pump Ratio to Palisades Reactor Coolant Pump." Byron Jackson, February 1975.

2. W.G. Kennedy, M.C. Jacob, and J.R. Shuckerow, Two Phase Pump Performance Program Preliminary Test Plan. EPRI NP-128, September 1975.

Appendix 3.2A

SSDR PROGRAM LISTING

```
      PROGRAM ETRY12(TAPE3,OUTPUT,TAPE6=OUTPUT,INPUT,TAPE10,                    000100
     1TAPE11)                                                                   000110
C     CREATED  10/12/78 FROM ETRY11                                             000120
C     MODIFIED  5/1/79  FOR GAMMA DEN CONVERSION                                000125
C A1                                                                            000130
      DIMENSION APS(5),APD(5),ADS(5),ADD(5),AA(55),AB(12)                       000140
      DIMENSION AC(9),ABB(46),ABG(17),ANORM(11)                                 000150
      DIMENSION BD(70,2)                                                        000160
      DIMENSION C(7,75),CON(13)                                                 000170
      DIMENSION DAL(32),DRIF(46),DSAT(5),DNORM(11),DAC(6),DRAL(32)              000180
      DIMENSION DPH(6),DZZ(5)                                                   000190
      DIMENSION ERR(32),ETM1(2),ETM2(2),ETM3(2),ETM4(2),ETM5(2)                 000200
      DIMENSION ETM6(2),ETM7(2),ETM8(2),ETM9(2),ETM10(2),ETM11(2)               000210
      DIMENSION E(90)                                                           000220
      DIMENSION FRT(5)                                                          000230
      DIMENSION HRT(5),HMS(5),HMD(5),HMA(5),HGDS(5),HGDD(5)                     000240
      DIMENSION HGDA(5)                                                         000250
      DIMENSION KCA(15),KP(11),KDP(19),KRTD(7),KTM(2),KGD(9)                    000260
      DIMENSION KDD(5),KT(5),KSM(2)                                             000270
      DIMENSION PRA(46),PR(75,5),PAC(9),PSD(5),PA(5),PDA(5)                     000280
      DIMENSION PSMD(5),PDMD(5)                                                 000290
      DIMENSION R(75),RSD(5),RDD(5),RT(70),RS(70,5)                             000300
      DIMENSION SP(46,5),SPRA(46),SSAT(5)                                       000310
      DIMENSION TDAT(5),TSAT(5),TSD(5)                                          000320
      DIMENSION UNORM(11)                                                       000330
      DIMENSION VSMD(5),VAPSE(5),VAPDE(5)                                       000340
      DIMENSION VMS(5),VMD(5),VMA(5),VGDS(5),VGDD(5)                            000350
      DIMENSION VGDA(5),VDMD(5),VPA(5),VRSD(5),VRDD(5),VPDA(5)                  000360
      DIMENSION VEL(8,6),VELE(8),VELH(8,6),VELHE(8)                             000370
      DIMENSION WT(5),WI(5),WO(5),WW(5),WS(5)                                   000380
      DIMENSION ZP(11),ZDP(19),ZTM(2),ZDD(5),ZT(5),ZSM(2)                       000390
      DIMENSION ZGD(9)                                                          000400
      DATA ETM1/6H(PSIA),6H(BAR) /                                              000410
      DATA ETM2/6H(GPM) ,6H(M3/S)/                                              000420
      DATA ETM3/4H(FT),4H(M) /                                                  000430
      DATA ETM4/6H(FTLB),6H(NM)  /                                              000440
      DATA ETM5/8H(LBM/SE),8H(KG/SEC)/                                          000450
      DATA ETM6/9H(FT3/LBM),9H(M3/KG)  /                                        000460
      DATA ETM7/8H(FT/SEC),8H(M/SEC) /                                          000470
      DATA ETM8/10H(LBM/FT-SE,10H(KG/M-SEC2/                                    000480
      DATA ETM9/3HC2),3H)  /                                                    000490
      DATA ETM10/5H(PSI),5H(BAR)/                                               000500
      DATA ETM11/3H(F),3H(C)/                                                   000510
      DATA ABG(1)/10HFLOW CNTRO/                                                000520
      DATA ABG(2)/10HL VLV L-60/                                                000530
      DATA ABG(3)/10HSUCT LEG-F/                                                000540
      DATA ABG(4)/10HLANGE L-61/                                                000550
      DATA ABG(5)/10HPAC16 DP  /                                                000560
      DATA ABG(6)/10H      L-62/                                                000570
      DATA ABG(7)/10HACROSS ELB/                                                000580
      DATA ABG(8)/10HOW DP L-33/                                                000590
      DATA ABG(9)/10HVOLUTE-IMP/                                                000600
      DATA ABG(10)/10H BACK L-68/                                               000610
      DATA ABG(11)/10HHP DRUM LE/                                               000620
      DATA ABG(12)/10HVL DP L-25/                                               000630
      DATA ABG(13)/10HPMP FLNGE-/                                               000640
      DATA ABG(14)/10HFLNGE L-66/                                               000650
```

```
      DATA ABG(15)/6HCLOSED/                                          000660
      DATA ABG(16)/6HMAIN  /                                          000670
60    DATA ABG(17)/6HBYPASS/                                          000680
      CALL CONNEC(6LOUTPUT)                                           000690
      CALL CONNEC(5LINPUT)                                            000700
C END BLOCK A                                                         000710
C START BLOCK B                                                       000720
65    C B1                                                            000730
      REWIND 3                                                        000740
C READ INSTRUMENT CONSTANT FILE I.D.                                  000750
108   READ(3,77) ZFILE,IZERO,ZDATE,ZTIME                              000760
      IF(EOF(3)) 556,557                                              000770
70    C B2                                                            000780
557   NOTEST=0                                                        000790
C B3                                                                  000800
      IF(IZERO.GE.30) NOTEST=1                                        000810
      IF(IZERO.LT.150)GOTO 107                                        000820
75    77    FORMAT(A4,I4,2A9)                                         000830
C B4                                                                  000840
C READ INSTRUMENT I.D. NUMBERS                                        000850
      ZZFILE=ZFILE                                                    000860
      NZERO=IZERO                                                     000870
80    ZZDATE=ZDATE                                                    000880
      ZZTIME=ZTIME                                                    000890
      READ(3,*) NTCA,(KCA(I),I=1,NTCA)                                000900
      READ(3,*) NP,(KP(I),I=1,NP)                                     000910
      READ(3,*) NDP,(KDP(I),I=1,NDP)                                  000920
85    READ(3,*) NRTD,(KRTD(I),I=1,NRTD)                               000930
      READ(3,*) NTM,(KTM(I),I=1,NTM)                                  000940
      READ(3,*) NDD,(KDD(I),I=1,NDD)                                  000950
      READ(3,*) NT,(KT(I),I=1,NT)                                     000960
      READ(3,*) NSM,(KSM(I),I=1,NSM)                                  000970
90    READ(3,*) NGD,(KGD(I),I=1,NGD)                                  000980
      READ(3,*) (KFP,I=1,7)                                           000990
C READ INSTRUMENT ZEROS                                               001000
      READ(3,*) (ZP(I),I=1,NP)                                        001010
      READ(3,*) (ZDP(I),I=1,NDP)                                      001020
95    READ(3,*) (ZTM(I),I=1,NTM)                                      001030
      READ(3,*) (ZDD(I),I=1,NDD)                                      001040
      READ(3,*) (ZT(I),I=1,NT)                                        001050
      READ(3,*) (ZSM(I),I=1,NSM),ZMF                                  001060
      IF(IZERO.LT.567)  GOTO 50                                       001070
100   C B5                                                            001080
      READ(3,*)(ZGD(I),I=1,NGD)                                       001090
50    CONTINUE                                                        001100
C INSTRUMENT CONVERSION AND CALIBRATION ERROR CONSTANTS               001110
C B6                                                                  001120
105   NS=68                                                           001130
C B7                                                                  001140
      IF(NDP.EQ.19)  NS=69                                            001150
      DO 104 I=1,NS                                                   001160
C B8                                                                  001170
110   READ(3,*)(C(J,I),J=1,7)                                         001180
104   CONTINUE                                                        001190
      GOTO 108                                                        001200
C END BLOCK B                                                         001210
C START BLOCK C                                                       001220
```

320002

```
115         C READING OF SCANNER DATA FILE                                          001230
            C READ DATA MANUALLY INPUT TC DATA FILE                                 001240
            C C                                                                     001250
            107   READ(3,*) ITEST                                                  001260
                  READ(3,*) ILAB                                                   001270
120               READ(3,*) IWFLC,IFLOW                                            001280
                  READ(3,*) ISFLC,IFLCS                                            001290
                  READ(3,*) PSET,VOID,VOLM,PSPD                                    001300
                  VOLS=VOLM/3500.                                                  001310
                  READ(3,*) PABS,TBAR                                              001320
125         C END BLOCK C                                                          001330
            C START BLOCK D                                                        001340
                  DO 100 I=1,86                                                    001350
            C D1                                                                   001360
                  E(I)=0.                                                          001370
130         100   CONTINUE                                                         001380
                  DO 117 I=1,32                                                    001390
            C D2                                                                   001400
                  PRA(I)=0.                                                        001410
                  ERR(I)=0.                                                        001420
135         117   CONTINUE                                                         001430
            C D3                                                                   001440
                  PABS=(1-.000622*(TBAR-22))*PABS                                  001450
                  PABS=PABS*(.9999924-1.811241E-4*TBAR+2.075103E-8*TBAR*TBAR)      001460
                  PABS=PABS-.2                                                     001470
140               PABS=.0193367617*PABS                                            001480
                  IPAGE=0                                                          001490
                  IF(NOTEST.EQ.0) GOTO 121                                         001500
                  DO 120 I=1,95                                                    001510
            C D4                                                                   001520
145               READ(3,122) DUM,DUM,DUM,DUM,DUM                                  001530
            122   FORMAT(5A9)                                                      001540
            120   CONTINUE                                                         001550
                  GOTO 108                                                         001560
            121   CONTINUE                                                         001570
150               DO 10 I=1,70                                                     001580
            C D5                                                                   001590
                  RT(I)=0.                                                         001600
                  IF(I.GT.35) GOTO 10                                              001610
            C D6                                                                   001620
155               AA(I)=0.                                                         001630
            10    CONTINUE                                                         001640
            C D7                                                                   001650
                  PSO=0.                                                           001660
                  PDO=0.                                                           001670
160         C END BLOCK D                                                          001680
                  DO 877  IJJ=1,5                                                  001690
            C START BLOCK E                                                        001700
            C E1                                                                   001710
                  ICALL1=1                                                         001720
165               ICALL2=2                                                         001730
            C READ SCANNED DATA                                                    001740
                  READ(3,130)XTM,XTS                                               001750
                  READ(3,131)DQ2                                                   001760
                  READ(3,132)DQ4                                                   001770
170               READ(3,132)DQ3                                                   001780
                  READ(3,133)DQ5                                                   001790
```

320003

```
      130   FORMAT(4X,F2.0,1X,F6.3)                                   001800
      131   FORMAT(A5)                                                001810
      132   FORMAT(A10)                                               001820
175   133   FORMAT(A1)                                                001830
            DO 144 I=1,14                                             001840
            IF(I.GT.1)GOTO 140                                        001850
      C E2                                                            001860
            READ(3,*)ZER,R(1),R(2),R(3),R(4)                          001870
180         J=5                                                       001880
            MJ=J+4                                                    001890
            GOTO 144                                                  001900
      C E3                                                            001910
      140   READ(3,141)(R(K),K=J,MJ)                                  001920
185   141   FORMAT(5F9.6)                                             001930
            J=MJ+1                                                    001940
            MJ=J+4                                                    001950
      144   CONTINUE                                                  001960
      C END BLOCK E                                                   001970
190   C START BLOCK F                                                 001980
      C F1                                                            001990
            ZER=ZER*1000.                                             002000
            DO 149 I=1,NS                                             002010
      C F2                                                            002020
195         R(I)=R(I)*1000.-ZER                                       002030
            RT(I)=R(I)/1000.+RT(I)                                    002040
      149   CONTINUE                                                  002050
      C F3                                                            002060
            ITIME=ILAB/1000000                                        002070
200         IDATE=ILAB-ITIME*1000000                                  002080
            IMO=IDATE/10000                                           002090
            IDAY=(IDATE-IMO*10000)/100                                002100
            IYR=IDATE-10000*IMO-100*IDAY                              002110
            XTIM=ITIME                                                002120
205         DO 159 I=1,8                                              002130
      C F4                                                            002140
            VEL(I,6)=0.                                               002150
            VELH(I,6)=0.                                              002160
      159   CONTINUE                                                  002170
210   C INSTRUMENT CONVERSION                                         002180
      C THERMOUCOUPLE DATA CONVERSION                                 002190
      C F5                                                            002200
            DATA PAC/-1.8533063273E+1,3.8918344612E+1,1.6645154356E-2,002210
           *-7.870237448E-5,2.2835785557E-7,-3.5700231258E-10,        002220
215        *2.9932909136E-13,-1.2849848798E-16,2.2239974336E-20/      002230
            DO 192 I=1,NTCA                                           002240
      C F6                                                            002250
            K=KCA(I)                                                  002260
            IF(K.LT.23) GOTO 172                                      002270
220         IF(K.EQ.30.OR.K.EQ.31)GOTO 172                            002280
            IF(ITEST.LT.850)GO TO 173                                 002290
            IF(K.EQ.50)GO TO 172                                      002300
            GOTO 173                                                  002310
      C F7                                                            002320
225   172   R(K)=R(K)/10.                                             002330
      173   CONTINUE                                                  002340
            IF(R(K).LT.(-2.65))GOTO 192                               002350
            IF(R(K).GT.20.)GOTO 192                                   002360
```

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```
      C F8                                                              002370
230         EI=1000.*(R(K)+2.6621)                                      002380
            PR(K,IJJ)=.0242*EI                                          002390
      C F9                                                              002400
      178   T=1.                                                        002410
            EL=0.                                                       002420
235         DO 183 J=1,9                                                002430
      C F10                                                             002440
            EL=EL+PAC(J)*T                                              002450
            T=T*PR(K,IJJ)                                               002460
      183   CONTINUE                                                    002470
240   C F11                                                             002480
            EL=EL+125.*EXP(-.5*((((PR(K,IJJ)-127.)/65.)**2)))           002490
            IF(ABS(EI-EL).LT.1.)GOTO 188                                002500
      C F12                                                             002510
            PR(K,IJJ)=PR(K,IJJ)+.0242*(EI-EL)                           002520
245         GOTO 178                                                    002530
      C F13                                                             002540
      188   PR(K,IJJ)=((PR(K,IJJ)*9.)/5.)+32.                          002550
            E(K)=(1.8*C(7,K)/PR(K,IJJ))*100.+E(K)                       002560
            RS(K,IJJ)=PR(K,IJJ)                                         002570
250   192   CONTINUE                                                    002580
      C RTD CONVERSION                                                  002590
            DO 200 I=1,NRTD                                             002600
      C F14                                                             002610
            K=KRTD(I)                                                   002620
255         PR(K,IJJ)=C(2,K)+C(3,K)*(R(K)-C(1,K))+C(4,K)*((R(K)-C(1,K))**2) 002630
            PR(K,IJJ)=((PR(K,IJJ)*9.)/5.)+32.                           002640
            E(K)=(1.8*C(7,K)/PR(K,IJJ))*100.+E(K)                       002650
            RS(K,IJJ)=PR(K,IJJ)                                         002660
      200   CONTINUE                                                    002670
260   C CORRECTION FOR RTD 55 REMOVAL                                   002680
            IF(ITEST.LT.1223.OR.ITEST.GT.1351) GOTO 201                 002690
      C F15                                                             002700
            PR(55,IJJ)=PR(13,IJJ)                                       002710
            E(55)=E(13)                                                 002720
265         RS(55,IJJ)=PR(55,IJJ)                                       002730
      C F16                                                             002740
      201   CONTINUE                                                    002750
            TSD(IJJ)=(PR(55,IJJ)+PR(56,IJJ))/2.                         002760
            TSDE=SQRT((.5*C(7,55))**2+(.5*C(7,56))**2)                  002770
270         IF(ITEST.GT.0.AND.ITEST.LT.391)GOTO 205                     002780
            IF(ITEST.GT.559.AND.ITEST.LT.1436)GOTO 205                  002790
      C REVERSE FLOW MODIFICATION                                       002800
      C F17                                                             002810
            CALL REVER(PR(55,IJJ),PR(56,IJJ))                           002820
275         CALL REVER(C(7,55),C(7,56))                                 002830
            CALL REVER(E(55),E(56))                                     002840
      205   CONTINUE                                                    002850
      C PRESSURE CELL CONVERSION                                        002860
            DO 217 I=1,NP                                               002870
280   C F18                                                             002880
            K=KP(I)                                                     002890
            R(K)=R(K)-ZP(I)                                             002900
      C F19                                                             002910
            IF(R(K).LT.0.)R(K)=0.                                       002920
285   C F20                                                             002930
```

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                ICALL1=1                                                        002940
                CALL SRSORT(PSET,PR(57,IJJ),VPTL,XHP,ICALL1,VG,XHG)             002950
                V1=1./(1728.*VPTL)                                              002960
                PR(K,IJJ)=C(1,K)*V1+C(2,K)+C(3,K)*R(K)+C(4,K)*R(K)*R(K)         002970
290             PR(K,IJJ)=PR(K,IJJ)+PABS                                        002980
                ICALL1=1                                                        002990
                CALL SRSORT(PR(K,IJJ),PR(57,IJJ),VPTL,XHP,ICALL1,VG,XHG)        003000
                V1=1./(1728.*VPTL)                                              003010
                PR(K,IJJ)=C(1,K)*V1+C(2,K)+C(3,K)*R(K)+C(4,K)*R(K)*R(K)         003020
295             RS(K,IJJ)=PR(K,IJJ)+PABS                                        003030
                PR(K,IJJ)=PR(K,IJJ)+PABS                                        003040
                E(K)=(C(7,K)/PR(K,IJJ))*100.+E(K)                               003050
            217 CONTINUE                                                        003060
                IF(ITEST.GT.0.AND.ITEST.LT.391)GOTO 227                         003070
300             IF(ITEST.GT.559.AND.ITEST.LT.1436)GOTO 227                      003080
            C REVERSE FLOW MODIFICATION                                         003090
            C F21                                                               003100
                CALL REVER(PR(5,IJJ),PR(6,IJJ))                                 003110
                CALL REVER(C(7,5),C(7,6))                                       003120
305             CALL REVER(E(5),E(6))                                           003130
            227 CONTINUE                                                        003140
            C F22                                                               003150
                PSD(IJJ)=(PR(5,IJJ)+PR(6,IJJ))*.5                               003160
                PSDE=SQRT((.5*C(7,5))**2+(.5*C(7,6))**2)                        003170
310             SP(23,IJJ)=PSD(IJJ)                                             003180
                ERR(23)=ERR(23)+PSDE                                            003190
            C DIFFERENTIAL PRESSURE CELL CONVERSION                             003200
            C SELECTION OF BLH OR ROSEMONT DP CELL FOR SN 7 AND 8               003210
                IBLHCEL=0                                                       003220
315             DO 220 I=1,NDP                                                  003230
            C F23                                                               003240
                K=KDP(I)                                                        003250
                IF(K.EQ.8) GOTO 221                                             003260
                GOTO 220                                                        003270
320         C F24                                                               003280
            221 IF(ZDP(I).GT.40.) IBLHCEL=1                                     003290
            220 CONTINUE                                                        003300
                DO 239 I=1,NDP                                                  003310
            C F25                                                               003320
325             K=KDP(I)                                                        003330
                R(K)=R(K)-ZDP(I)                                                003340
            C F26                                                               003350
                IF(K.EQ.7)M=5                                                   003360
                IF(K.EQ.8)M=5                                                   003370
330         C F27                                                               003380
                IF(K.EQ.9)M=10                                                  003390
            C F28                                                               003400
                IF(K.EQ.69)M=42                                                 003410
            C F29                                                               003420
335             IF(K.EQ.37.OR.K.EQ.39)M=47                                      003430
            C F30                                                               003440
                IF(K.EQ.38.OR.K.EQ.40)M=48                                      003450
            C F31                                                               003460
                IF(K.EQ.43.OR.K.EQ.45)M=41                                      003470
340         C F32                                                               003480
                IF(K.EQ.44.OR.K.EQ.46)M=42                                      003490
            C F33                                                               003500
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```
                IF(K.EQ.60.OR.K.EQ.66)M=5                                       003510
                IF(K.EQ.61.OR.K.EQ.62)M=5                                       003520
345           C F34                                                             003530
                PR(K,IJJ)=C(1,K)*V1+((C(2,K)+C(4,K)*RS(M,IJJ))+(C(3,K)+C(5,K)*RS(M003540
               *,IJJ))*R(K))*C(6,K)                                             003550
                E(K)=(C(7,K)/PR(K,IJJ))*100.+E(K)                               003560
                RS(K,IJJ)=PR(K,IJJ)                                             003570
350           239   CONTINUE                                                    003580
              C SELECTION OF LEG TO LEG DP CELL                                 003590
                IF(IBLHCEL.EQ.1) GOTO 70                                        003600
              C  ROSEMONT                                                       003610
                IF(ITEST.GT.297) GOTO 66                                        003620
355             IF(PR(7,IJJ).GT.25.) GOTO 246                                   003630
                GOTO 242                                                        003640
              66    IF(PR(7,IJJ).GT.16..OR.PR(7,IJJ).LT.-8.)GOTO 246            003650
              C  BLH                                                            003660
              70    IF(ITEST.GT.400)  GOTO 242                                  003670
360             IF(PR(7,IJJ).GT.200..OR.PR(7,IJJ).LT.-200.)GOTO 246             003680
              C F35                                                             003690
              242   MJ=8                                                        003700
                SP(9,IJJ)=PR(8,IJJ)                                             003710
                ERR(9)=ERR(9)+C(7,8)                                            003720
365             GOTO 250                                                        003730
              C F36                                                             003740
              246   MJ=7                                                        003750
                SP(9,IJJ)=PR(7,IJJ)                                             003760
                ERR(9)=C(7,7)+ERR(9)                                            003770
370           250   CONTINUE                                                    003780
              C DRAG DISC CONVERSION                                            003790
                DO 274 I=1,NDD                                                  003800
              C F37                                                             003810
                K=KDD(I)                                                        003820
375           C F38                                                             003830
                IF(K.EQ.1.OR.K.EQ.26)M=30                                       003840
              C F39                                                             003850
                IF(K.EQ.2.OR.K.EQ.27)M=31                                       003860
              C F40                                                             003870
380             DZZ(I)=ZDD(I)+C(3,K)*(PR(M,IJJ)-525.)                           003880
                R(K)=R(K)-DZZ(I)                                                003890
                PR(K,IJJ)=C(1,K)+C(2,K)*R(K)                                    003900
                RS(K,IJJ)=PR(K,IJJ)                                             003910
              274   CONTINUE                                                    003920
385           C TURBINE METER CONVERSION                                        003930
                DO 282 I=1,NT                                                   003940
              C F41                                                             003950
                K=KT(I)                                                         003960
                IF(ITEST.LT.244.OR.ITEST.GT.364) GOTO 283                       003970
390             IF(K.NE.3) GOTO 283                                             003980
                R(K)=R(28)                                                      003990
                R(28)=0.                                                        004000
              283   CONTINUE                                                    004010
                R(K)=R(K)-ZT(I)                                                 004020
395             PR(K,IJJ)=C(1,K)+C(3,K)*R(K)                                    004030
                RS(K,IJJ)=PR(K,IJJ)                                             004040
              282   CONTINUE                                                    004050
              C GAMMA DENSITOMETER CONVERSION                                   004060
                DO 288 I=1,NGD                                                  004070
```

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      C F42                                                                  004080
            K=KGD(I)                                                         004090
            IF(K.NE.19) GOTO 285                                             004100
            IF(ITEST.GT.527.AND.ITEST.LT.559) GOTO 287                       004110
      C F43                                                                  004120
      285   IF(R(K).LE.C(3,K)) R(K)=C(3,K)+.001                              004130
            PR(K,IJJ)=(C(1,K)-ALOG(R(K)-C(3,K)))/C(2,K)                      004140
            IF(PR(K,IJJ).LT.0.) PR(K,IJJ)=0.                                 004145
            RS(K,IJJ)=PR(K,IJJ)                                              004150
            GOTO 288                                                         004160
      C F44                                                                  004170
      287   PR(19,IJJ)=1.0                                                   004180
            RS(K,IJJ)=PR(K,IJJ)                                              004190
      288   CONTINUE                                                         004200
      C SPEEDOMETER CONVERSION                                               004210
            DO 295 I=1,NSM                                                   004220
      C F45                                                                  004230
            K=KSM(I)                                                         004240
            R(K)=R(K)-ZSM(I)                                                 004250
            PR(K,IJJ)=C(2,K)*C(4,K)*R(K)                                     004260
      295   CONTINUE                                                         004270
            IF(PSPD.GE.0.)GOTO 298                                           004280
      C F46                                                                  004290
            PR(K,IJJ)=-PR(K,IJJ)                                             004300
      C F47                                                                  004310
      298   RS(K,IJJ)=PR(K,IJJ)                                              004320
            SP(6,IJJ)=PR(K,IJJ)                                              004330
            ERR(6)=C(7,K)+ERR(6)                                             004340
      C TORQUEMETER CONVERSION                                               004350
            I=1                                                              004360
            K=KTM(I)                                                         004370
            K1=KSM(1)                                                        004380
            R(K)=R(K)-ZTM(I)                                                 004390
            PR(K,IJJ)=C(2,K)*(R(K)-C(3,K))                                   004400
            PR(K,IJJ)=-PR(K,IJJ)/12.                                         004410
      C FRICTION TORQUE                                                      004420
            FRT(IJJ)=-.018*(PR(5,IJJ)-PABS)+.0000305*(PR(5,IJJ)-PABS)**2     004430
            FRT(IJJ)=FRT(IJJ)+8.0197E-2*ABS(PR(K1,IJJ))                      004440
            FRT(IJJ)=FRT(IJJ)-3.5856E-6*(PR(K1,IJJ))**2                      004450
            FRT(IJJ)=FRT(IJJ)/12.                                            004460
            FRTE=1.96                                                        004470
      C F48                                                                  004480
            IF(PR(K1,IJJ).LT.0.)FRT(IJJ)=-FRT(IJJ)                           004490
      C F49                                                                  004500
      C HYDRAULIC TORQUE                                                     004510
            HRT(IJJ)=PR(K,IJJ)-FRT(IJJ)                                      004520
            HRTE=SQRT(C(7,K)**2+FRTE**2)                                     004530
            ERR(10)=ERR(10)+HRTE                                             004540
            ERR(11)=ERR(11)+FRTE                                             004550
            ERR(12)=ERR(12)+C(7,K)                                           004560
            SP(10,IJJ)=HRT(IJJ)                                              004570
            SP(11,IJJ)=FRT(IJJ)                                              004580
            SP(12,IJJ)=PR(K,IJJ)                                             004590
            RS(K,IJJ)=PR(K,IJJ)                                              004600
      C MAGNETIC FLOWMETER CONVERSION                                        004610
            PR(32,IJJ)=C(1,32)*(R(32)-ZMF)                                   004620
            RS(32,IJJ)=PR(32,IJJ)                                            004630
```

```
      C END BLOCK F                                                          004640
      C START BLOCK G                                                        004650
      C WATER FLOW CALCULATION                                               004660
460         IF(IFLOW.EQ.0)GOTO 332                                           004670
      C G1                                                                   004680
            WW(IJJ)=0.                                                       004690
      C G2                                                                   004700
            IF(IFLOS.EQ.1) WW(IJJ)=1.0                                       004710
465         GOTO 389                                                         004720
      332   CONTINUE                                                         004730
            IF(IWFLO.EQ.1)GOTO 360                                           004740
      C MAIN WATER ORIFICE                                                   004750
      C G3                                                                   004760
470         DO=5.8048                                                        004770
            D=10.908                                                         004780
            IF(PR(44,IJJ).LT.3.5)GOTO 343                                    004790
            IF(ITEST.LT.298)GOTO 338                                         004800
            IF(PR(44,IJJ).GT.25.)GOTO 340                                    004810
475   C G4                                                                   004820
      338   SDP=C(7,44)                                                      004830
            GOTO 345                                                         004840
      C G5                                                                   004850
      340   PR(44,IJJ)=PR(69,IJJ)                                            004860
480         SDP=C(7,69)                                                      004870
            GOTO 345                                                         004880
      C G6                                                                   004890
      343   PR(44,IJJ)=PR(38,IJJ)                                            004900
            SDP=C(7,38)                                                      004910
485   345   CONTINUE                                                         004920
            GOTO 371                                                         004930
      360   CONTINUE                                                         004940
      C BYPASS WATER ORIFICE                                                 004950
      C G7                                                                   004960
490         DO=2.1488                                                        004970
            D=3.610                                                          004980
            IF(PR(46,IJJ).LT.3.5)GOTO 369                                    004990
      C G8                                                                   005000
            SDP=C(7,46)                                                      005010
495         GOTO 371                                                         005020
      C G9                                                                   005030
      369   PR(46,IJJ)=PR(40,IJJ)                                            005040
            SDP=C(7,40)                                                      005050
      371   CONTINUE                                                         005060
500   C G10                                                                  005070
            J1=42+6*IWFLO                                                    005080
            J2=58-5*IWFLO                                                    005090
            J3=44+2*IWFLO                                                    005100
      C G11                                                                  005110
505         IF(IFLOS.EQ.1) PR(J2,IJJ)=PR(55,IJJ)                             005120
      C G12                                                                  005130
            ICALL2=2                                                         005140
            CALL SATUR(PWO,PR(J2,IJJ),VPTL,HSCMT,VG,XHG,ICALL2)              005150
            AA(9)=AA(9)+PWO                                                  005160
510         ICALL2=2                                                         005170
            CALL SATUR(PWO1,PR(J2,IJJ)+1.,VPTL1,HSCMT1,VG1,XHG1,ICALL2)      005180
            PR(J1,IJJ)=PWC                                                   005190
            RTL=1./VPTL                                                      005200
```

```
                RTLE=(RTL-1./VPTL1)*C(7,J2)*1.8                                 005210
515             HSCME=(HSCMT-HSCMT1)*C(7,J2)*1.8                                005220
                ICALL1=1                                                        005230
                CALL FLOW(PR(J3,IJJ),PR(J1,IJJ),PR(J2,IJJ),D,DO,VPTL,ICALL1,WW(IJJ005240
               *),XK9,Y,FA)                                                     005250
                DP=PR(J3,IJJ)                                                   005260
520             SFA=.000022*C(7,J2)*1.8                                         005270
                CONTINUE                                                        005280
              C WATER ORIFICE UNCERTAINTIES                                     005290
                SK=.01*XK9                                                      005300
                SD=.001                                                         005310
525             E1=(SK/XK9)**2+(2.*SD/DO)**2+(RTLE/(2.*RTL))**2                 005320
                E2=(SDP/(2.*DP))**2+(SFA/FA)**2                                 005330
                WWE=WW(IJJ)*SQRT(E1+E2)                                         005340
                E(73)=(WWE/WW(IJJ))*100.+E(73)                                  005350
              389   CONTINUE                                                    005360
530           C STEAM FLOW CALCULATION                                          005370
              C G13                                                             005380
                COND=.0005                                                      005390
                SCOND=.0005                                                     005400
                IF(IFLOS.EQ.0)GOTO 396                                          005410
535           C G14                                                             005420
                WS(IJJ)=0.                                                      005430
                GOTO 471                                                        005440
              396   CONTINUE                                                    005450
                IF(ISFLO.EQ.1)GOTO 431                                          005460
540           C MAIN STEAM ORIFICE                                              005470
              C G15                                                             005480
                D=5.734                                                         005490
                DO=3.9397                                                       005500
              C G16                                                             005510
545             IF(ITEST.LT.298)  DO=3.1615                                     005520
                IF(PR(43,IJJ).LT.3.5)GOTO 403                                   005530
              C G17                                                             005540
                SDP=C(7,43)                                                     005550
                GOTO 405                                                        005560
550           C G18                                                             005570
              403   PR(43,IJJ)=PR(37,IJJ)                                       005580
                SDP=C(7,37)                                                     005590
              405   CONTINUE                                                    005600
                GOTO 439                                                        005610
555           431   CONTINUE                                                    005620
              C BYPASS STEAM ORIFICE                                            005630
              C G19                                                             005640
                DO=1.2322                                                       005650
                D=2.770                                                         005660
560             IF(PR(45,IJJ).LT.3.5)GOTO 437                                   005670
              C G20                                                             005680
                SDP=C(7,45)                                                     005690
                GOTO 439                                                        005700
              C G21                                                             005710
565           437   PR(45,IJJ)=PR(39,IJJ)                                       005720
                SDP=C(7,39)                                                     005730
              439   CONTINUE                                                    005740
              C G22                                                             005750
                J2=59-5*ISFLO                                                   005760
570             J3=43+2*ISFLO                                                   005770
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                ICALL2=2                                                        005780
                CALL SATUR(PST,PR(J2,IJJ),VSS,HSS,VSG,HSG,ICALL2)               005790
                AA(12)=AA(12)+PST                                               005800
                ICALL2=2                                                        005810
575             CALL SATUR(PST1,PR(J2,IJJ)+1.,VSS1,HSS1,VSG1,HSG1,ICALL2)       005820
                RTS=1./VSS                                                      005830
                RTS1=1./VSS1                                                    005840
                RTSE=((RTS-RTS1)/1.)*C(7,J2)*1.8                                005850
                HSSE=((HSS-HSS1)/1.)*C(7,J2)*1.8                                005860
580             HSGE=((HSG-HSG1)/1.)*C(7,J2)*1.8                                005870
                RTG=1./VSG                                                      005880
                RTG1=1./VSG1                                                    005890
                RTGE=((RTG-RTG1)/1.)*C(7,J2)*1.8                                005900
                RSTC=RTS*RTG*(1.+COND)/(RTG*COND+RTS)                           005910
585             VPTL=1./RSTC                                                    005920
                ST1=RSTC/(RTS+COND*RTG)                                         005930
                RTGE=ST1*SQRT(((RTS/RTG)*RTGE)**2+((COND*RTG/RTS)*RTSE)**2+(((  005940
               *RTS-RTG)/(1.+COND))*SCOND)**2)                                  005950
                RTG=RSTC                                                        005960
590             HCOND=(HSG+COND*HSS)/(1.+COND)                                  005970
                HCONDE=1./(1.+COND)*SQRT(HSGE**2+(COND*HSSE)**2+(((HSS-HSG)/(1. 005980
               **+COND))*SCOND)**2)                                             005990
                ICALL2=2                                                        006000
                CALL FLOW(PR(J3,IJJ),PST,PR(J2,IJJ),D,DD,VPTL,ICALL2,WS(IJJ),XK 006010
595            *9,V,FA)                                                         006020
                DP=PR(J3,IJJ)                                                   006030
                SFA=.000022*C(7,J2)*1.8                                         006040
                SY=DP*.018716/PST                                               006050
                CONTINUE                                                        006060
600         C STEAM ORIFICE UNCERTAINTIES                                       006070
                SDP=.02                                                         006080
                SK=.01*XK9                                                      006090
                E1=(SK/XK9)**2+(2.*SD/DO)**2+(SDP/(2.*DP))**2                   006100
                E2=(RTGE/(2.*RTG))**2+(SY/Y)**2+(SFA/FA)**2                     006110
605             WSE=WS(IJJ)*SQRT(E1+E2)                                         006120
                E(74)=E(74)+(WSE/WS(IJJ))*100.                                  006130
            C G23                                                               006140
            471 WT(IJJ)=WW(IJJ)+WS(IJJ)                                         006150
                SP(43,IJJ)=WW(IJJ)                                              006160
610             SP(44,IJJ)=WS(IJJ)                                              006170
                WTE=SQRT(WWE**2+WSE**2)                                         006180
            C TEST PUMP INJECTION FLOW                                          006190
                D=1.727                                                         006200
                DD=.811                                                         006210
615             ICALL1=1                                                        006220
                CALL SRSORT(PR(10,IJJ),PR(21,IJJ),VPTL,XHP,ICALL1,VG,XHG)       006230
                ICALL1=1                                                        006240
                CALL SRSORT(PR(10,IJJ)+1.,PR(21,IJJ),VPTL1,XHP1,ICALL1,VG1,XHG1) 006250
                ICALL1=1                                                        006260
620             CALL SRSORT(PR(10,IJJ),PR(21,IJJ)-1.,VPTL2,XHP2,ICALL1,VG2,XHG2) 006270
                ICALL1=1                                                        006280
                CALL SRSORT(14.7,PR(22,IJJ),VIJ,HIJ,ICALL1,VIJG,HIJG)           006290
                RTL=1./VPTL                                                     006300
                RTL1=1./VPTL1                                                   006310
625             RTL2=1./VPTL2                                                   006320
                RTLP=((RTL-RTL1)/1.)*C(7,10)                                    006330
                RTLT=((RTL-RTL2)/1.)*C(7,21)                                    006340
```

```
                RTLE=SQRT(RTLP**2+RTLT**2)                                      006350
                ICALL1=1                                                        006360
630             CALL FLOW(PR(9,IJJ),PR(10,IJJ),PR(21,IJJ),D,DO,VPTL,ICALL1,WI(IJJ)006370
               *,XK9,Y,FA)                                                      006380
                WO(IJJ)=(RS(32,IJJ)*60.)/(7.4805*VIJ)                           006390
                IF(WO(IJJ).LE.0.) WO(IJJ)=.001                                  006400
                WL=WO(IJJ)-WI(IJJ)                                              006410
635             WSU=WT(IJJ)                                                     006420
                WD=WT(IJJ)-WL                                                   006430
                WA=WT(IJJ)-.5*WL                                                006440
                SP(45,IJJ)=WI(IJJ)                                              006450
                SP(46,IJJ)=WO(IJJ)                                              006460
640         C INJECTION FLOW UNCERTAINTIES                                      006470
                DP=PR(9,IJJ)                                                    006480
                SDP=.02                                                         006490
                SK=.01*XK9                                                      006500
                SFA=.000022*C(7,21)*1.8                                         006510
645             E1=(SK/XK9)**2+(2.*SD/DO)**2+(SDP/(2.*DP))**2                   006520
                E2=(RTLE/(2.*RTL))**2+(SFA/FA)**2                               006530
                WIE=WI(IJJ)*SQRT(E1+E2)                                         006540
                WOE=(.05*60)/(7.4805*VIJ)                                       006550
                E(75)=E(75)+(WIE/WI(IJJ))*100.                                  006560
650             E(76)=E(76)+(WOE/WO(IJJ))*100.                                  006570
                WLE=SQRT(WOE**2+WIE**2)                                         006580
                VWLE=(WLE/WL)*100.                                              006590
            C FLUID PROPERTY CALCULATIONS                                       006600
            C INLET INJECTION ENTHALPY AND ITS UNCERTAINTY                      006610
655             HI=(WO(IJJ)*HIJ-WI(IJJ)*XHP)/WL                                 006620
                HIP=((XHP-XHP1)/1.)*C(7,10)                                     006630
                HIT=((XHP-XHP2)/1.)*C(7,21)                                     006640
                HIE=SQRT(HIP**2+HIT**2)                                         006650
            C  TEST SECTION SATURATION PROPERTIES                               006660
660             ICALL2=2                                                        006670
                CALL SATUR(PSP,PR(55,IJJ),VFTS,HFTS,VGTS,HGTS,ICALL2)           006680
                ICALL2=2                                                        006690
                CALL SATUR(PSP1,PR(55,IJJ)+1.,VFTS1,HFTS1,VGTS1,HGTS1,ICALL2)   006700
                ICALL2=2                                                        006710
665             CALL SATUR(PDP,PR(56,IJJ),VFTD,HFTD,VGTD,HGTD,ICALL2)           006720
                ICALL2=2                                                        006730
                CALL SATUR(PDP1,PR(56,IJJ)+1.,VFTD1,HFTD1,VGTD1,HGTD1,ICALL2)   006740
                ICALL1=1                                                        006750
                CALL SATUR(PR(5,IJJ),TSPS,VFPS,HFPS,VGPS,HGPS,ICALL1)           006760
670             ICALL1=1                                                        006770
                CALL SATUR(PR(6,IJJ),TSPD,VFPD,HFPD,VGPD,HGPD,ICALL1)           006780
                ICALL1=1                                                        006790
                CALL SATUR(PR(5,IJJ)+1.,TSPS1,VFPS1,HFPS1,VGPS1,HGPS1,ICALL1)   006800
                ICALL1=1                                                        006810
675             CALL SATUR(PR(6,IJJ)+1.,TSPD1,VFPD1,HFPD1,VGPD1,HGPD1,ICALL1)   006820
                ICALL2=2                                                        006830
                CALL SATUR(PAPS,TSD(IJJ),VATS,HATS,VGATS,HGATS,ICALL2)          006840
                ICALL2=2                                                        006850
                CALL SATUR(PAPS,TSD(IJJ)+1.,VATS1,HATS1,VGATS1,HGATS1,ICALL2)   006860
680             TSAT(IJJ)=TSPS                                                  006870
                TDAT(IJJ)=TSPD                                                  006880
                SSAT(IJJ)=PSP                                                   006890
                DSAT(IJJ)=PDP                                                   006900
                PS=PSP                                                          006910
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320012

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685               PD=PDP                                                  006920
                C CONVERSION OF SPECIFIC VOLUMES TO DENSITIES             006930
                  RFTS=1./VFTS                                            006940
                  RFTS1=1./VFTS1                                          006950
                  RGTS=1./VGTS                                            006960
690               RGTS1=1./VGTS1                                          006970
                  RFTD=1./VFTD                                            006980
                  RGTD1=1./VGTD1                                          006990
                  RGTD=1./VGTD                                            007000
                  RFTD1=1./VFTD1                                          007010
695               RATS=1./VATS                                            007020
                  RGATS=1./VGATS                                          007030
                  RATS1=1./VATS1                                          007040
                  RGATS1=1./VGATS1                                        007050
                C LOWER BOUNDS OF GAMMA DENSITOMETER DENSITIES            007060
700               DO 551 I=1,9                                            007070
                C G24                                                     007080
                  K=KGD(I)                                                007090
                  IF(ITEST.GT.0.AND.ITEST.LT.391)GOTO 482                 007100
                  IF(ITEST.GT.559.AND.ITEST.LT.1436)GOTO 482              007110
705               IF(I.GT.3.AND.I.LT.7) GOTO 497                          007120
                  GOTO 494                                                007130
                482  IF(I.LT.4.OR.I.GT.6) GOTO 497                        007140
                C G25                                                     007150
                494  IF(PR(K,IJJ).LT.RGTD) PR(K,IJJ)=RGTD                 007160
710               GOTO 551                                                007170
                C G26                                                     007180
                497  IF(PR(K,IJJ).LT.RGTS) PR(K,IJJ)=RGTS                 007190
                551  CONTINUE                                             007200
                C  TEST SECTION SATURATION PROPERTY UNCERTAINTIES          007210
715             C G27                                                     007220
                  E(82)=E(82)+((ABS((TSPS-TSPS1)/1.)*C(7,5))/TSPS)*100.   007230
                  E(83)=E(83)+((ABS((TSPD-TSPD1)/1.)*C(7,6))/TSPD)*100.   007240
                  E(84)=E(84)+((ABS((PSP-PSP1)/1.)*C(7,55)*1.8)/PSP)*100. 007250
                  E(85)=E(85)+((ABS((PDP-PDP1)/1.)*C(7,56)*1.8)/PDP)*100. 007260
720               VFTSE=ABS((VFTS-VFTS1)/1.)*C(7,55)*1.8                  007270
                  VFTDE=ABS((VFTD-VFTD1)/1.)*C(7,56)*1.8                  007280
                  VGTSE=ABS((VGTS-VGTS1)/1.)*C(7,55)*1.8                  007290
                  VGTDE=ABS((VGTD-VGTD1)/1.)*C(7,56)*1.8                  007300
                  RFTSE=RFTS*(VFTSE/VFTS)                                 007310
725               RGTSE=RGTS*(VGTSE/VGTS)                                 007320
                  RFTDE=RFTD*(VFTDE/VFTD)                                 007330
                  RGTDE=RGTD*(VGTDE/VGTD)                                 007340
                  RDSE=ABS(((RFTS-RGTS)-(RFTS1-RGTS1))/1.)*C(7,55)*1.8    007350
                  RDPE=ABS(((RFTD-RGTD)-(RFTD1-RGTD1))/1.)*C(7,56)*1.8    007360
730               RATSE=ABS((RATS-RATS1)/1.)*TSDE                         007370
                  RDATSE=ABS(((RATS-RGATS)-(RATS1-RGATS1))/1.*TSDE)       007380
                  HFTSE=ABS((HFTS-HFTS1)/1.)*C(7,55)*1.8                  007390
                  HGTSE=ABS((HGTS-HGTS1)/1.)*C(7,55)*1.8                  007400
                  HFTDE=ABS((HFTD-HFTD1)/1.)*C(7,56)*1.8                  007410
735               HGTDE=ABS((HGTD-HGTD1)/1.)*C(7,56)*1.8                  007420
                  HDGSE=ABS(((HGTS-HFTS)-(HGTS1-HFTS1))/1.)*C(7,55)*1.8   007430
                  HDGDE=ABS(((HGTD-HFTD)-(HGTD1-HFTD1))/1.)*C(7,56)*1.8   007440
                C TEST PUMP PERFORMANCE CALCULATIONS                      007450
                C VOID FRACTION CALCULATION                               007460
740             C MIXING TEE VOID FRACTION                                007470
                C UPSTREAM QUALITY CALCULATION                            007480
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320013

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                XKW=.552                                                        007490
                XKS=.335                                                        007500
                XKWE=.3*XKW                                                     007510
745             XKSE=.3*XKS                                                     007520
                XLW=40.8                                                        007530
                XLS=49.5                                                        007540
          C G28                                                                 007550
                IF(IFLOS.EQ.1) XLS=.1                                           007560
750       C G29                                                                 007570
                XLWE=.5                                                         007580
                XLSE=.5                                                         007590
                IF(WW(IJJ).GT.0.)GOTO 604                                       007600
          C G30                                                                 007610
755             XLW=27.5                                                        007620
                XKL=XKS*XLS+XKW*XLW                                             007630
                TFL=(PR(55,IJJ)+PR(59,IJJ))*.5                                  007640
                TFLE=1.8*SQRT((.5*C(7,55))**2+(.5*C(7,59))**2)                  007650
                GOTO 624                                                        007660
760       604   CONTINUE                                                        007670
          C G31                                                                 007680
                XKL=XKS*XLS+XKW*XLW                                             007690
                TFL=(PR(58,IJJ)+PR(55,IJJ))*.5                                  007700
                TFLE=1.8*SQRT((.5*C(7,55))**2+(.5*C(7,58))**2)                  007710
765       624   CONTINUE                                                        007720
          C G32                                                                 007730
                X1=XKL*(TFL-PR(57,IJJ))                                         007740
                X2=WW(IJJ)*(HGTS-HSCMT)+WS(IJJ)*(HGTS-HCOND)                    007750
                XPS=1.-(X1+X2)/((WW(IJJ)+WS(IJJ))*(HGTS-HFTS))                  007760
770             TERM1=X2+X1                                                     007770
                TERM2=(WW(IJJ)*HSCME)**2+(WS(IJJ)*HCONDE)**2+((WW(IJJ)+WS       007780
               *(IJJ))*HGTSE)**2+XKL**2*(C(7,57)**2+TFLE**2)                    007790
                TERM3=(TFL-PR(57,IJJ))*((XKS*XLS)**2*((XKSE/XKS)**2+(XLSE/      007800
               *XLS)**2)+(XKW*XLW)**2*((XKWE/XKW)**2+(XLWE/XLW)**2))            007810
775             TERM4=(TERM1*(HDGSE/(HGTS-HFTS)))**2                            007820
                TERM5=(((HSCMT-HGTS)+TERM1/(WW(IJJ)+WS(IJJ)))*WWE)**2           007830
                TERM6=(((HCOND-HGTS)+TERM1/(WW(IJJ)+WS(IJJ)))*WSE)**2           007840
                TERM7=1./((WS(IJJ)+WW(IJJ))*(HGTS-HFTS))                        007850
                XPSE=TERM7*SQRT(TERM2+TERM3+TERM4+TERM5+TERM6)                  007860
780       C UPSTREAM VOID FRACTION CALCULATION                                  007870
                HTS=HFTS+XPS*(HGTS-HFTS)                                        007880
                HTSE=SQRT(HFTSE**2+(XPSE*(HGTS-HFTS))**2+(HDGSE*XPS)**2)        007890
                APS(IJJ)=1./(1.+RGTS/RFTS*(1./XPS-1.))                          007900
                CS=RGTS*RFTS*XPS*(1.-XPS)/(RFTS*XPS+RGTS*(1.-XPS))**2           007910
785             APSE=CS*SQRT((RFTSE/RFTS)**2+(RGTSE/RGTS)**2+(XPSE/(XPS*(1.-XPS)))007920
               ***2)                                                            007930
                IF(XPS.LE.1.0) GOTO 652                                         007940
          C G33                                                                 007950
                IF(PR(5,IJJ).GE.PSP) PR(5,IJJ)=PSP-.001                         007960
790       C G34                                                                 007970
                ICALL1=1                                                        007980
                CALL SRSORT(PR(5,IJJ),PR(55,IJJ),VSMD(IJJ),HTS,ICALL1,PY,HY)    007990
                ICALL1=1                                                        008000
                CALL SRSORT(PR(5,IJJ)-1,PR(55,IJJ),VSMDP,HP,ICALL1,VSP,HSP)     008010
795             PSMDP=1/VSMDP                                                   008020
                ICALL1=1                                                        008030
                CALL SRSORT(PR(5,IJJ),PR(55,IJJ)+1,VSMDT,HT,ICALL1,VST,HST)     008040
                PSMDT=1/VSMDT                                                   008050
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320014

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      PSMD(IJJ)=1./VSMD(IJJ)                                                  008060
800   VSMDE=SQRT((VSMDP-VSMD(IJJ))**2+(VSMDT-VSMD(IJJ))**2)                  008070
      PSMDE=SQRT((PSMDP-PSMD(IJJ))**2+(PSMDT-PSMD(IJJ))**2)                  008080
      GOTO 654                                                               008090
C G35                                                                        008100
652   PS=PSP                                                                 008110
805   IF(XPS.GE.0.) GOTO 653                                                 008120
C G36                                                                        008130
      HX=HFTS                                                                008140
      XPS=0.                                                                 008150
      APS(IJJ)=0.                                                            008160
810 C G37                                                                    008170
653   PSMD(IJJ)=RFTS-APS(IJJ)*(RFTS-RGTS)                                    008180
      VSMD(IJJ)=1./PSMD(IJJ)                                                 008190
      PSMDE=SQRT(RFTSE**2+((RFTS-RGTS)*APSE)**2+(APS(IJJ)*RDSE)**2)          008200
      VSMDE=(PSMDE/PSMD(IJJ))*VSMD(IJJ)                                      008210
815   IF(APS(IJJ).EQ.0.) GOTO 654                                            008220
C G38                                                                        008230
      VAPSE(IJJ)=(APSE/APS(IJJ))*100.                                        008240
C G39                                                                        008250
654   E(78)=(PSMDE/PSMD(IJJ))*100.+E(78)                                     008260
820   PSO=PSO+PS/5.                                                          008270
C DOWNSTREAM QUALITY CALCULATION                                             008280
C EFFECT OF INJECTION WATER                                                  008290
      HPT=(WSU*HTS-WL*HI)/(WD)                                               008300
      HPT=HPT+(120.*3.14159*HRT(IJJ)*PR(12,IJJ))/((WD)*772.)                 008310
825   CAL1=(WSU*HTSE)**2+(WL*HIE)**2                                         008320
      CAL2=(((WL*HI-WL*HTS)/(WD))*WTE)**2                                    008330
      CAL3=(((WSU*HTS-WSU*HI)/(WD))*WLE)**2                                  008340
      HPTE=(1./(WD))*SQRT(CAL1+CAL2+CAL3)                                    008350
      XPD=(HPT-HFTD)/(HGTD-HFTD)                                             008360
830   XPDE=HPTE**2+((1-XPD)*HFTDE)**2+(XPD*HGTDE)**2                         008370
      XPDE=(1./(HGTD-HFTD))*SQRT(XPDE)                                       008380
C DOWNSTREAM VOID FRACTION CALCULATION                                       008390
      APD(IJJ)=1./(1.+RGTD/RFTD*(1./XPD-1.))                                 008400
      CS=RGTD*RFTD*XPD*(1.-XPD)/(RFTD*XPD+RGTD*(1.-XPD))**2                  008410
835   APDE=CS*SQRT((RFTDE/RFTD)**2+(RGTDE/RGTD)**2+(XPDE/(XPD*(1.-XPD)))008420
     ***2)                                                                   008430
      VAPDE(IJJ)=(APDE/APD(IJJ))*100.                                        008440
      IF(XPD.LT.1.0) GOTO 680                                                008450
C G40                                                                        008460
840   IF(PR(6,IJJ).GE.PDP) PR(6,IJJ)=PDP-.001                                008470
C G41                                                                        008480
      ICALL1=1                                                               008490
      CALL SRSORT(PR(6,IJJ),PR(56,IJJ),VDMD(IJJ),HPT,ICALL1,PY,HY)           008500
      PDMD(IJJ)=1/VDMD(IJJ)                                                  008510
845   ICALL1=1                                                               008520
      CALL SRSORT(PR(6,IJJ)-1,PR(56,IJJ),VDMDP,HP,ICALL1,VSP,HSP)            008530
      PDMDP=1/VDMDP                                                          008540
      ICALL1=1                                                               008550
      CALL SRSORT(PR(6,IJJ),PR(56,IJJ)+1,VDMDT,HT,ICALL1,VST,HST)            008560
850   PDMDT=1/VDMDT                                                          008570
      VDMDE=SQRT((VDMDP-VDMD(IJJ))**2+(VDMDT-VDMD(IJJ))**2)                  008580
      PDMDE=SQRT((PDMDP-PDMD(IJJ))**2+(PDMDT-PDMD(IJJ))**2)                  008590
      GOTO 690                                                               008600
C G42                                                                        008610
855   680   PD=PDP                                                           008620
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                PC=PSP+PR(MJ,IJJ)                                                  008630
              C G43                                                                008650
                PR6=PR(6,IJJ)-20.                                                  008660
              C G44                                                                008670
860           IF(XPS.LE.0..AND.PD.LT.PC) GOTO 682                                  008680
                IF(PD.EQ.PR6) GOTO 682                                             008690
                IF(XPD.LE.0.) APD(IJJ)=0.                                          008700
                GOTO 688                                                           008710
              C G45                                                                008720
865           682  IF(PD.LE.PR6) PD=PR6                                            008730
                PC=PD                                                              008735
                ICALL1=1                                                           008740
                CALL SRSORT(PD,PR(56,IJJ),VDMD(IJJ),HX,ICALL1,VG,HG)               008750
                PDMD(IJJ)=1./VDMD(IJJ)                                             008760
870             XPD=0.0                                                            008770
                APD(IJJ)=0.0                                                       008780
                GOTO 689                                                           008790
              C G46                                                                008800
              688  PDMD(IJJ)=RFTD-APD(IJJ)*(RFTD-RGTD)                             008810
875           VDMD(IJJ)=1./PDMD(IJJ)                                               008820
              C G47                                                                008830
              689  PDMDE=SQRT(RFTDE**2+((RFTD-RGTD)*APDE)**2+(APD(IJJ)*RDPE)**2)  008840
                VDMDE=(PDMDE/PDMD(IJJ))*VDMD(IJJ)                                  008850
              C G48                                                                008860
880           690  E(79)=(VDMDE/VDMD(IJJ))*100.+E(79)                              008870
                PDO=PDO+PD/5.                                                      008880
              C AVERAGE VOID FRACTION CALCULATION                                  008890
                PA(IJJ)=(PSMD(IJJ)+PDMD(IJJ))*.5                                   008900
                VPA(IJJ)=1./PA(IJJ)                                                008910
885             PAE=SQRT((.5*PSMDE)**2+(.5*PDMDE)**2)                              008920
                VPAE=(PAE/PA(IJJ))*VPA(IJJ)                                        008930
                SP(27,IJJ)=(RATS-PA(IJJ))/(RATS-RGATS)                             008940
                AAP=(1./(RATS-RGATS))*SQRT(RATSE**2+PAE**2+(SP(27,IJJ)*RDATSE)**2)008950
                ERR(27)=ERR(27)+AAP                                                008960
890             NRN=1                                                              008970
                IF(ITEST.GT.0.AND.ITEST.LT.391)GOTO 703                            008980
                IF(ITEST.GT.559.AND.ITEST.LT.1436)GOTO 703                         008990
                NRN=-1                                                             009000
                CALL REVER(PR(55,IJJ),PR(56,IJJ))                                  009010
895             CALL REVER(C(7,55),C(7,56))                                        009020
                CALL REVER(E(55),E(56))                                            009030
                CALL REVER(PR(5,IJJ),PR(6,IJJ))                                    009040
                CALL REVER(C(7,5),C(7,6))                                          009050
                CALL REVER(E(5),E(6))                                              009060
900             CALL REVER(TDAT(IJJ),TSPS)                                         009070
                CALL REVER(TSAT(IJJ),TSPD)                                         009080
                CALL REVER(RFTS,RFTD)                                              009090
                CALL REVER(RGTS,RGTD)                                              009100
                CALL REVER(SSAT(IJJ),PDP)                                          009110
905             CALL REVER(DSAT(IJJ),PSP)                                          009120
                CALL REVER(VFTSE,VFTDE)                                            009130
                CALL REVER(VGTSE,VGTDE)                                            009140
                CALL REVER(RFTSE,RFTDE)                                            009150
                CALL REVER(RGTSE,RGTDE)                                            009160
910             CALL REVER(RDSE,RDPE)                                              009170
                CALL REVER(PSMD(IJJ),PDMD(IJJ))                                    009180
                CALL REVER(PSMDE,PDMDE)                                            009190
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320016

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                CALL REVER(E(78),E(79))                                  009200
                CALL REVER(E(82),E(83))                                  009210
915             CALL REVER(E(84),E(85))                                  009220
                CALL REVER(PSO,PDO)                                      009230
                CALL REVER(VSMD(IJJ),VDMD(IJJ))                          009240
                CALL REVER(WSU,WD)                                       009250
                CALL REVER(APSE,APDE)                                    009260
920             CALL REVER(APS(IJJ),APD(IJJ))                            009270
            703 CONTINUE                                                 009280
                SP(1,IJJ)=PR(5,IJJ)                                      009290
                ERR(1)=ERR(1)+C(7,5)                                     009300
                SP(5,IJJ)=APS(IJJ)                                       009310
925             ERR(5)=ERR(5)+APSE                                       009320
                SP(13,IJJ)=PR(6,IJJ)                                     009330
                ERR(13)=ERR(13)+C(7,6)                                   009340
                SP(17,IJJ)=APD(IJJ)                                      009350
                ERR(17)=ERR(17)+APDE                                     009360
930             SP(33,IJJ)=PR(55,IJJ)                                    009370
                SP(34,IJJ)=PR(56,IJJ)                                    009380
                SP(35,IJJ)=PSMD(IJJ)                                     009390
                SP(36,IJJ)=PDMD(IJJ)                                     009400
                SP(41,IJJ)=WSU                                           009410
935             SP(42,IJJ)=WD                                            009420
            C GAMMA DENSITOMETER VOID FRACTION                           009430
            C G50                                                        009440
                RSD(IJJ)=PR(16,IJJ)                                      009450
                VRSD(IJJ)=1./RSD(IJJ)                                    009460
940             IF(ITEST.LT.526.OR.ITEST.GT.559)  GOTO 707               009470
            C G51                                                        009480
                RDD(IJJ)=PR(18,IJJ)                                      009490
                GOTO 709                                                 009500
            707 CONTINUE                                                 009510
945         C G52                                                        009520
                RDD(IJJ)=PR(19,IJJ)                                      009530
            709 CONTINUE                                                 009540
            C G53                                                        009550
                VRDD(IJJ)=1./RDD(IJJ)                                    009560
950             RSDE=C(7,16)                                             009570
                VRSDE=VRSD(IJJ)*(RSDE/RSD(IJJ))                          009580
                DO 714  I=15,20                                          009590
            C G54                                                        009600
                E(I)=C(7,I)+E(I)                                         009610
955         714 CONTINUE                                                 009620
                IF(ITEST.LT.526.OR.ITEST.GT.559)  GOTO 711               009630
            C G55                                                        009640
                RDDE=C(7,18)                                             009650
                GOTO 727                                                 009660
960         711 CONTINUE                                                 009670
            C G56                                                        009680
                RDDE=C(7,19)                                             009690
            727 CONTINUE                                                 009700
            C G57                                                        009710
965             VRDDE=VRDD(IJJ)*(RSDE/RDD(IJJ))                          009720
                ADS(IJJ)=(RFTS-RSD(IJJ))/(RFTS-RGTS)                     009730
            C G58                                                        009740
                IF(ADS(IJJ).LT.0.0) ADS(IJJ)=0.0                         009750
            C G59                                                        009760
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970               ADSE=(1./(RFTS-RGTS))*SQRT(RFTSE**2+RSDE**2+(ADS(IJJ)*RDSE)**2)   009770
                  ADD(IJJ)=(RFTD-RDD(IJJ))/(RFTD-RGTD)                              009780
            C G60                                                                   009790
                  IF(ADD(IJJ).LT.0.0) ADD(IJJ)=0.0                                  009800
            C G61                                                                   009810
975               ADDE=(1./(RFTD-RGTD))*SQRT(RFTDE**2+RDDE**2+(ADD(IJJ)*RDPE)**2)   009820
                  PDA(IJJ)=(RSD(IJJ)+RDD(IJJ))*.5                                   009830
                  VPDA(IJJ)=1./PDA(IJJ)                                             009840
                  PDAE=SQRT((.5*RSDE)**2+(.5*RDDE)**2)                              009850
                  VPDAE=1./PDAE                                                     009860
980               E(80)=E(80)+(VRSDE/VRSD(IJJ))*100.                                009870
                  E(81)=E(81)+(VRDDE/VRDD(IJJ))*100.                                009880
                  DO 733  I=15,20                                                   009890
            C G62                                                                   009900
                  PR(I,IJJ)=1./PR(I,IJJ)                                            009910
985         733   CONTINUE                                                          009920
            C G63                                                                   009930
                  SP(4,IJJ)=ADS(IJJ)                                                009940
                  SP(16,IJJ)=ADD(IJJ)                                               009950
                  SP(26,IJJ)=(RATS-PDA(IJJ))/(RATS-RGATS)                           009960
990               ERR(4)=ERR(4)+ADSE                                                009970
                  ERR(16)=ERR(16)+ADSE                                              009980
                  AAPDE=(1./(RATS-RGATS))*SQRT(RATSE**2+PDAE**2+(SP(26,IJJ)*RDATSE)*009990
                 **2)                                                               010000
                  ERR(26)=ERR(26)+AAPDE                                             010010
995         C G64                                                                   010020
                  IF(SP(26,IJJ).LT.0.0) SP(26,IJJ)=0.0                              010030
            C AECL DENSITY UNCERTAINTY                                              010040
                  DO 753  I=34,36                                                   010050
            C G65                                                                   010060
1000              E(I)=E(I)+C(7,I)                                                  010070
                  PR(I,IJJ)=1./PR(I,IJJ)                                            010080
            753   CONTINUE                                                          010090
            C TEST PUMP HEAD CALCULATION                                            010100
            C DIFFERENTIAL PRESSURE ACROSS PUMP (LEG-TO-LEG)                        010110
1005        C G66                                                                   010120
                  K=MJ                                                              010130
                  DPH(IJJ)=PR(K,IJJ)                                                010140
            C MIXING TEE DENSITY                                                    010150
                  HMS(IJJ)=(PR(K,IJJ)/PSMD(IJJ))*144.                               010160
1010              HMD(IJJ)=(PR(K,IJJ)/PDMD(IJJ))*144.                               010170
                  HMA(IJJ)=(PR(K,IJJ)/PA(IJJ))*144.                                 010180
                  HMSE=HMS(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(PSMDE/PSMD(IJJ))**2)    010190
                  HMDE=HMD(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(PDMDE/PDMD(IJJ))**2)    010200
                  HMAE=HMA(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(PAE/PA(IJJ))**2)        010210
1015              SP(8,IJJ)=HMS(IJJ)                                                010220
                  SP(20,IJJ)=HMD(IJJ)                                               010230
                  SP(30,IJJ)=HMA(IJJ)                                               010240
                  ERR(8)=ERR(8)+HMSE                                                010250
                  ERR(20)=ERR(20)+HMDE                                              010260
1020              ERR(30)=ERR(30)+HMAE                                              010270
            C GAMMA DENSITOMETER DENSITY                                            010280
                  HGDS(IJJ)=(PR(K,IJJ)/RSD(IJJ))*144.                               010290
                  HGDD(IJJ)=(PR(K,IJJ)/RDD(IJJ))*144.                               010300
                  HGDA(IJJ)=(PR(K,IJJ)/PDA(IJJ))*144.                               010310
1025              HGDSE=HGDS(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(RSDE/RSD(IJJ))**2)    010320
                  HGDDE=HGDD(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(RDDE/RDD(IJJ))**2)    010330
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                CALL REVER(E(78),E(79))                                  009200
                CALL REVER(E(82),E(83))                                  009210
915             CALL REVER(E(84),E(85))                                  009220
                CALL REVER(PSO,PDO)                                      009230
                CALL REVER(VSMD(IJJ),VDMD(IJJ))                          009240
                CALL REVER(WSU,WD)                                       009250
                CALL REVER(APSE,APDE)                                    009260
920             CALL REVER(APS(IJJ),APD(IJJ))                            009270
            703 CONTINUE                                                 009280
                SP(1,IJJ)=PR(5,IJJ)                                      009290
                ERR(1)=ERR(1)+C(7,5)                                     009300
                SP(5,IJJ)=APS(IJJ)                                       009310
925             ERR(5)=ERR(5)+APSE                                       009320
                SP(13,IJJ)=PR(6,IJJ)                                     009330
                ERR(13)=ERR(13)+C(7,6)                                   009340
                SP(17,IJJ)=APD(IJJ)                                      009350
                ERR(17)=ERR(17)+APDE                                     009360
930             SP(33,IJJ)=PR(55,IJJ)                                    009370
                SP(34,IJJ)=PR(56,IJJ)                                    009380
                SP(35,IJJ)=PSMD(IJJ)                                     009390
                SP(36,IJJ)=PDMD(IJJ)                                     009400
                SP(41,IJJ)=WSU                                           009410
935             SP(42,IJJ)=WD                                            009420
            C GAMMA DENSITOMETER VOID FRACTION                           009430
            C G50                                                        009440
                RSD(IJJ)=PR(16,IJJ)                                      009450
                VRSD(IJJ)=1./RSD(IJJ)                                    009460
940             IF(ITEST.LT.526.OR.ITEST.GT.559)  GOTO 707               009470
            C G51                                                        009480
                RDD(IJJ)=PR(18,IJJ)                                      009490
                GOTO 709                                                 009500
            707 CONTINUE                                                 009510
945         C G52                                                        009520
                RDD(IJJ)=PR(19,IJJ)                                      009530
            709 CONTINUE                                                 009540
            C G53                                                        009550
                VRDD(IJJ)=1./RDD(IJJ)                                    009560
950             RSDE=C(7,16)                                             009570
                VRSDE=VRSD(IJJ)*(RSDE/RSD(IJJ))                          009580
                DO 714  I=15,20                                          009590
            C G54                                                        009600
                E(I)=C(7,I)+E(I)                                         009610
955         714 CONTINUE                                                 009620
                IF(ITEST.LT.526.OR.ITEST.GT.559)  GOTO 711               009630
            C G55                                                        009640
                RDDE=C(7,18)                                             009650
                GOTO 727                                                 009660
960         711 CONTINUE                                                 009670
            C G56                                                        009680
                RDDE=C(7,19)                                             009690
            727 CONTINUE                                                 009700
            C G57                                                        009710
965             VRDDE=VRDD(IJJ)*(RSDE/RDD(IJJ))                          009720
                ADS(IJJ)=(RFTS-RSD(IJJ))/(RFTS-RGTS)                     009730
            C G58                                                        009740
                IF(ADS(IJJ).LT.0.0) ADS(IJJ)=0.0                         009750
            C G59                                                        009760
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      ADSE=(1./(RFTS-RGTS))*SQRT(RFTSE**2+RSDE**2+(ADS(IJJ)*RDSE)**2)   009770
      ADD(IJJ)=(RFTD-RDD(IJJ))/(RFTD-RGTD)                              009780
C G60                                                                   009790
      IF(ADD(IJJ).LT.0.0) ADD(IJJ)=0.0                                  009800
C G61                                                                   009810
      ADDE=(1./(RFTD-RGTD))*SQRT(RFTDE**2+RDDE**2+(ADD(IJJ)*RDPE)**2)   009820
      PDA(IJJ)=(RSD(IJJ)+RDD(IJJ))*.5                                   009830
      VPDA(IJJ)=1./PDA(IJJ)                                             009840
      PDAE=SQRT((.5*RSDE)**2+(.5*RDDE)**2)                              009850
      VPDAE=1./PDAE                                                     009860
      E(80)=E(80)+(VRSDE/VRSD(IJJ))*100.                                009870
      E(81)=E(81)+(VRDDE/VRDD(IJJ))*100.                                009880
      DO 733  I=15,20                                                   009890
C G62                                                                   009900
      PR(I,IJJ)=1./PR(I,IJJ)                                            009910
733   CONTINUE                                                          009920
C G63                                                                   009930
      SP(4,IJJ)=ADS(IJJ)                                                009940
      SP(16,IJJ)=ADD(IJJ)                                               009950
      SP(26,IJJ)=(RATS-PDA(IJJ))/(RATS-RGATS)                           009960
      ERR(4)=ERR(4)+ADSE                                                009970
      ERR(16)=ERR(16)+ADSE                                              009980
      AAPDE=(1./(RATS-RGATS))*SQRT(RATSE**2+PDAE**2+(SP(26,IJJ)*RDATSE)*009990
     **2)                                                               010000
      ERR(26)=ERR(26)+AAPDE                                             010010
C G64                                                                   010020
      IF(SP(26,IJJ).LT.0.0) SP(26,IJJ)=0.0                              010030
C AECL DENSITY UNCERTAINTY                                              010040
      DO 753  I=34,36                                                   010050
C G65                                                                   010060
      E(I)=E(I)+C(7,I)                                                  010070
      PR(I,IJJ)=1./PR(I,IJJ)                                            010080
753   CONTINUE                                                          010090
C TEST PUMP HEAD CALCULATION                                            010100
C DIFFERENTIAL PRESSURE ACROSS PUMP (LEG-TO-LEG)                        010110
C G66                                                                   010120
      K=NJ                                                              010130
      DPH(IJJ)=PR(K,IJJ)                                                010140
C MIXING TEE DENSITY                                                    010150
      HMS(IJJ)=(PR(K,IJJ)/PSMD(IJJ))*144.                               010160
      HMD(IJJ)=(PR(K,IJJ)/PDMD(IJJ))*144.                               010170
      HMA(IJJ)=(PR(K,IJJ)/PA(IJJ))*144.                                 010180
      HMSE=HMS(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(PSMDE/PSMD(IJJ))**2)    010190
      HMDE=HMD(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(PDMDE/PDMD(IJJ))**2)    010200
      HMAE=HMA(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(PAE/PA(IJJ))**2)        010210
      SP(8,IJJ)=HMS(IJJ)                                                010220
      SP(20,IJJ)=HMD(IJJ)                                               010230
      SP(30,IJJ)=HMA(IJJ)                                               010240
      ERR(8)=ERR(8)+HMSE                                                010250
      ERR(20)=ERR(20)+HMDE                                              010260
      ERR(30)=ERR(30)+HMAE                                              010270
C GAMMA DENSITOMETER DENSITY                                            010280
      HGDS(IJJ)=(PR(K,IJJ)/RSD(IJJ))*144.                               010290
      HGDD(IJJ)=(PR(K,IJJ)/RDD(IJJ))*144.                               010300
      HGDA(IJJ)=(PR(K,IJJ)/PDA(IJJ))*144.                               010310
      HGDSE=HGDS(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(RSDE/RSD(IJJ))**2)    010320
      HGDDE=HGDD(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(RDDE/RDD(IJJ))**2)    010330
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                HGDAE=HGDA(IJJ)*SQRT((C(7,K)/PR(K,IJJ))**2+(PDAE/PDA(IJJ))**2)    010340
                SP(7,IJJ)=HGDS(IJJ)                                               010350
                SP(19,IJJ)=HGDD(IJJ)                                              010360
1030            SP(29,IJJ)=HGDA(IJJ)                                              010370
                ERR(7)=ERR(7)+HGDSE                                               010380
                ERR(19)=ERR(19)+HGDDE                                             010390
                ERR(29)=ERR(29)+HGDAE                                             010400
              C TEST PUMP VOLUMETRIC FLOW CALCULATION                             010410
1035          C MIXING TEE DENSITY                                                010420
                VMS(IJJ)=((WSU)/PSMD(IJJ))*.1247                                  010430
                VMD(IJJ)=((WD)/PDMD(IJJ))*.1247                                   010440
                VMA(IJJ)=((WA)/PA(IJJ))*.1247                                     010450
                VMSE=(1./PSMD(IJJ))*SQRT(WTE**2+(WSU/PSMD(IJJ                     010460
1040           *))**2*PSMDE**2)                                                   010470
                VMDE=(1./PDMD(IJJ))*SQRT(WTE**2+WLE**2+((WD)/PDMD(IJJ             010480
               *))**2*PDMDE**2)                                                   010490
                VMAE=(1./PA(IJJ))*SQRT(WTE**2+(WLE/2)**2+(WA/PA(IJJ)              010500
               *)**2*PAE**2)                                                      010510
1045            IF(VOLM.GE.0.)  GOTO 789                                          010520
              C G67                                                               010530
                VMS(IJJ)=-VMS(IJJ)                                                010540
                VMD(IJJ)=-VMD(IJJ)                                                010550
                VMA(IJJ)=-VMA(IJJ)                                                010560
1050          789   CONTINUE                                                      010570
              C G68                                                               010580
                SP(3,IJJ)=VMS(IJJ)                                                010590
                SP(15,IJJ)=VMD(IJJ)                                               010600
                SP(25,IJJ)=VMA(IJJ)                                               010610
1055            ERR(3)=ERR(3)+.1247*VMSE                                          010620
                ERR(15)=ERR(15)+.1247*VMDE                                        010630
                ERR(25)=ERR(25)+.1247*VMAE                                        010640
              C GAMMA DENSITOMETER DENSITY                                        010650
                VGDS(IJJ)=((WSU)/RSD(IJJ))*.1247                                  010660
1060            VGDD(IJJ)=((WD)/RDD(IJJ))*.1247                                   010670
                VGDA(IJJ)=(WA/PDA(IJJ))*.1247                                     010680
                VGDSE=(1./RSD(IJJ))*SQRT(WTE**2+(WSU/RSD(IJJ                      010690
               *))**2*RSDE**2)                                                    010700
                VGDDE=(1./RDD(IJJ))*SQRT(WTE**2+WLE**2+((WD)/RDD(IJJ              010710
1065           *))**2*RDDE**2)                                                    010720
                VGDAE=(1./PDA(IJJ))*SQRT(WTE**2+(WLE/2)**2+(WA/PDA(IJJ            010730
               *))**2*PDAE**2)                                                    010740
                IF(VOLM.GE.0.)  GOTO 793                                          010750
              C G69                                                               010760
1070            VGDS(IJJ)=-VGDS(IJJ)                                              010770
                VGDD(IJJ)=-VGDD(IJJ)                                              010780
                VGDA(IJJ)=-VGDA(IJJ)                                              010790
              793   CONTINUE                                                      010800
              C G70                                                               010810
1075            SP(2,IJJ)=VGDS(IJJ)                                               010820
                SP(14,IJJ)=VGDD(IJJ)                                              010830
                SP(24,IJJ)=VGDA(IJJ)                                              010840
                ERR(2)=ERR(2)+VGDSE*.1247                                         010850
                ERR(14)=ERR(14)+VGDDE*.1247                                       010860
1080            ERR(24)=ERR(24)+VGDAE*.1247                                       010870
              C FLUID VELOCITY CALCULATION                                        010880
                VEL(1,IJJ)=WSU/((.181*PSMD(IJJ))*3600.)                           010890
                SP(39,IJJ)=VEL(1,IJJ)                                             010900
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                VEL(2,IJJ)=(WD)/(.181*PDMD(IJJ)*3600.)                  010910
1085            SP(40,IJJ)=VEL(2,IJJ)                                   010920
                VEL(3,IJJ)=WSU/(.181*RSD(IJJ)*3600.)                    010930
                VEL(4,IJJ)=(WD)/(.181*RDD(IJJ)*3600.)                   010940
                VEL(5,IJJ)=PR(3,IJJ)                                    010950
                VEL(6,IJJ)=PR(4,IJJ)                                    010960
1090            VEL(7,IJJ)=PR(28,IJJ)                                   010970
                VEL(8,IJJ)=PR(29,IJJ)                                   010980
                VELE(1)=VEL(1,IJJ)*SQRT((WTE/WSU)**2+(PSMDE/PSMD(IJJ))**2)  010990
                VELE(2)=VEL(2,IJJ)*SQRT((WTE/WSU)**2+(PDMDE/PDMD(IJJ))**2)  011000
                VELE(3)=VEL(3,IJJ)*SQRT((WTE/WSU)**2+(RSDE/RSD(IJJ))**2)    011010
1095            VELE(4)=VEL(4,IJJ)*SQRT((WTE/WSU)**2+(RDDE/RDD(IJJ))**2)    011020
                VELE(5)=C(7,3)                                          011030
                VELE(6)=C(7,4)                                          011040
                VELE(7)=C(7,28)                                         011050
                VELE(8)=C(7,29)                                         011060
1100            DO 852  I=1,4                                           011070
          C G71                                                         011080
                VEL(I,6)=VEL(I,6)+(VELE(I)/VEL(I,IJJ))*100.             011090
          852   CONTINUE                                                011100
          C FLUID VELOCITY HEAD CALCULATION                             011110
1105      C G72                                                         011120
                VELH(1,IJJ)=PSMD(IJJ)*VEL(1,IJJ)**2                     011130
                SP(37,IJJ)=VELH(1,IJJ)                                  011140
                VELH(2,IJJ)=PDMD(IJJ)*VEL(2,IJJ)**2                     011150
                SP(38,IJJ)=VELH(2,IJJ)                                  011160
1110            VELH(3,IJJ)=RSD(IJJ)*VEL(3,IJJ)**2                      011170
                VELH(4,IJJ)=RDD(IJJ)*VEL(4,IJJ)**2                      011180
                VELH(5,IJJ)=PR(1,IJJ)                                   011190
                VELH(6,IJJ)=PR(2,IJJ)                                   011200
                VELH(7,IJJ)=PR(26,IJJ)                                  011210
1115            VELH(8,IJJ)=PR(27,IJJ)                                  011220
                VELHE(1)=VELH(1,IJJ)*SQRT((PSMDE/PSMD(IJJ))**2+(2.*VELE(1)  011230
               */VEL(1,IJJ))**2)                                        011240
                VELHE(2)=VELH(2,IJJ)*SQRT((PDMDE/PDMD(IJJ))**2+(2.*VELE(2)  011250
               */VEL(2,IJJ))**2)                                        011260
1120            VELHE(3)=VELH(3,IJJ)*SQRT((RSDE/RSD(IJJ))**2+(2.*VELE(3)  011270
               */VEL(3,IJJ))**2)                                        011280
                VELHE(4)=VELH(4,IJJ)*SQRT((RDDE/RDD(IJJ))**2+(2.*VELE(4)  011290
               */VEL(4,IJJ))**2)                                        011300
                VELHE(5)=C(7,1)                                         011310
1125            VELHE(6)=C(7,2)                                         011320
                VELHE(7)=C(7,26)                                        011330
                VELHE(8)=C(7,27)                                        011340
                DO 876  I=1,4                                           011350
          C G73                                                         011360
1130            VELH(I,6)=VELH(I,6)+(VELHE(I)/VELH(I,IJJ))*100.         011370
          876   CONTINUE                                                011380
          C END BLOCK G                                                 011390
          877   CONTINUE                                                011400
          C START BLOCK H                                               011410
1135      C AVERAGE, DRIFT AND STANDARD DEVIATION CALCULATION           011420
                DO 2 I=1,46                                             011430
          C H4                                                          011440
                AAA=0                                                   011450
                AAB=0                                                   011460
1140            AAC=0                                                   011470
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                AAD=0                                                   011480
                AAE=0                                                   011490
                ABB(I)=0                                                011500
                DO 3 J=1,5                                              011510
1145        C H5                                                        011520
                AAF=(J-1)*30.                                           011530
                AAA=AAA+AAF*SP(I,J)                                     011540
                AAB=AAB+SP(I,J)                                         011550
                AAC=AAC+AAF                                             011560
1150            AAD=AAD+AAF**2                                          011570
            3   CONTINUE                                                011580
            C H6                                                        011590
                DRIF(I)=(5.*AAA-AAB*AAC)/(5.*AAD-AAC**2)                011600
                ABB(I)=(AAB-DRIF(I)*AAC)/5.                             011610
1155            DO 4 J=1,5                                              011620
            C H7                                                        011630
                AAE=((J-1)*30.*DRIF(I)+ABB(I)-SP(I,J))**2+AAE           011640
            4   CONTINUE                                                011650
            C H8                                                        011660
1160            SPRA(I)=(AAE/4.)**.5                                    011670
                PRA(I)=ABB(I)+60.*DRIF(I)                               011680
                DRIF(I)=ABS(DRIF(I)*60.)                                011690
            2   CONTINUE                                                011700
            C  LIMIT ON DEFINITION OF VOID FRACTION                     011710
1165        C H9                                                        011720
                IF(PRA(5).GT.1.) PRA(5)=1.                              011730
            C H10                                                       011740
                IF(PRA(5).LT.0.) PRA(5)=0.                              011750
            C H11                                                       011760
1170            IF(PRA(17).GT.1.) PRA(17)=1.                            011770
            C H12                                                       011780
                IF(PRA(17).LT.0.) PRA(17)=0.                            011790
            C H13                                                       011800
                IF(PRA(27).GT.1.) PRA(27)=1.                            011810
1175        C H14                                                       011820
                IF(PRA(27).LT.0.) PRA(27)=0.                            011830
            C H15                                                       011840
            C ACTUAL DIFFERENCES                                        011850
                DAC(1)=ABS(PSET-PRA(1))                                 011860
1180            DAC(3)=ABS(VOLM-PRA(3))                                 011870
                DAC(5)=ABS(VOID-PRA(5))                                 011880
                DAC(6)=ABS(PSPD-PRA(6))                                 011890
                IF(ITEST.GT.0.AND.ITEST.LT.391)GOTO 8992                011900
                IF(ITEST.GT.559.AND.ITEST.LT.1436)GOTO 8992             011910
1185        C H16                                                       011920
            C REVERSE FLOW MODIFICATION                                 011930
                DAC(1)=ABS(PSET-PRA(13))                                011940
                DAC(3)=ABS(VOLM-PRA(15))                                011950
                DAC(5)=ABS(VOID-PRA(17))                                011960
1190        8992  CONTINUE                                              011970
            C END BLOCK H                                               011980
            C START BLOCK I                                             011990
            C I1                                                        012000
            C ALLOWABLE DIFFERENCES                                     012010
1195            DAL(1)=PSET*.015                                        012020
                DAL(3)=VCLM*.05                                         012030
                IF(VOID.LT..25)GOTO 1088                                012040
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                IF(VOID.LT..4)GOTO 101                                  012050
                IF(VOID.LT..65)GOTO 102                                 012060
1200            IF(VOID.LT..8)GOTO 103                                  012070
                IF(VOID.LT..9)GOTO 1080                                 012080
              C I2                                                      012090
                DAL(5)=.007                                             012100
                GOTO 105                                                012110
1205          C I3                                                      012120
              1080  DAL(5)=.017                                         012130
                GOTO 105                                                012140
              C I4                                                      012150
              103   DAL(5)=.035                                         012160
1210            GOTO 105                                                012170
              C I5                                                      012180
              102   DAL(5)=.05                                          012190
                GOTO 105                                                012200
              C I6                                                      012210
1215          101   DAL(5)=.04                                          012220
                GOTO 105                                                012230
              C I7                                                      012240
              1088  DAL(5)=.01                                          012250
              105   IF(PSPD.GT.2500.)GOTO 106                           012260
1220            IF(PSPD.LT.-2500.)GOTO 106                              012270
              C I8                                                      012280
                DAL(6)=PSPD*.02                                         012290
                GOTO 1094                                               012300
              C I9                                                      012310
1225          106   DAL(6)=50.                                          012320
              1094  CONTINUE                                            012330
                DO 1095 I=1,6                                           012340
              C I10                                                     012350
                DAL(I)=ABS(DAL(I))                                      012360
1230          1095  CONTINUE                                            012370
              C ALLOWABLE DRIFTS AND UNCERTAINTIES                      012380
                DO 5 I=1,32                                             012390
              C I11                                                     012400
                DRAL(I)=ABS(PRA(I)*.01)                                 012410
1235            ERR(I)=ABS(ERR(I))/5.                                   012420
              5     CONTINUE                                            012430
              C END BLOCK I                                             012440
              C START BLOCK J                                           012450
              C MEAN PERCENT UNCERTAINTIES                              012460
1240            DO 7905 K=1,86                                          012470
              C J1                                                      012480
                E(K)=E(K)/5.                                            012490
                E(K)=ABS(E(K))                                          012500
              7905  CONTINUE                                            012510
1245            DO 7908 I=1,8                                           012520
              C J2                                                      012530
                VEL(I,6)=VEL(I,6)/5.                                    012540
                VELH(I,6)=VELH(I,6)/5.                                  012550
              7908  CONTINUE                                            012560
1250          C END BLOCK J                                             012570
              C START BLOCK K                                           012580
              C NORMALIZATION OF PUMP PERFORMANCE PARAMETERS            012590
              C K1                                                      012600
                UNORM(1)=PRA(7)/252.                                    012610
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1255                DNORM(1)=PRA(19)/252.                                   012620
                    ANORM(1)=PRA(29)/252.                                   012630
                    UNORM(2)=PRA(8)/252.                                    012640
                    DNORM(2)=PRA(20)/252.                                   012650
                    ANORM(2)=PRA(30)/252.                                   012660
1260                UNORM(4)=PRA(3)/3500.                                   012670
                    DNORM(4)=PRA(15)/3500.                                  012680
                    ANORM(4)=PRA(25)/3500.                                  012690
                    UNORM(5)=PRA(4)*100.                                    012700
                    DNORM(5)=PRA(16)*100.                                   012710
1265                ANORM(5)=PRA(26)*100.                                   012720
                    UNORM(6)=PRA(5)*100.                                    012730
                    DNORM(6)=PRA(17)*100.                                   012740
                    ANORM(6)=PRA(27)*100.                                   012750
                    UNORM(7)=VOID*100.                                      012760
1270                DNORM(7)=UNORM(7)                                       012770
                    ANORM(7)=UNORM(7)                                       012780
                    UNORM(8)=PRA(6)/4500.                                   012790
                    DNORM(8)=UNORM(8)                                       012800
                    ANORM(8)=UNORM(8)                                       012810
1275                UNORM(9)=PSPD/4500.                                     012820
                    DNORM(9)=UNORM(9)                                       012830
                    ANORM(9)=UNORM(9)                                       012840
                    BE=0.                                                   012850
                    BF=0.                                                   012860
1280                BG=0.                                                   012870
                    CE=0.                                                   012880
                    CF=0.                                                   012890
                    CG=0.                                                   012900
                    DO 9030 I=1,5                                           012910
1285          C K2                                                          012920
                    BE=BE+VSMD(I)                                           012930
                    BF=BF+VDMD(I)                                           012940
                    CE=CE+VRSD(I)                                           012950
                    CF=CF+VRDD(I)                                           012960
1290        9030    CONTINUE                                                012970
              C K3                                                          012980
                    BE=BE/5.                                                012990
                    BF=BF/5.                                                013000
                    BG=(BE+BF)/2.                                           013010
1295                CE=CE/5.                                                013020
                    CF=CF/5.                                                013030
                    CG=(CE+CF)/2.                                           013040
                    UNORM(10)=PRA(10)*62.3*CE/308.                          013050
                    DNORM(10)=PRA(10)*62.3*CF/308.                          013060
1300                ANORM(10)=PRA(10)*62.3*CG/308.                          013070
                    UNORM(11)=PRA(10)*62.3*BE/308.                          013080
                    DNORM(11)=PRA(10)*62.3*BF/308.                          013090
                    ANORM(11)=PRA(10)*62.3*BG/308.                          013100
              C END BLOCK K                                                 013110
1305          C START BLOCK L                                               013120
              C PRINTOUT OF DATA FOR REVIEW                                 013130
              C L1                                                          013140
                    IF=11                                                   013150
              C L2                                                          013160
1310                IF(ITEST.GT.0.AND.ITEST.LT.391) IF=10                   013170
                    IF(ITEST.GT.559.AND.ITEST.LT.1436) IF=10                013180
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      C L3                                                              013190
            PRINT 1007                                                  013200
            PRINT 1004,ITEST,IMO,IDAY,IYR,XTIM,IPAGE                    013210
1315        WRITE(IF,9008) ITEST,IMO,IDAY,IYR,XTIM,IPAGE                013220
            PRINT 9020                                                  013230
            DO 9021 I=1,NTCA                                            013240
      C L4                                                              013250
            K=KCA(I)                                                    013260
1320        BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.        013270
            IF(BD(K,1).GE.662.) BD(K,1)=660.                            013280
            BC=RT(K)/5.                                                 013290
            BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2   013300
            BB=SQRT((BB-5.*BD(K,1)**2)/4.)                              013310
1325        IF(K.EQ.13) AA(36)=PSL(BD(K,1))                             013320
            IF(K.EQ.13) AA(37)=1./VPT1(AA(36),BD(K,1))                  013330
            IF(K.EQ.13) AA(38)=1./VPT2(AA(36),BD(K,1))                  013340
            IF(K.EQ.14) AA(45)=PSL(BD(K,1))                             013350
            IF(K.EQ.14) AA(46)=1./VPT1(AA(45),BD(K,1))                  013360
1330        IF(K.EQ.14) AA(47)=1./VPT2(AA(45),BD(K,1))                  013370
            PRINT 9010,K,BC,BD(K,1),BB                                  013380
            WRITE(IF,9009) K,BC,BD(K,1),BB                              013390
      9021  CONTINUE                                                    013400
            DO 9022 I=1,NP                                              013410
1335  C L5                                                              013420
            K=KP(I)                                                     013430
            BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.        013440
            BC=RT(K)/5.                                                 013450
            BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2   013460
1340        BB=SQRT((BB-5.*BD(K,1)**2)/4.)                              013470
            IF(K.EQ.5) AA(42)=TSL(BD(K,1))                              013480
            IF(K.EQ.5) AA(43)=1./VPT1(BD(K,1),AA(42))                   013490
            IF(K.EQ.5) AA(44)=1./VPT2(BD(K,1),AA(42))                   013500
            IF(K.EQ.6) AA(51)=TSL(BD(K,1))                              013510
1345        IF(K.EQ.6) AA(52)=1./VPT1(BD(K,1),AA(51))                   013520
            IF(K.EQ.6) AA(53)=1./VPT2(BD(K,1),AA(51))                   013530
            PRINT  9011,K,BC,BD(K,1),BB                                 013540
            WRITE(IF,9009) K,BC,BD(K,1),BB                              013550
      9022  CONTINUE                                                    013560
1350        DO 9023 I=1,NDP                                             013570
      C L6                                                              013580
            K=KDP(I)                                                    013590
            BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.        013600
            BC=RT(K)/5.                                                 013610
1355        BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2   013620
            BB=SQRT((BB-5.*BD(K,1)**2)/4.)                              013630
            PRINT 9012,K,BC,BD(K,1),BB                                  013640
            WRITE(IF,9009) K,BC,BD(K,1),BB                              013650
      9023  CONTINUE                                                    013660
1360        DO 9024 I=1,NRTD                                            013670
      C L7                                                              013680
            K=KRTD(I)                                                   013690
            BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.        013700
            BC=RT(K)/5.                                                 013710
1365        BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2   013720
            BB=SQRT((BB-5.*BD(K,1)**2)/4.)                              013730
                                                                        013740
            IF(K.EQ.55) AA(39)=PSL(BD(K,1))                             013750
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      IF(K.EQ.55) AA(40)=1./VPT1(AA(39),BD(K,1))                        013760
1370  IF(K.EQ.55) AA(41)=1./VPT2(AA(39),BD(K,1))                        013770
      IF(K.EQ.56) AA(48)=PSL(BD(K,1))                                   013780
      IF(K.EQ.56) AA(49)=1./VPT1(AA(48),BD(K,1))                        013790
      IF(K.EQ.56) AA(50)=1./VPT2(AA(48),BD(K,1))                        013800
      PRINT 9013,K,BC,BD(K,1),BB                                        013810
1375  WRITE(IF,9009) K,BC,BD(K,1),BB                                    013820
 9024 CONTINUE                                                          013830
      DO 9025 I=1,NTM                                                   013840
C L8                                                                    013850
      K=KTM(I)                                                          013860
1380  BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.              013870
      BC=RT(K)/5.                                                       013880
      BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2         013890
      BB=SQRT((BB-5.*BD(K,1)**2)/4.)                                    013900
      PRINT 9014,K,BC,BD(K,1),BB                                        013910
1385  WRITE(IF,9009) K,BC,BD(K,1),BB                                    013920
 9025 CONTINUE                                                          013930
      DO 9026 I=1,NDD                                                   013940
C L9                                                                    013950
      K=KDD(I)                                                          013960
1390  IF(K.EQ.70) GOTO 9026                                             013970
      BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.              013980
      BC=RT(K)/5.                                                       013990
      BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2         014000
      BB=SQRT((BB-5.*BD(K,1)**2)/4.)                                    014010
1395  PRINT 9015,K,BC,BD(K,1),BB                                        014020
      WRITE(IF,9009) K,BC,BD(K,1),BB                                    014030
 9026 CONTINUE                                                          014040
      PRINT 1007                                                        014050
      DO 9027 I=1,NT                                                    014060
1400 C L10                                                              014070
      K=KT(I)                                                           014080
      IF(K.EQ.70) GOTO 9027                                             014090
      BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.              014100
      BC=RT(K)/5.                                                       014110
1405  BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2         014120
      BB=SQRT((BB-5.*BD(K,1)**2)/4.)                                    014130
      PRINT 9016,K,BC,BD(K,1),BB                                        014140
      WRITE(IF,9009) K,BC,BD(K,1),BB                                    014150
 9027 CONTINUE                                                          014160
1410  DO 9028 I=1,NSM                                                   014170
C L11                                                                   014180
      K=KSM(I)                                                          014190
      BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.              014200
      BC=RT(K)/5.                                                       014210
1415  BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2         014220
      BB=SQRT((BB-5.*BD(K,1)**2)/4.)                                    014230
      PRINT 9017,K,BC,BD(K,1),BB                                        014240
      WRITE(IF,9009) K,BC,BD(K,1),BB                                    014250
 9028 CONTINUE                                                          014260
1420  DO 9029 I=1,NGD                                                   014270
C L12                                                                   014280
      K=KGD(I)                                                          014290
      BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.              014300
      BC=RT(K)/5.                                                       014310
1425  BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2         014320
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                BB=SQRT((BB-5.*BD(K,1)**2)/4.)                                  014330
                PRINT 9018,K,BC,BD(K,1),BB                                      014340
                WRITE(IF,9009) K,BC,BD(K,1),BB                                  014350
                AC(I)=BD(K,1)                                                   014360
1430        9029 CONTINUE                                                       014370
            C L13                                                               014380
                K=32                                                            014390
                BD(K,1)=(RS(K,1)+RS(K,2)+RS(K,3)+RS(K,4)+RS(K,5))/5.            014400
                BC=RT(K)/5.                                                     014410
1435            BB=RS(K,1)**2+RS(K,2)**2+RS(K,3)**2+RS(K,4)**2+RS(K,5)**2       014420
                BB=SQRT((BB-5.*BD(K,1)**2)/4.)                                  014430
                PRINT 9019,K,BC,BD(K,1),BB                                      014440
                WRITE(IF,9009) K,BC,BD(K,1),BB                                  014450
            9008 FORMAT(1X,4I10,E21.15,I10)                                     014460
1440        9009 FORMAT(1X,I3,3E21.15)                                          014470
            9010 FORMAT(4X,I3,*  THERMOCOUPLE   *,F12.6,2F12.3)                 014480
            9011 FORMAT(4X,I3,*  PRESSURE CELL  *,F12.6,2F12.3)                 014490
            9012 FORMAT(4X,I3,*  D. P. CELL     *,F12.6,2F12.3)                 014500
            9013 FORMAT(4X,I3,*  R. T. D.       *,F12.6,2F12.3)                 014510
1445        9014 FORMAT(4X,I3,*  TORQUE METER   *,F12.6,2F12.3)                 014520
            9015 FORMAT(4X,I3,*  DRAG DISC      *,F12.6,2F12.3)                 014530
            9016 FORMAT(4X,I3,*  TURBINE METER  *,F12.6,2F12.3)                 014540
            9017 FORMAT(4X,I3,*  SPEED METER    *,F12.6,2F12.3)                 014550
            9018 FORMAT(4X,I3,*  DENSITOMETER   *,F12.6,2F12.3)                 014560
1450        9019 FORMAT(4X,I3,*  MAG FLOW METER*,F12.6,2F12.3)                  014570
            9020 FORMAT(/,4X,*S/N    DEVICE            OUTPUT        VALUE     STD.DE014580
                *V.*,/)                                                         014590
                DO 9042 I=1,12                                                  014600
            C L14                                                               014610
1455            AB(I)=0.                                                        014620
            9042 CONTINUE                                                       014630
                DO 9047 I=1,35                                                  014640
            C L15                                                               014650
                AA(I)=0.                                                        014660
1460        9047 CONTINUE                                                       014670
                DO 8989 L=1,5                                                   014680
            C L16                                                               014690
                AA(34)=AA(34)+VSMD(L)                                           014700
                AA(35)=AA(35)+VDMD(L)                                           014710
1465        8989 CONTINUE                                                       014720
            C L17                                                               014730
                AA(34)=5./AA(34)                                                014740
                AA(35)=5./AA(35)                                                014750
                PRINT 8519                                                      014760
1470            PRINT 8521                                                      014770
                PRINT 8522,AC(1),AA(34)                                         014780
                PRINT 8523,AC(2),AA(34)                                         014790
                PRINT 8524,AC(3),AA(34)                                         014800
                PRINT 8525,AC(4),AA(35)                                         014810
1475            PRINT 8526,AC(5),AA(35)                                         014820
                PRINT 8527,AC(6),AA(35)                                         014830
                PRINT 8528,AC(8),AA(34)                                         014840
                PRINT 8529,AC(9),AA(34)                                         014850
                PRINT 8530,AC(7),AA(34)                                         014860
1480            WRITE(IF,8534) AC(1),AA(34)                                     014870
                WRITE(IF,8534) AC(2),AA(34)                                     014880
                WRITE(IF,8534) AC(3),AA(34)                                     014890
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                WRITE(IF,8534) AC(4),AA(35)                                     014900
                WRITE(IF,8534) AC(5),AA(35)                                     014910
1485            WRITE(IF,8534) AC(6),AA(35)                                     014920
                WRITE(IF,8534) AC(8),AA(34)                                     014930
                WRITE(IF,8534) AC(9),AA(34)                                     014940
                WRITE(IF,8534) AC(7),AA(34)                                     014950
                DO 8000 L=1,5                                                   014960
1490        C L18                                                               014970
                AA(1)=AA(1)+PR(13,L)                                            014980
                AA(2)=AA(2)+PR(55,L)                                            014990
                AA(3)=AA(3)+TSAT(L)                                             015000
                AA(4)=AA(4)+PR(14,L)                                            015010
1495            AA(5)=AA(5)+PR(56,L)                                            015020
                AA(6)=AA(6)+TDAT(L)                                             015030
                IF(IWFLO.EQ.1)GOTO 8001                                         015040
            C L19                                                               015050
                AA(7)=AA(7)+PR(50,L)                                            015060
1500            AA(8)=AA(8)+PR(58,L)                                            015070
                GOTO 8002                                                       015080
            C L20                                                               015090
            8001  AA(7)=AA(7)+PR(52,L)                                         015100
                AA(8)=AA(8)+PR(53,L)                                            015110
1505        C L21                                                               015120
            8002  AA(9)=AA(9)+PR(42,L)                                         015130
                IF(ISFLO.EQ.1)GOTO 8003                                         015140
            C L22                                                               015150
                AA(10)=AA(10)+PR(49,L)                                          015160
1510            AA(11)=AA(11)+PR(59,L)                                          015170
                GOTO 8004                                                       015180
            C L23                                                               015190
            8003  AA(10)=AA(10)+PR(51,L)                                        015200
                AA(11)=AA(11)+PR(54,L)                                          015210
1515        C L24                                                               015220
            8004  AA(12)=AA(12)+PR(41,L)                                        015230
                AA(13)=AA(13)+PR(23,L)                                          015240
                AA(14)=AA(14)+PR(65,L)                                          015250
                AA(15)=AA(15)+DPH(L)                                            015260
1520            AA(16)=AA(16)-PRA(1)+PRA(13)                                    015270
                AA(17)=AA(17)+NRN*PR(61,L)+PR(66,L)                             015280
                AA(18)=AA(18)+PR(22,L)                                          015290
                AA(19)=AA(19)+WO(L)-WI(L)                                       015300
                AA(20)=AA(20)+PR(68,L)                                          015310
1525            AA(21)=AA(21)+PR(62,L)                                          015320
                AB(1)=AB(1)+VEL(7,L)                                            015330
                AB(2)=AB(2)+VEL(1,L)                                            015340
                AB(3)=AB(3)+VEL(5,L)                                            015350
                AB(4)=AB(4)+VEL(8,L)                                            015360
1530            AB(5)=AB(5)+VEL(2,L)                                            015370
                AB(6)=AB(6)+VEL(6,L)                                            015380
                AB(7)=AB(7)+VELH(7,L)                                           015390
                AB(8)=AB(8)+VELH(1,L)                                           015400
                AB(9)=AB(9)+VELH(5,L)                                           015410
1535            AB(10)=AB(10)+VELH(8,L)                                         015420
                AB(11)=AB(11)+VELH(2,L)                                         015430
                AB(12)=AB(12)+VELH(6,L)                                         015440
            8000  CONTINUE                                                      015450
                DO 8005 L=1,21                                                  015460
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      C L28                                                          015470
            IF(L.GT.12)GOTO 8006                                     015480
            AB(L)=AB(L)/5.                                           015490
      C L29                                                          015500
      8006  AA(L)=AA(L)/5.                                          015510
      8005  CONTINUE                                                 015520
      C L30                                                          015530
            AA(22)=AB(1)/AB(2)                                       015540
            AA(23)=AB(3)/AB(2)                                       015550
            AA(24)=AB(4)/AB(5)                                       015560
            AA(25)=AB(6)/AB(5)                                       015570
            AA(26)=AB(7)/AB(8)                                       015580
            AA(27)=AB(9)/AB(8)                                       015590
            AA(28)=AB(10)/AB(11)                                     015600
            AA(29)=AB(12)/AB(11)                                     015610
            AA(31)=AA(9)                                             015620
            ICALL1=1                                                 015630
            CALL SATUR(AA(9),T5,V5,V6,V7,V8,ICALL1)                  015640
      C L31                                                          015650
            AA(9)=T5                                                 015660
            AA(32)=AA(12)                                            015670
            ICALL1=1                                                 015680
            CALL SATUR(AA(12),T6,V5,V6,V7,V8,ICALL1)                 015690
      C L32                                                          015700
            AA(12)=T6                                                015710
            AA(33)=AA(14)                                            015720
            ICALL1=1                                                 015730
            CALL SATUR(AA(14),T7,V5,V6,V7,V8,ICALL1)                 015740
      C L33                                                          015750
            AA(14)=T7                                                015760
            PRINT 8500                                               015770
            PRINT 8501,AA(1),AA(2),AA(3),PRA(1)                      015780
            PRINT 8502,AA(4),AA(5),AA(6),PRA(13)                     015790
            PRINT 8503,AA(7),AA(8),AA(9),AA(31)                      015800
            PRINT 8504,AA(10),AA(11),AA(12),AA(32)                   015810
            PRINT 8505,AA(13),AA(14),AA(33)                          015820
            PRINT 8520,UNORM(11)                                     015830
            PRINT 8506,AA(15)                                        015840
            PRINT 8507,AA(16)                                        015850
            PRINT 8508,AA(17)                                        015860
            PRINT 8509,AA(18)                                        015870
            PRINT 8510,AA(19)                                        015880
            PRINT 8539                                               015890
            PRINT 8513,AB(2),AB(5)                                   015900
            PRINT 8517,AB(8),AB(11)                                  015910
            PRINT 8538                                               015920
            PRINT 8540                                               015930
            PRINT 8541                                               015940
            PRINT 8542,AA(36),AA(37),AA(38)                          015950
            PRINT 8543,AA(39),AA(40),AA(41)                          015960
            PRINT 8544,AA(42),AA(43),AA(44)                          015970
            PRINT 8545,AA(45),AA(46),AA(47)                          015980
            PRINT 8543,AA(48),AA(49),AA(50)                          015990
            PRINT 8544,AA(51),AA(52),AA(53)                          016000
            WRITE(IF,8535) AA(1),AA(2),AA(3),PRA(1)                  016010
            WRITE(IF,8535) AA(4),AA(5),AA(6),PRA(13)                 016020
            WRITE(IF,8535) AA(7),AA(8),AA(9),AA(31)                  016030
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                WRITE(IF,8535) AA(10),AA(11),AA(12),AA(32)                      016040
                WRITE(IF,8536) AA(13),AA(14),AA(33)                             016050
                WRITE(IF,8537) UNORM(1)                                         016060
1600            WRITE(IF,8537) AA(15)                                           016070
                WRITE(IF,8537) AA(16)                                           016080
                WRITE(IF,8537) AA(17)                                           016090
                WRITE(IF,8537) AA(18)                                           016100
                WRITE(IF,8537) AA(19)                                           016110
1605            WRITE(IF,8548) AB(2),AB(5)                                      016120
                WRITE(IF,8548) AB(8),AB(11)                                     016130
                WRITE(IF,8536) AA(36),AA(37),AA(38)                             016140
                WRITE(IF,8536) AA(39),AA(40),AA(41)                             016150
                WRITE(IF,8536) AA(42),AA(43),AA(44)                             016160
1610            WRITE(IF,8536) AA(45),AA(46),AA(47)                             016170
                WRITE(IF,8536) AA(48),AA(49),AA(50)                             016180
                WRITE(IF,8536) AA(51),AA(52),AA(53)                             016190
           8500 FORMAT(20X,*TC*,7X,*RTD*,7X,*TSAT*,3X,*PRESSURE*)               016200
           8501 FORMAT(3X,*SUCT LEG  *,3F10.1,F10.0)                            016210
1615       8502 FORMAT(3X,*DISCH LEG *,3F10.1,F10.0)                            016220
           8503 FORMAT(3X,*WATER ORIF*,3F10.1,F10.0)                            016230
           8504 FORMAT(3X,*STEAM ORIF*,3F10.1,F10.0)                            016240
           8505 FORMAT(3X,*H P DRUM  *,F10.1,10X,F10.1,F10.0,//)                016250
           8506 FORMAT(3X,*PUMP DP (LEG-LEG) (PSI)        *,F10.1)              016260
1620       8507 FORMAT(3X,*DISCHARGE P - SUCTION P  (PSI)*,F11.1)               016270
           8508 FORMAT(3X,*LEG-FLANGE +  F-F DP (PSI)     *,F10.1)              016280
           8509 FORMAT(3X,*INJECT OUT TEMP (DEG F)        *,F10.1)              016290
           8510 FORMAT(3X,*INJECT FLOW (OUT-IN) (LB/HR)   *,F10.0,/)            016300
           8513 FORMAT(4X,*VELOCITY     *,7X,F10.1,7X,F10.1)                    016310
1625       8517 FORMAT(4X,*MOMENTUM FLUX*,7X,F10.1,7X,F10.1,/)                  016320
           8519 FORMAT(//)                                                      016330
           8520 FORMAT(3X,*SUCT LEG NORMALIZED HYD TORQUE *,F10.3)              016340
           8521 FORMAT(3X,*GAMMA DENSITOMETER DENSITIES     MIX TEE DENSITY*,/) 016350
           8522 FORMAT(4X,*SUCT LEG BEAM 1  *,F8.2,7X,F8.2)                     016360
1630       8523 FORMAT(4X,*SUCT LEG BEAM 2  *,F8.2,7X,F8.2)                     016370
           8524 FORMAT(4X,*SUCT LEG BEAM 3  *,F8.2,7X,F8.2)                     016380
           8525 FORMAT(4X,*DISCH LEG  BEAM 1*,F8.2,7X,F8.2)                     016390
           8526 FORMAT(4X,*DISCH LEG  BEAM 2*,F8.2,7X,F8.2)                     016400
           8527 FORMAT(4X,*DISCH LEG  BEAM 3*,F8.2,7X,F8.2)                     016410
1635       8528 FORMAT(4X,*AECL BEAM 1      *,F8.2,7X,F8.2)                     016420
           8529 FORMAT(4X,*AECL BEAM 2      *,F8.2,7X,F8.2)                     016430
           8530 FORMAT(4X,*AECL BEAM 3      *,F8.2,7X,F8.2)                     016440
           8534 FORMAT(1X,2E21.15)                                              016450
           8535 FORMAT(1X,4E21.15)                                              016460
1640       8536 FORMAT(1X,3E21.15)                                              016470
           8537 FORMAT(1X,E21.15)                                               016480
           8538 FORMAT(3X,*THERMODYNAMIC PROPERTIES BASED ON LOOP PARAMETERS*,/) 016490
           8539 FORMAT(3X,*MIXING TEE-*,12X,*SUCT LEG*,8X,*DISCH LEG*)         016500
           8540 FORMAT(18X,*T-SAT*,5X,*P-SAT*,7X,*SAT-DENSITY*)                 016510
1645       8541 FORMAT(3X,*PARAMETER-*,26X,*LIQ*,6X,*VAPOR*)                    016520
           8542 FORMAT(4X,*SUCT -TC *,*     -     *,F10.1,2F10.2)               016530
           8543 FORMAT(4X,*     -RTD*,*     -     *,F10.1,2F10.2)               016540
           8544 FORMAT(4X,*     -P  *,F10.1,*      -     *,2F10.2)              016550
           8545 FORMAT(4X,*DISCH-TC *,*     -     *,F10.1,2F10.2)               016560
1650       8548 FORMAT(1X,2E21.15)                                              016570
           C END BLOCK L                                                        016580
           C START BLOCK M                                                      016590
                DO 1465 I=1,5                                                   016600
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      C M1                                                              016610
1655        WI(I)=WI(I)/3600.                                           016620
            WO(I)=WO(I)/3600.                                           016630
            WW(I)=WW(I)/3600.                                           016640
            WS(I)=WS(I)/3600.                                           016650
      1465  CONTINUE                                                    016660
1660  C M2                                                              016670
            SV1=(1.-PRA(5))*AB(2)                                       016680
            SV2=(1.-PRA(17))*AB(5)                                      016690
            SV3=PRA(5)*AB(2)                                            016700
            SV4=PRA(17)*AB(5)                                           016710
1665        ESPD=ABS(100.*ERR(6)/PRA(6))                                016720
            ETOR=ABS(100.*ERR(12)/PRA(12))                              016730
            DPH(6)=ABS(100.*ERR(9)/PRA(9))                              016740
            DO 1467 I=1,13                                              016750
      C M3                                                              016760
1670        CON(I)=1.                                                   016770
      1467  CONTINUE                                                    016780
      C END BLOCK M                                                     016790
            ISF=ISFLG+16                                                016800
            IF(IFLOS.EQ.1) ISF=15                                       016810
1675        IWF=IWFLG+16                                                016820
            IF(IFLOW.EQ.1) IWF=15                                       016830
            DO 7600 N=1,2                                               016840
      C START BLOCK N                                                   016850
      C N1                                                              016860
1680  C SELECTION OF ENGLISH OR METRIC LABELS                           016870
            PRT1=ETM1(N)                                                016880
            PRT2=ETM2(N)                                                016890
            PRT3=ETM3(N)                                                016900
            PRT4=ETM4(N)                                                016910
1685        PRT5=ETM5(N)                                                016920
            PRT6=ETM6(N)                                                016930
            PRT7=ETM7(N)                                                016940
            PRT8=ETM8(N)                                                016950
            PRT9=ETM9(N)                                                016960
1690        PRT10=ETM10(N)                                              016970
            PRT11=ETM11(N)                                              016980
      C PRINTOUT OF RESULTS                                             016990
      C PRINTOUT PAGE 1 OR 5                                            017000
      C N2                                                              017010
1695  7500  PRINT 1002                                                  017020
            IPAGE=IPAGE+1                                               017030
            PRINT 1004,ITEST,IMO,IDAY,IYR,XTIM,IPAGE                    017040
            PRINT 1006                                                  017050
            PRINT 1008                                                  017060
1700        PRINT 1010                                                  017070
            PRINT 1012                                                  017080
            PRINT 1014                                                  017090
            IF(ITEST.GT.0.AND.ITEST.LT.391)GOTO 7487                    017100
            IF(ITEST.GT.559.AND.ITEST.LT.1436)GOTO 7487                 017110
1705  C REVERSE FLOW MODIFICATION                                       017120
      C N3                                                              017130
            PRINT 1720,PRT1,PRA(1),DRIF(1),ERR(1),SPRA(1)               017140
            IF(N.EQ.2)  GOTO 8952                                       017150
      C N4                                                              017160
1710        PRINT 1021,PRT2,PRA(3),DRIF(3),ERR(3),SPRA(3)               017170
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                GOTO 8954                                                       017180
              C N5                                                              017190
              8952  PRINT 1121,PRT2,PRA(3),DRIF(3),ERR(3),SPRA(3)               017200
              C N6                                                              017210
1715          8954  PRINT 1024                                                  017220
                    PRINT 1029,PRA(5),DRIF(5),ERR(5),SPRA(5)                    017230
                    PRINT 1026,PRA(4),DRIF(4),ERR(4),SPRA(4)                    017240
                    PRINT 1031,PRA(6),DRIF(6),ERR(6),SPRA(6)                    017250
                    GOTO 7489                                                   017260
1720          7487  CONTINUE                                                    017270
              C N7                                                              017280
                    PRINT 1016,PRT1,PSET,PRA(1),DAL(1),DAC(1),DRAL(1),DRIF(1),ERR(1)  017290
                   *,SPRA(1)                                                    017300
                    IF(N.EQ.2)GOTO 7501                                         017310
1725          C N8                                                              017320
                    PRINT 1018,PRT2,VOLM,PRA(3),DAL(3),DAC(3),DRAL(3),DRIF(3)   017330
                   *,ERR(3),SPRA(3)                                             017340
                    GOTO 7502                                                   017350
              C N9                                                              017360
1730          7501  PRINT 1118,PRT2,VOLM,PRA(3),DAL(3),DAC(3),DRAL(3),DRIF(3)   017370
                   *,ERR(3),SPRA(3)                                             017380
              C N10                                                             017390
              7502  PRINT 1024                                                  017400
                    PRINT 1028,VOID,PRA(5),DAL(5),DAC(5),DRAL(5),DRIF(5),       017410
1735                *ERR(5),SPRA(5)                                             017420
                    PRINT 1026,PRA(4),DRIF(4),ERR(4),SPRA(4)                    017430
                    PRINT 1030,PSPD,PRA(6),DAL(6),DAC(6),DRAL(6),DRIF(6),ERR(6),SPRA(6017440
                   *)                                                           017450
              7489  CONTINUE                                                    017460
1740          C N11                                                             017470
                    PRINT 1032                                                  017480
                    PRINT 1034,PRT3,PRA(7),DRIF(7),ERR(7),SPRA(7)               017490
                    PRINT 1036,PRT3,PRA(8),DRIF(8),ERR(8),SPRA(8)               017500
                    PRINT 1038,PRT10,PRA(9),DRIF(9),ERR(9),SPRA(9)              017510
1745                PRINT 1040,PRT4                                             017520
                    PRINT 1042,PRA(10),DRIF(10),ERR(10),SPRA(10)                017530
                    PRINT 1044,PRA(11),DRIF(11),ERR(11),SPRA(11)                017540
                    PRINT 1046,PRA(12),DRIF(12),ERR(12),SPRA(12)                017550
                    PRINT 1048                                                  017560
1750                IF(ITEST.GT.0.AND.ITEST.LT.391)GOTO 7479                    017570
                    IF(ITEST.GT.559.AND.ITEST.LT.1436)GOTO 7479                 017580
              C REVERSE FLOW MODIFICATION                                       017590
              C N12                                                             017600
                    PRINT 1730,PRT1,PSET,PRA(13),DAL(1),DAC(1),DRAL(13),DRIF(13),  017610
1755                *ERR(13),SPRA(13)                                           017620
                    IF(N.EQ.2)  GOTO 7477                                       017630
              C N13                                                             017640
                    PRINT 1018,PRT2,VOLM,PRA(15),DAL(3),DAC(3),DRAL(15),DRIF(15),  017650
                   *ERR(15),SPRA(15)                                            017660
1760                GOTO 7455                                                   017670
              C N14                                                             017680
              7477  PRINT 1118,PRT2,VOLM,PRA(15),DAL(3),DAC(3),DRAL(15),DRIF(15),  017690
                   *ERR(15),SPRA(15)                                            017700
              C N15                                                             017710
1765          7455  PRINT 1025                                                  017720
                    PRINT 1028,VOID,PRA(17),DAL(5),DAC(5),DRAL(17),DRIF(17),    017730
                   *ERR(17),SPRA(17)                                            017740
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      PRINT 1027,PRA(16),DRIF(16),ERR(16),SPRA(16)                      017750
      PRINT 1030,PSPD,PRA(6),DAL(6),DAC(6),DRAL(6),DRIF(6),             017760
1770 *ERR(6),SPRA(6)                                                    017770
      GOTO 7457                                                         017780
 7479 CONTINUE                                                          017790
C N16                                                                   017800
      PRINT 1017,PRT1,PRA(13),DRIF(13),ERR(13),SPRA(13)                 017810
1775  IF(N.EQ.2)GOTO 7503                                               017820
C N17                                                                   017830
      PRINT 1021,PRT2,PRA(15),DRIF(15),ERR(15),SPRA(15)                 017840
      GOTO 7504                                                         017850
C N18                                                                   017860
1780  7503 PRINT 1121,PRT2,PRA(15),DRIF(15),ERR(15),SPRA(15)            017870
C N19                                                                   017880
 7504 PRINT 1025                                                        017890
      PRINT 1029,PRA(17),DRIF(17),ERR(17),SPRA(17)                      017900
      PRINT 1027,PRA(16),DRIF(16),ERR(16),SPRA(16)                      017910
1785  PRINT 1031,PRA(6),DRIF(6),ERR(6),SPRA(6)                          017920
 7457 CONTINUE                                                          017930
C N20                                                                   017940
      PRINT 1032                                                        017950
      PRINT 1034,PRT3,PRA(19),DRIF(19),ERR(19),SPRA(19)                 017960
1790  PRINT 1036,PRT3,PRA(20),DRIF(20),ERR(20),SPRA(20)                 017970
      PRINT 1038,PRT10,PRA(9),DRIF(9),ERR(9),SPRA(9)                    017980
      PRINT 1040,PRT4                                                   017990
      PRINT 1042,PRA(10),DRIF(10),ERR(10),SPRA(10)                      018000
      PRINT 1044,PRA(11),DRIF(11),ERR(11),SPRA(11)                      018010
1795  PRINT 1046,PRA(12),DRIF(12),ERR(12),SPRA(12)                      018020
      PRINT 1003,ZZFILE,NZERO,ZZDATE,ZZTIME                             018030
      PRINT 9066,TIME(X),DATE(X)                                        018040
      PRINT 9067,ABG(IWF),ABG(ISF)                                      018050
      PRINT 1002                                                        018060
1800 C PRINTOUT PAGE 2 OR 6                                             018070
C N21                                                                   018080
      IPAGE=IPAGE+1                                                     018090
      PRINT 1050,ITEST,IMC,IDAY,IYR,XTIM,IPAGE                          018100
      PRINT 1060                                                        018110
1805  PRINT 1062                                                        018120
      PRINT 1064                                                        018130
      PRINT 1066                                                        018140
      PRINT 1068                                                        018150
      PRINT 1019,PRT1,PRA(23),DRIF(23),ERR(23),SPRA(23)                 018160
1810  IF(N.EQ.2)GOTO 7505                                               018170
C N22                                                                   018180
      PRINT 1021,PRT2,PRA(25),DRIF(25),ERR(25),SPRA(25)                 018190
      GOTO 7506                                                         018200
C N23                                                                   018210
1815  7505 PRINT 1121,PRT2,PRA(25),DRIF(25),ERR(25),SPRA(25)            018220
C N24                                                                   018230
 7506 PRINT 1025                                                        018240
      PRINT 1029,PRA(27),DRIF(27),ERR(27),SPRA(27)                      018250
      PRINT 1027,PRA(26),DRIF(26),ERR(26),SPRA(26)                      018260
1820  PRINT 1031,PRA(6),DRIF(6),ERR(6),SPRA(6)                          018270
      PRINT 1032                                                        018280
      PRINT 1034,PRT3,PRA(29),DRIF(29),ERR(29),SPRA(29)                 018290
      PRINT 1036,PRT3,PRA(30),DRIF(30),ERR(30),SPRA(30)                 018300
      PRINT 1038,PRT10,PRA(9),DRIF(9),ERR(9),SPRA(9)                    018310
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1825              PRINT 1040,PRT4                                          018320
                  PRINT 1042,PRA(10),DRIF(10),ERR(10),SPRA(10)             018330
                  PRINT 1044,PRA(11),DRIF(11),ERR(11),SPRA(11)             018340
                  PRINT 1046,PRA(12),DRIF(12),ERR(12),SPRA(12)             018350
                  PRINT 1672                                               018360
1830              PRINT 1674                                               018370
                  PRINT 1676                                               018380
                  PRINT 1678,UNORM(1),DNORM(1),ANORM(1)                    018390
                  PRINT 1680,UNORM(2),DNORM(2),ANORM(2)                    018400
                  PRINT 1682                                               018410
1835              PRINT 1680,UNORM(4),DNORM(4),ANORM(4)                    018420
                  PRINT 1695,VOLS,VOLS,VOLS                                018430
                  PRINT 1688                                               018440
                  PRINT 1692,UNORM(6),DNORM(6),ANORM(6)                    018450
                  PRINT 1690,UNORM(5),DNORM(5),ANORM(5)                    018460
1840              PRINT 1694,UNORM(7),DNORM(7),ANORM(7)                    018470
                  PRINT 1696                                               018480
                  PRINT 1698,UNORM(8),DNORM(8),ANORM(8)                    018490
                  PRINT 1695,UNORM(9),DNORM(9),ANORM(9)                    018500
                  PRINT 1702                                               018510
1845              PRINT 1704,UNORM(10),DNORM(10),ANORM(10)                 018520
                  PRINT 1705,UNORM(11),DNORM(11),ANORM(11)                 018530
                  PRINT 8531,PRT7                                          018540
                  PRINT 8532,SV1,SV2                                       018550
                  PRINT 8533,SV3,SV4                                       018560
1850              PRINT 10C2                                               018570
          C PRINTOUT PAGE 3 OR 7                                           018580
          C N25                                                            018590
                  IPAGE=IPAGE+1                                            018600
                  PRINT 1500,ITEST,IMO,IDAY,IYR,XTIM,IPAGE                 018610
1855              PRINT 1502                                               018620
                  PRINT 1504,PRT1                                          018630
                  PRINT 1506,(PR(65,I),I=1,5),E(65)                        018640
                  PRINT 1512,(PR(41,I),I=1,5),E(41)                        018650
                  PRINT 1514,(PR(42,I),I=1,5),E(42)                        018660
1860              PRINT 1516,(PR(5,I),I=1,5),E(5)                          018670
                  PRINT 1522,(SSAT(I),I=1,5),E(84)                         018680
                  PRINT 1520,(PR(6,I),I=1,5),E(6)                          018690
                  PRINT 1522,(DSAT(I),I=1,5),E(85)                         018700
                  PRINT 1530,PRT11                                         018710
1865              PRINT 1532,(PR(55,I),I=1,5),E(55)                        018720
                  PRINT 1534,(PR(13,I),I=1,5),E(13)                        018730
                  PRINT 1536,(TSAT(I),I=1,5),E(82)                         018740
                  PRINT 1538,(PR(56,I),I=1,5),E(56)                        018750
                  PRINT 1540,(PR(14,I),I=1,5),E(14)                        018760
1870              PRINT 1536,(TDAT(I),I=1,5),E(83)                         018770
                  IF(IWFLO.EQ.1)GOTO 946                                   018780
          C N26                                                            018790
                  PRINT 1542,(PR(58,I),I=1,5),E(58)                        018800
                  PRINT 1544,(PR(50,I),I=1,5),E(50)                        018810
1875              GOTO 947                                                 018820
          C N27                                                            018830
          946     PRINT 1542,(PR(53,I),I=1,5),E(53)                        018840
                  PRINT 1544,(PR(52,I),I=1,5),E(52)                        018850
          947     IF(ISFLO.EQ.1)GOTO 948                                   018860
1880      C N28                                                            018870
                  PRINT 1546,(PR(59,I),I=1,5),E(59)                        018880
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                PRINT 1548,(PR(49,I),I=1,5),E(49)                                018890
                GOTO 949                                                         018900
          C N29                                                                  018910
1885      948   PRINT 1546,(PR(54,I),I=1,5),E(54)                                018920
                PRINT 1548,(PR(51,I),I=1,5),E(51)                                018930
          C N30                                                                  018940
          949   PRINT 1550,(PR(21,I),I=1,5),E(21)                                018950
                PRINT 1552,(PR(22,I),I=1,5),E(22)                                018960
1890            PRINT 1554,(PR(23,I),I=1,5),E(23)                                018970
                PRINT 1556,(PR(24,I),I=1,5),E(24)                                018980
                PRINT 1558,(PR(57,I),I=1,5),E(57)                                018990
                PRINT 1560,(PR(30,I),I=1,5),E(30)                                019000
                PRINT 1562,(PR(31,I),I=1,5),E(31)                                019010
1895            PRINT 1570,PRT10                                                 019020
                DO 1572 J=1,7                                                    019030
          C N31                                                                  019040
                MF=59+J                                                          019050
          C N32                                                                  019060
1900            IF(J.EQ.4) MF=33                                                 019070
          C N33                                                                  019080
                IF(J.EQ.5) MF=68                                                 019090
          C N34                                                                  019100
                IF(J.EQ.6) MF=25                                                 019110
1905      C N35                                                                  019120
                PRINT 1580,ABG(2*J-1),ABG(2*J),(PR(MF,I),I=1,5),E(MF)            019130
          1572  CONTINUE                                                         019140
          C N36                                                                  019150
                PRINT 1610,PRT5                                                  019160
1910            PRINT 1612,(WW(I),I=1,5),E(73)                                   019170
                PRINT 1614,(WS(I),I=1,5),E(74)                                   019180
                PRINT 1616,(WI(I),I=1,5),E(75)                                   019190
                PRINT 1618,(WO(I),I=1,5),E(76)                                   019200
                PRINT 1710,(PR(12,I),I=1,5),ESPD                                 019210
1915            PRINT 1712,PRT4,(PR(11,I),I=1,5),ETOR                            019220
                PRINT 1714,PRT10,(DPH(I),I=1,6)                                  019230
                PRINT 1002                                                       019240
          C PRINTOUT PAGE 4 OR 8                                                 019250
          C N37                                                                  019260
1920            IPAGE=IPAGE+1                                                    019270
                PRINT 1630,ITEST,IMO,IDAY,IYR,XTIM,IPAGE                         019280
                PRINT 1502                                                       019290
                PRINT 1632,PRT6                                                  019300
                PRINT 1634                                                       019310
1925            PRINT 1636,(VSMD(I),I=1,5),E(78)                                 019320
                PRINT 1638,(VDMD(I),I=1,5),E(79)                                 019330
                PRINT 1640                                                       019340
                PRINT 1642,(PR(15,I),I=1,5),E(15)                                019350
                PRINT 1644,(PR(16,I),I=1,5),E(16)                                019360
1930            PRINT 1646,(PR(17,I),I=1,5),E(17)                                019370
                PRINT 1650                                                       019380
                PRINT 1643,(PR(18,I),I=1,5),E(18)                                019390
                PRINT 1645,(PR(19,I),I=1,5),E(19)                                019400
                PRINT 1647,(PR(20,I),I=1,5),E(20)                                019410
1935            PRINT 1800                                                       019420
                PRINT 1810,(PR(35,I),I=1,5),E(35)                                019430
                PRINT 1820,(PR(36,I),I=1,5),E(36)                                019440
                PRINT 1830,(PR(34,I),I=1,5),E(34)                                019450
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                PRINT 1652                                                      019460
1940            PRINT 1634,PRT7                                                 019470
                PRINT 1654,(VEL(1,I),I=1,6)                                     019480
                PRINT 1656,(VEL(2,I),I=1,6)                                     019490
                PRINT 1658,PRT7                                                 019500
                PRINT 1654,(VEL(3,I),I=1,6)                                     019510
1945            PRINT 1656,(VEL(4,I),I=1,6)                                     019520
                IF(ITEST.GT.673)GOTO 6021                                       019530
              C N38                                                             019540
                PRINT 1661                                                      019550
                PRINT 1663,(VEL(5,I),I=1,5)                                     019560
1950            PRINT 1657,(VEL(6,I),I=1,5)                                     019570
                PRINT 1667                                                      019580
                PRINT 1655,(VEL(7,I),I=1,5)                                     019590
                PRINT 1665,(VEL(8,I),I=1,5)                                     019600
                GOTO 6022                                                       019610
1955          6021  CONTINUE                                                    019620
              C N39                                                             019630
                PRINT 1660                                                      019640
                PRINT 1655,(VEL(7,I),I=1,5)                                     019650
                PRINT 1665,(VEL(8,I),I=1,5)                                     019660
1960            PRINT 1662                                                      019670
                PRINT 1663,(VEL(5,I),I=1,5)                                     019680
                PRINT 1657,(VEL(6,I),I=1,5)                                     019690
              6022  CONTINUE                                                    019700
              C N40                                                             019710
1965            PRINT 1664                                                      019720
                PRINT 1635,PRT8,PRT9                                            019730
                PRINT 1706,(VELH(1,I),I=1,6)                                    019740
                PRINT 1708,(VELH(2,I),I=1,6)                                    019750
                PRINT 1659,PRT8,PRT9                                            019760
1970            PRINT 1706,(VELH(3,I),I=1,6)                                    019770
                PRINT 1708,(VELH(4,I),I=1,6)                                    019780
                IF(ITEST.GT.673) GOTO 6023                                      019790
              C N41                                                             019800
                PRINT 1681                                                      019810
1975            GOTO 6024                                                       019820
              6023  CONTINUE                                                    019830
              C N42                                                             019840
                PRINT 1666                                                      019850
              6024  CONTINUE                                                    019860
1980          C N43                                                             019870
                PRINT 1671,(VELH(5,I),I=1,5)                                    019880
                PRINT 1673,(VELH(6,I),I=1,5)                                    019890
                IF(ITEST.GT.673)GOTO 6025                                       019900
              C N44                                                             019910
1985            PRINT 1683                                                      019920
                GOTO 6026                                                       019930
              6025  CONTINUE                                                    019940
              C N45                                                             019950
                PRINT 1668                                                      019960
1990          6026  CONTINUE                                                    019970
              C N46                                                             019980
                PRINT 1675,(VELH(7,I),I=1,5)                                    019990
                PRINT 1677,(VELH(8,I),I=1,5)                                    020000
              C N47                                                             020010
1995          1000  FORMAT(////)                                              020020
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      1001  FORMAT(//////)                                                    020030
      1002  FORMAT(1H1,*CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STA020040
     *TE TESTS*,/)                                                          020050
      1003  FORMAT(//,6X*CONV CONST FILE *,A4,I4,2A10,)                      020060
2000  1004  FORMAT(2X,*TEST NO*,I4,*   DATE *,I2,*/*,I2,*/*,I2,*   TIME*,F7.2 020070
     *,3X,*PAGE *,I2,//)                                                    020080
      1005  FORMAT(////)                                                     020090
      1006  FORMAT(/,2X,*PUMP PERFORMANCE BASED ON SUCTION LEG CONDITIONS*,//)020100
      1008  FORMAT(22X,*SET*,19X,*ACTUAL CONDITIONS*)                        020110
2005  1007  FORMAT(1H1)                                                     020120
      1010  FORMAT(21X,*PCINT   ACTUAL  SPEC. ACTUAL  SPEC. ACTUAL  INST.  DAT020130
     *A*)                                                                   020140
      1012  FORMAT(30X,*PCINT  DIFF.  DIFF.  DRIFT  DRIFT  UNCTY  STD.*)    020150
      1014  FORMAT(30X,*(AVG)*,17X,*/MIN   /MIN         DEV.*)              020160
2010  1016  FORMAT(3X,*PRESSURE*,A6,* L-5*,8F7.0)                           020170
      1017  FORMAT(3X,*PRESSURE*,A6,*  L-6 *,F12.0,21X,3F7.0)               020180
      1018  FORMAT(3X,*VOL FLOW*,A6,3X,F8.0,7F7.0)                          020190
      1019  FORMAT(3X,*PRESSURE*,A6,*  L-5+6 *,F10.0,21X,3F7.0)             020200
      1021  FORMAT(3X,*VOL FLOW*,A6,2X,F16.0,21X,3F7.0)                     020210
2015  1024  FORMAT(3X,*VOID FRACTION*)                                      020220
      1025  FORMAT(3X,*VOID FRACTION*)                                      020230
      1026  FORMAT(4X,*GD*,13X,F16.3,21X,3F7.3)                             020240
      1027  FORMAT(4X,*GD*,13X,F16.3,21X,3F7.3)                             020250
      1028  FORMAT(4X,*ORIF*,11X,2F8.3,6F7.3)                               020260
2020  1029  FORMAT(4X,*ORIF*,11X,F16.3,21X,3F7.3)                           020270
      1030  FORMAT(3X,*SPEED (RPM) L-12*,F8.0,F8.0,6F7.0)                   020280
      1031  FORMAT(3X,*SPEED (RPM)  L-12*,F16.0,21X,3F7.0)                  020290
      1032  FORMAT(3X,*PUMP HEAD*)                                          020300
      1034  FORMAT(4X,*GD*,A4,11X,F14.1,21X,3F7.1)                          020310
2025  1036  FORMAT(4X,*ORIF*,A4,9X,F14.1,21X,3F7.1)                         020320
      1038  FORMAT(4X,*DP*,A5,*  L-7   *,F16.1,21X,3F7.2)                   020330
      1040  FORMAT(3X,*PUMP TORQUE*,A6)                                     020340
      1042  FORMAT(4X,*HYDRAULIC*,6X,F16.1,21X,3F7.1)                       020350
      1044  FORMAT(4X,*FRICTION*,7X,F16.1,21X,3F7.1)                        020360
2030  1046  FORMAT(4X,*SHAFT  L-11    *,F16.1,21X,3F7.1)                    020370
      1048  FORMAT(//,2X,*PUMP PERFORMANCE BASED ON DISCHARGE LEG CONDITIONS*,020380
     *//)                                                                   020390
      1050  FORMAT(2X,*TEST NO*,I4,*   DATE *,I2,*/*,I2,*/*,I2,*   TIME*,   020400
     *F7.2,3X,*PAGE *,I2,//)                                                020410
2035  1060  FORMAT(2X,*PUMP PERFORMANCE BASED ON SUCTION AND DISCHARGE LEG   020420
     * AVERAGE*,///)                                                        020430
      1062  FORMAT(44X,*ACTUAL CONDITIONS*)                                 020440
      1064  FORMAT(29X,*ACTUAL*,22X,*ACTUAL  INST.  DATA*)                  020450
      1066  FORMAT(30X,*POINT*,23X,*DRIFT   STD.  STD.*)                    020460
2040  1068  FORMAT(30X,*(AVG)*,24X,*/MIN   DEV.  DEV.*)                     020470
      1118  FORMAT(3X,*VOL FLOW*,A6,3X,F8.4,7F7.4)                          020480
      1121  FORMAT(3X,*VOL FLOW*,A6,2X,F16.4,21X,3F7.4)                     020490
      1500  FORMAT(2X,*TEST NO*,I4,*   DATE *,I2,*/*,I2,*/*,I2,*   TIME*,F7.2 020500
     *,3X,*PAGE *,I2,//)                                                    020510
2045  1502  FORMAT(25X,*POINT 1  POINT 2  POINT 3  POINT 4  POINT 5*,4X,*PCT*)020520
      1504  FORMAT(71X,*UNCTY*,/,2X,*LOOP PRESSURES *,A6,/)                 020530
      1506  FORMAT(3X,*HIGH PRES DRUM L-65 *,5(3X,F6.1),3X,F5.2)            020540
      1512  FORMAT(3X,*STEAM ORIFICE L-41/47  *,F6.1,4(3X,F6.1),3X,F5.2)    020550
      1514  FORMAT(3X,*WATER ORIFICE L-42/48  *,F6.1,4(3X,F6.1),3X,F5.2)    020560
2050  1516  FORMAT(3X,*SUCTION LEG  L-5    *,5(3X,F6.1),3X,F5.2)            020570
      1520  FORMAT(3X,*DISCHARGE LEG  L-6  *,5(3X,F6.1),3X,F5.2)            020580
      1522  FORMAT(3X,*SAT PRES*,12X,5(3X,F6.1),3X,F5.2)                    020590
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      1530  FORMAT(/,2X,*LOOP TEMPERATURE *,A3,/)                                  020600
      1532  FORMAT(3X,*SUCTION LEG-RTD L-55*,5(4X,F5.1),3X,F5.2)                   020610
2055  1534  FORMAT(3X,*SUCTION LEG-TC  L-13*,5(4X,F5.1),3X,F5.2)                   020620
      1536  FORMAT(3X,*SAT TEMP*,12X,5(4X,F5.1),3X,F5.2)                           020630
      1538  FORMAT(3X,*DISCHARGE LEG-RTD L-56  *,F5.1,4(4X,F5.1),3X,F5.2)          020640
      1540  FORMAT(3X,*DISCHARGE LEG-TC L-14*,3X,F5.1,4(4X,F5.1),3X,F5.2)          020650
      1542  FORMAT(3X,*WATER ORIF.-RTD L-53/58*,1X,F5.1,4(4X,F5.1),3X,F5.2)        020660
2060  1544  FORMAT(3X,*WATER ORIF.-TC L-50/52*,2X,F5.1,4(4X,F5.1),3X,F5.2)         020670
      1546  FORMAT(3X,*STEAM ORIF.-RTD L-54/59 *,F5.1,4(4X,F5.1),3X,F5.2)          020680
      1548  FORMAT(3X,*STEAM ORIF.-TC L-49/51  *,F5.1,4(4X,F5.1),3X,F5.2)          020690
      1550  FORMAT(3X,*PUMP INJ IN-TC L-21 *,5(4X,F5.1),3X,F5.2)                   020700
      1552  FORMAT(3X,*PUMP INJ OUT-TC L-22*,5(4X,F5.1),3X,F5.2)                   020710
2065  1554  FORMAT(3X,*HP DRUM ID-TC  L-23 *,5(4X,F5.1),3X,F5.2)                   020720
      1556  FORMAT(3X,*HP DRUM OD-TC  L-24 *,5(4X,F5.1),3X,F5.2)                   020730
      1558  FORMAT(3X,*AMBIENT-TC  L-57    *,5(4X,F5.1),3X,F5.2)                   020740
      1560  FORMAT(3X,*SUCTION LEG OD-TC L-30*,2X,F5.1,4(4X,F5.1),3X,F5.2)          020750
      1562  FORMAT(3X,*DISCH. LEG OD-TC L-31*,3X,F5.1,4(4X,F5.1),3X,F5.2)          020760
2070  1570  FORMAT(/,2X,*LOOP PRESSURE DROPS *,A6,/)                                020770
      1580  FORMAT(3X,A10,A10,5(3X,F6.1),1X,F7.2)                                   020780
      1610  FORMAT(/,2X,*LOOP FLOWRATES *,A8,/)                                     020790
      1612  FORMAT(3X,*WATER FLOW*,11X,5(F9.2),2X,F5.2)                             020800
      1614  FORMAT(3X,*STEAM FLOW*,11X,5(F9.2),2X,F5.2)                             020810
2075  1616  FORMAT(3X,*SEAL INJ IN   L-9    *,5(F9.2),2X,F5.2)                      020820
      1618  FORMAT(3X,*SEAL INJ OUT  L-32   *,5(F9.2),2X,F5.2,/)                    020830
      1630  FORMAT(2X,*TEST NO*,I4,*   DATE *,I2,*/*,I2,*/*,I2,*   TIME*,F7.2     020840
     *,3X,*PAGE *,I2,/)                                                           020850
      1632  FORMAT(71X,*UNCTY*,/,2X,*LOOP SPECIFIC VOLUMES *,A9,/)                  020860
2080  1634  FORMAT(3X,*MIXING TEE*,A8)                                              020870
      1635  FORMAT(3X,*MIXING TEE*,A10,A3)                                          020880
      1636  FORMAT(4X,*SUCTION *,11X,5(1X,F8.5),1X,F7.2)                            020890
      1638  FORMAT(4X,*DISCHARGE *,9X,5(1X,F8.5),1X,F7.2)                           020900
      1640  FORMAT(3X,*GAMMA DENSITOMETER*,/,4X,*SUCTION LEG*,)                     020910
2085  1642  FORMAT(5X,*BEAM 1   L-15*,5X,5(1X,F8.5),1X,F7.2)                        020920
      1643  FORMAT(5X,*BEAM 1   L-18*,5X,5(1X,F8.5),1X,F7.2)                        020930
      1644  FORMAT(5X,*BEAM 2   L-16*,5X,5(1X,F8.5),1X,F7.2)                        020940
      1645  FORMAT(5X,*BEAM 2   L-19*,5X,5(1X,F8.5),1X,F7.2)                        020950
      1646  FORMAT(5X,*BEAM 3   L-17*,5X,5(1X,F8.5),1X,F7.2)                        020960
2090  1647  FORMAT(5X,*BEAM 3   L-20*,5X,5(1X,F8.5),1X,F7.2)                        020970
      1650  FORMAT(4X,*DISCHARGE LEG*)                                              020980
      1652  FORMAT(/,2X,*FLUID VELOCITY*,/)                                         020990
      1654  FORMAT(4X,*SUCTION *,10X,5(4X,F5.1),4X,F6.2)                            021000
      1655  FORMAT(4X,*SUCT LEG   L-28   *,5(2X,F7.0),4X,F6.2)                      021010
2095  1656  FORMAT(4X,*DISCHARGE *,8X,5(4X,F5.1),4X,F6.2)                           021020
      1657  FORMAT(4X,*DISCH LEG  L-4    *,5(2X,F7.0),4X,F6.2)                     021030
      1658  FORMAT(3X,*MIX TEE-GAM DEN*,A8)                                         021040
      1659  FORMAT(3X,*MIX TEE-GAM DEN*,A10,A3)                                     021050
      1660  FORMAT(3X,*CENTER TURBINE METER*)                                       021060
2100  1661  FORMAT(3X,*HI TURBINE METER (MANUF CAL)*)                               021070
      1662  FORMAT(3X,*LO TURBINE METER*)                                           021080
      1663  FORMAT(4X,*SUCT LEG   L-3    *,5(2X,F7.0),4X,F6.2)                      021090
      1664  FORMAT(/,2X,*MOMENTUM FLUX*,/)                                          021100
      1665  FORMAT(4X,*DISCH LEG  L-29   *,5(2X,F7.0),4X,F6.2)                      021110
2105  1666  FORMAT(3X,*HI DRAG DISC*)                                               021120
      1667  FORMAT(3X,*LO TURBINE METER (MANUF CAL)*)                               021130
      1668  FORMAT(3X,*LO DRAG DISC*)                                               021140
      1671  FORMAT(4X,*SUCT LEG   L-1    *,5(2X,F7.0),4X,F6.2)                      021150
      1672  FORMAT(//,2X,*PUMP PERFORMANCE NORMALIZED VALUES*,/)                    021160
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2110        1673  FORMAT(4X,*DISCH LEG  L-2    *,5(2X,F7.0),4X,F6.2)                021170
            1674  FORMAT(28X,*SUCTION *,9X,*DISCHARGE *,9X,*AVERAGE*,/)               021180
            1675  FORMAT(4X,*SUCT LEG   L-26   *,5(2X,F7.0),4X,F6.2)                021190
            1676  FORMAT(3X,*PUMP HEAD*)                                            021200
            1677  FORMAT(4X,*DISCH LEG  L-27   *,5(2X,F7.0),4X,F6.2)                021210
2115        1678  FORMAT(4X,*GAMMA DENSITOMETER*,3X,F9.3,2(9X,F9.3))                021220
            1680  FORMAT(4X,*ORIFICE*,5X,3(9X,F9.3))                                021230
            1681  FORMAT(3X,*HI DRAG DISC (MANUF CAL)*)                             021240
            1682  FORMAT(3X,*VOLUMETRIC FLOW*)                                      021250
            1683  FORMAT(3X,*LO DRAG DISC (MANUF CAL)*)                             021260
2120        1688  FORMAT(3X,*VOID FRACTION (PERCENT)*)                              021270
            1690  FORMAT(4X,*GAMMA DENSITOMETER*,7X,F5.1,2(13X,F5.1))               021280
            1692  FORMAT(4X,*ORIFICE*,5X,3(13X,F5.1))                               021290
            1694  FORMAT(4X,*SET POINT*,3X,3(13X,F5.1))                             021300
            1695  FORMAT(4X,*SET POINT*,3X,3(11X,F7.3))                             021310
2125        1696  FORMAT(3X,*PUMP SPEED*)                                           021320
            1698  FORMAT(4X,*ACTUAL*,6X,3(11X,F7.3))                                021330
            1702  FORMAT(3X,*PUMP HYDRAULIC TORQUE*)                                021340
            1704  FORMAT(4X,*GAM DEN*,5X,3(9X,F9.3))                                021350
            1705  FORMAT(4X,*ORIFICES*,4X,3(9X,F9.3),//)                            021360
2130        1706  FORMAT(4X,*SUCTION *,10X,5(2X,F7.0),4X,F6.2)                      021370
            1708  FORMAT(4X,*DISCHARGE *,8X,5(2X,F7.0),4X,F6.2)                     021380
            1710  FORMAT(/,2X,*PUMP SPEED(RPM)  L-12 *,5(3X,F6.0),1X,F6.1)          021390
            1712  FORMAT(/,2X,*SHAFT TORQUE*,A6,* L-11*,2X,F6.1,4(3X,F6.1),1X,F6.1) 021400
            1714  FORMAT(/,2X,*PUMP DP*,A5,*  L-7     *,5(3X,F6.1),1X,F6.1)         021410
2135        1720  FORMAT(3X,*PRESSURE*,A6,*  L-5 *,F12.0,21X,3F7.0)                 021420
            1730  FORMAT(3X,*PRESSURE*,A6,* L-6*,8F7.0)                             021430
            1800  FORMAT(4X,*AECL*)                                                 021440
            1810  FORMAT(5X,*BEAM 1   L-35*,5X,5(1X,F8.5),1X,F7.2)                  021450
            1820  FORMAT(5X,*BEAM 2   L-36*,5X,5(1X,F8.5),1X,F7.2)                  021460
2140        1830  FORMAT(5X,*BEAM 3   L-34*,5X,5(1X,F8.5),1X,F7.2)                  021470
            8531  FORMAT(2X,*SUPERFICIAL VELOCITIES   SUCT LEG   DISCH LEG *,A8,/)  021480
            8532  FORMAT(4X,*WATER*,18X,F8.2,4X,F8.2)                               021490
            8533  FORMAT(4X,*STEAM*,18X,F8.2,4X,F8.2,////)                          021500
            9066  FORMAT(6X,*DATA REDUCED  *,A10,2X,A10)                            021510
2145        9067  FORMAT(/,4X,*WATER ORIFICE = *,A6,*: STEAM ORIFICE = *,A6)        021520
            C END BLOCK N                                                           021530
            C START BLOCK O                                                         021540
            C WRITE TO FILE                                                         021550
            C WRITE PAGE 1 OR 5                                                     021560
2150              IF(ITEST.GT.0.AND.ITEST.LT.391)GOTO 6057                          021570
                  IF(ITEST.GT.559.AND.ITEST.LT.1436)GOTO 6057                       021580
            C REVERSE FLOW MODIFICATION                                             021590
            C 01                                                                    021600
                  WRITE(IF,6012) PRA(1),DRIF(1),ERR(1),SPRA(1)                      021610
2155              IF(N.EQ.2)GOTO 6030                                               021620
            C 02                                                                    021630
                  WRITE(IF,6012) PRA(3),DRIF(3),ERR(3),SPRA(3)                      021640
                  GOTO 6031                                                         021650
            C 03                                                                    021660
2160        6030  WRITE(IF,6015) PRA(3),DRIF(3),ERR(3),SPRA(3)                      021670
            C 04                                                                    021680
            6031  WRITE(IF,6012) PRA(5),DRIF(5),ERR(5),SPRA(5)                      021690
                  WRITE(IF,6012) PRA(4),DRIF(4),ERR(4),SPRA(4)                      021700
                  WRITE(IF,6012) PRA(6),DRIF(6),ERR(6),SPRA(6)                      021710
2165              GOTO 6059                                                         021720
            6057  CONTINUE                                                          021730
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      C 05                                                                    021740
           WRITE(IF,1)PSET,PRA(1),DAL(1),DAC(1),DRAL(1),DRIF(1),ERR(1),SPRA(1021750
          *)                                                                  021760
2170       IF(N.EQ.2)GOTO 6032                                                021770
      C 06                                                                    021780
           WRITE(IF,6011)VOLM,PRA(3),DAL(3),DAC(3),DRAL(3),DRIF(3),ERR(3),SPR021790
          *A(3)                                                               021800
           GOTO 6033                                                          021810
2175  C 07                                                                    021820
      6032 WRITE(IF,6013) VOLM,PRA(3),DAL(3),DAC(3),DRAL(3),DRIF(3),ERR(3)    021830
          *,SPRA(3)                                                           021840
      6033 WRITE(IF,1)VOID,PRA(5),DAL(5),DAC(5),DRAL(5),DRIF(5),ERR(5),SPRA(5021850
      C 08                                                                    021860
2180      *)                                                                  021870
           WRITE(IF,6012)PRA(4),DRIF(4),ERR(4),SPRA(4)                        021880
           WRITE(IF,1)PSPD,PRA(6),DAL(6),DAC(6),DRAL(6),DRIF(6),ERR(6),SPRA(6021890
          *)                                                                  021900
      6059 CONTINUE                                                           021910
2185  C 09                                                                    021920
           WRITE(IF,6012)PRA(7),DRIF(7),ERR(7),SPRA(7)                        021930
           WRITE(IF,6012)PRA(8),DRIF(8),ERR(8),SPRA(8)                        021940
           WRITE(IF,6012)PRA(9),DRIF(9),ERR(9),SPRA(9)                        021950
           WRITE(IF,6012)PRA(10),DRIF(10),ERR(10),SPRA(10)                    021960
2190       WRITE(IF,6012)PRA(11),DRIF(11),ERR(11),SPRA(11)                    021970
           WRITE(IF,6012)PRA(12),DRIF(12),ERR(12),SPRA(12)                    021980
           IF(ITEST.GT.0.AND.ITEST.LT.391)GOTO 6064                           021990
           IF(ITEST.GT.559.AND.ITEST.LT.1436)GOTO 6064                        022000
      C REVERSE FLOW MODIFICATION                                             022010
2195  C 010                                                                   022020
           WRITE(IF,1) PSET,PRA(13),DAL(1),DAC(1),DRAL(13),DRIF(13),ERR(13)   022030
          *,SPRA(13)                                                          022040
           IF(N.EQ.2)GOTO 6034                                                022050
      C 011                                                                   022060
2200       WRITE(IF,6011) VOLM,PRA(15),DAL(3),DAC(3),DRAL(15),DRIF(15),ERR(15022070
          *),SPRA(15)                                                         022080
           GOTO 6035                                                          022090
      C 012                                                                   022100
      6034 WRITE(IF,6013) VOLM,PRA(15),DAL(3),DAC(3),DRAL(15),DRIF(15),ERR(15022110
2205      *),SPRA(15)                                                         022120
      C 013                                                                   022130
      6035 WRITE(IF,1) VOID,PRA(17),DAL(5),DAC(5),DRAL(17),DRIF(17),ERR(17)   022140
          *,SPRA(17)                                                          022150
           WRITE(IF,6012) PRA(16),DRIF(16),ERR(16),SPRA(16)                   022160
2210       WRITE(IF,1) PSPD,PRA(6),DAL(6),DAC(6),DRAL(6),DRIF(6),ERR(6)       022170
          *,SPRA(6)                                                           022180
           GOTO 6067                                                          022190
      6064 CONTINUE                                                           022200
      C 014                                                                   022210
2215       WRITE(IF,6012)PRA(13),DRIF(13),ERR(13),SPRA(13)                    022220
           IF(N.EQ.2)GOTO 6036                                                022230
      C 015                                                                   022240
           WRITE(IF,6012)PRA(15),DRIF(15),ERR(15),SPRA(15)                    022250
           GOTO 6037                                                          022260
2220  C 016                                                                   022270
      6036 WRITE(IF,6015) PRA(15),DRIF(15),ERR(15),SPRA(15)                   022280
      C 017                                                                   022290
      6037 WRITE(IF,6012)PRA(17),DRIF(17),ERR(17),SPRA(17)                    022300
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      WRITE(IF,6012)PRA(16),DRIF(16),ERR(16),SPRA(16)                   022310
2225  WRITE(IF,6012)PRA(6), DRIF(6) ,ERR(6) ,SPRA(6)                    022320
 6067 CONTINUE                                                          022330
C 018                                                                   022340
      WRITE(IF,6012)PRA(19),DRIF(19),ERR(19),SPRA(19)                   022350
      WRITE(IF,6012)PRA(20),DRIF(20),ERR(20),SPRA(20)                   022360
2230  WRITE(IF,6012) PRA(9),DRIF(9),ERR(9),SPRA(9)                      022370
      WRITE(IF,6012) PRA(10),DRIF(10),ERR(10),SPRA(10)                  022380
      WRITE(IF,6012) PRA(11),DRIF(11),ERR(11),SPRA(11)                  022390
      WRITE(IF,6012) PRA(12),DRIF(12),ERR(12),SPRA(12)                  022400
C WRITE PAGE 2 OR 6                                                     022410
2235  WRITE(IF,6012)PRA(23),DRIF(23),ERR(23),SPRA(23)                   022420
      IF(N.EQ.2)GOTO 6038                                               022430
C 019                                                                   022440
      WRITE(IF,6012)PRA(25),DRIF(25),ERR(25),SPRA(25)                   022450
      GOTO 6039                                                         022460
2240  C 020                                                             022470
 6038 WRITE(IF,6015) PRA(25),DRIF(25),ERR(25),SPRA(25)                  022480
C 021                                                                   022490
 6039 WRITE(IF,6012) PRA(27),DRIF(27),ERR(27),SPRA(27)                  022500
      WRITE(IF,6012)PRA(26),DRIF(26),ERR(26),SPRA(26)                   022510
2245  WRITE(IF,6012) PRA(6),DRIF(6),ERR(6),SPRA(6)                      022520
      WRITE(IF,6012)PRA(29),DRIF(29),ERR(29),SPRA(29)                   022530
      WRITE(IF,6012)PRA(30),DRIF(30),ERR(30),SPRA(30)                   022540
      WRITE(IF,6012) PRA(9),DRIF(9),ERR(9),SPRA(9)                      022550
      WRITE(IF,6012) PRA(10),DRIF(10),ERR(10),SPRA(10)                  022560
2250  WRITE(IF,6012) PRA(11),DRIF(11),ERR(11),SPRA(11)                  022570
      WRITE(IF,6012) PRA(12),DRIF(12),ERR(12),SPRA(12)                  022580
      WRITE(IF,6014)UNORM(1),DNORM(1),ANORM(1)                          022590
      WRITE(IF,6014)UNORM(2),DNORM(2),ANORM(2)                          022600
      WRITE(IF,6014)UNORM(4),DNORM(4),ANORM(4)                          022610
2255  WRITE(IF,6014)VOLS,VOLS,VOLS                                      022620
      WRITE(IF,6014)UNORM(6),DNORM(6),ANORM(6)                          022630
      WRITE(IF,6014)UNORM(5),DNORM(5),ANORM(5)                          022640
      WRITE(IF,6014)UNORM(7),DNORM(7),ANORM(7)                          022650
      WRITE(IF,6014)UNORM(8),DNORM(8),ANORM(8)                          022660
2260  WRITE(IF,6014)UNORM(9),DNORM(9),ANORM(9)                          022670
      WRITE(IF,6014)UNORM(10),DNORM(10),ANORM(10)                       022680
      WRITE(IF,6014)UNORM(11),DNORM(11),ANORM(11)                       022690
      WRITE(IF,6017) SV1,SV2                                            022700
      WRITE(IF,6017) SV3,SV4                                            022710
2265  C WRITE PAGE 3 OR 7                                               022720
      WRITE(IF,6016) (PR(65,I),I=1,5),E(65)                             022730
      WRITE(IF,6016) (PR(41,I),I=1,5),E(41)                             022740
      WRITE(IF,6016)(PR(42,I),I=1,5),E(42)                              022750
      WRITE(IF,6016)(PR(5,I),I=1,5),E(5)                                022760
2270  WRITE(IF,6016)(SSAT(I),I=1,5),E(84)                               022770
      WRITE(IF,6016)(PR(6,I),I=1,5),E(6)                                022780
      WRITE(IF,6016)(DSAT(I),I=1,5),E(85)                               022790
      WRITE(IF,6016)(PR(55,I),I=1,5),E(55)                              022800
      WRITE(IF,6016)(PR(13,I),I=1,5),E(13)                              022810
2275  WRITE(IF,6016)(TSAT(I),I=1,5) ,E(82)                              022820
      WRITE(IF,6016)(PR(56,I),I=1,5),E(56)                              022830
      WRITE(IF,6016)(PR(14,I),I=1,5),E(14)                              022840
      WRITE(IF,6016)(TDAT(I),I=1,5),E(83)                               022850
      IF(IWFLO.EQ.1)GOTO 6001                                           022860
2280  C 022                                                             022870
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320040

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                WRITE(IF,6016)(PR(58,I),I=1,5),E(58)                    022880
                WRITE(IF,6016)(PR(50,I),I=1,5),E(50)                    022890
                GOTO 6002                                               022900
          C 023                                                         022910
2285      6001  WRITE(IF,6016)(PR(53,I),I=1,5),E(53)                    022920
                WRITE(IF,6016)(PR(52,I),I=1,5),E(52)                    022930
          6002  IF(ISFLO.EQ.1)GOTO 6003                                 022940
          C 024                                                         022950
                WRITE(IF,6016)(PR(59,I),I=1,5),E(59)                    022960
2290            WRITE(IF,6016)(PR(49,I),I=1,5),E(49)                    022970
                GOTO 6004                                               022980
          C 025                                                         022990
          6003  WRITE(IF,6016)(PR(54,I),I=1,5),E(54)                    023000
                WRITE(IF,6016)(PR(51,I),I=1,5),E(51)                    023010
2295      C 026                                                         023020
          6004  WRITE(IF,6016)(PR(21,I),I=1,5),E(21)                    023030
                WRITE(IF,6016)(PR(22,I),I=1,5),E(22)                    023040
                WRITE(IF,6016)(PR(23,I),I=1,5),E(23)                    023050
                WRITE(IF,6016)(PR(24,I),I=1,5),E(24)                    023060
2300            WRITE(IF,6016)(PR(57,I),I=1,5),E(57)                    023070
                WRITE(IF,6016)(PR(30,I),I=1,5),E(30)                    023080
                WRITE(IF,6016)(PR(31,I),I=1,5),E(31)                    023090
                DO 6005 J=1,7                                           023100
          C 027                                                         023110
2305            MF=59+J                                                 023120
          C 028                                                         023130
                IF(J.EQ.4) MF=33                                        023140
          C 029                                                         023150
                IF(J.EQ.5) MF=68                                        023160
2310      C 030                                                         023170
                IF(J.EQ.6) MF=25                                        023180
          C 031                                                         023190
                WRITE(IF,6016)(PR(MF,I),I=1,5),E(MF)                    023200
          6005  CONTINUE                                                023210
2315      C 032                                                         023220
                WRITE(IF,6016)(WW(I),I=1,5),E(73)                       023230
                WRITE(IF,6016)(WS(I),I=1,5),E(74)                       023240
                WRITE(IF,6016)(WI(I),I=1,5),E(75)                       023250
                WRITE(IF,6016)(WO(I),I=1,5),E(76)                       023260
2320            WRITE(IF,6016)(PR(12,I),I=1,5),ESPD                     023270
                WRITE(IF,6016)(PR(11,I),I=1,5),ETOR                     023280
                WRITE(IF,6016)(DPH(I),I=1,6)                            023290
          C WRITE PAGE 4 OR 8                                           023300
                WRITE(IF,6018)(VSMD(I),I=1,5),E(78)                     023310
2325            WRITE(IF,6018)(VDMD(I),I=1,5),E(79)                     023320
                WRITE(IF,6018)(PR(15,I),I=1,5),E(15)                    023330
                WRITE(IF,6018)(PR(16,I),I=1,5),E(16)                    023340
                WRITE(IF,6018)(PR(17,I),I=1,5),E(17)                    023350
                WRITE(IF,6018)(PR(18,I),I=1,5),E(18)                    023360
2330            WRITE(IF,6018)(PR(19,I),I=1,5),E(19)                    023370
                WRITE(IF,6018)(PR(20,I),I=1,5),E(20)                    023380
                WRITE(IF,6018)(PR(35,I),I=1,5),E(35)                    023390
                WRITE(IF,6018)(PR(36,I),I=1,5),E(36)                    023400
                WRITE(IF,6018)(PR(34,I),I=1,5),E(34)                    023410
2335            WRITE(IF,6016)(VEL(1,I),I=1,6)                          023420
                WRITE(IF,6016)(VEL(2,I),I=1,6)                          023430
                WRITE(IF,6016)(VEL(3,I),I=1,6)                          023440
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      WRITE(IF,6016)(VEL(4,I),I=1,6)                                    023450
      WRITE(IF,6016)(VEL(5,I),I=1,5)                                    023460
2340  WRITE(IF,6016)(VEL(6,I),I=1,5)                                    023470
      WRITE(IF,6016)(VEL(7,I),I=1,5)                                    023480
      WRITE(IF,6016)(VEL(8,I),I=1,5)                                    023490
      WRITE(IF,6016)(VELH(1,I),I=1,6)                                   023500
      WRITE(IF,6016)(VELH(2,I),I=1,6)                                   023510
2345  WRITE(IF,6016)(VELH(3,I),I=1,6)                                   023520
      WRITE(IF,6016)(VELH(4,I),I=1,6)                                   023530
      WRITE(IF,6016)(VELH(5,I),I=1,5)                                   023540
      WRITE(IF,6016)(VELH(6,I),I=1,5)                                   023550
      WRITE(IF,6016)(VELH(7,I),I=1,5)                                   023560
2350  WRITE(IF,6016)(VELH(8,I),I=1,5)                                   023570
C 033                                                                   023580
1     FORMAT(1X,4E21.15,/,1X,4E21.15)                                   023590
6010  FORMAT(1X,4I10)                                                   023600
6011  FORMAT(1X,4E21.15,/,1X,4E21.15)                                   023610
2355  6012  FORMAT(1X,4E21.15)                                          023620
6013  FORMAT(1X,4E21.15,/,1X,4E21.15)                                   023630
6014  FORMAT(1X,3E21.15)                                                023640
6015  FORMAT(1X,4E21.15)                                                023650
6016  FORMAT(1X,3E21.15,/,1X,3E21.15)                                   023660
2360  6017  FORMAT(1X,2E21.15)                                          023670
6018  FORMAT(1X,3E21.15,/,1X,3E21.15)                                   023680
C END BLOCK O                                                           023690
      IF(N.EQ.2)GOTO 7600                                               023700
C START BLOCK P                                                         023710
2365  C                                                                 023720
C ENGLISH TO METRIC UNIT CONVERSIONS                                    023730
      DO 906 J=1,5                                                      023740
C TEMPERATURE CONVERSION                                                023750
C THERMOCOUPLE CONVERSION                                               023760
2370  DO 720 I=1,NTCA                                                   023770
C P1                                                                    023780
      K=KCA(I)                                                          023790
      PR(K,J)=(PR(K,J)-32.)*5./9.                                       023800
720   CONTINUE                                                          023810
2375  C RTD CONVERSION                                                  023820
      DO 721 I=1,NRTD                                                   023830
C P2                                                                    023840
      K=KRTD(I)                                                         023850
      PR(K,J)=(PR(K,J)-32.)*5./9.                                       023860
2380  721   CONTINUE                                                    023870
C PRESSURE CELL CONVERSION                                              023880
      DO 722 I=1,NP                                                     023890
C P3                                                                    023900
      K=KP(I)                                                           023910
2385  PR(K,J)=PR(K,J)*.06895                                            023920
722   CONTINUE                                                          023930
C DIFFERENTIAL PRESSURE CELL CONVERSION                                 023940
      DO 723 I=1,NDP                                                    023950
C P4                                                                    023960
2390  K=KDP(I)                                                          023970
      PR(K,J)=PR(K,J)*.06895                                            023980
723   CONTINUE                                                          023990
C GAMMA DENSITOMETER CONVERSION                                         024000
      DO 729 I=1,NGD                                                    024010
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2395          C P5                                                          024020
                    K=KGD(I)                                                024030
                    PR(K,J)=PR(K,J)*.06243                                  024040
              729   CONTINUE                                                024050
              C TORQUEMETER CONVERSION                                      024060
2400                DO 737 I=1,NTM                                          024070
              C P6                                                          024080
                    K=KTM(I)                                                024090
                    PR(K,J)=PR(K,J)*1.3558                                  024100
              737   CONTINUE                                                024110
2405          C MASS FLOW, HEAD AND FLUID SPECIFIC VOLUME CONVERSION         024120
              C P7                                                          024130
                    WW(J)=WW(J)*.4536                                       024140
                    WS(J)=WS(J)*.4536                                       024150
                    WI(J)=WI(J)*.4536                                       024160
2410                WO(J)=WO(J)*.4536                                       024170
                    DPH(J)=DPH(J)*.06895                                    024180
                    VSMD(J)=VSMD(J)*.06243                                  024190
                    VDMD(J)=VDMD(J)*.06243                                  024200
              C FLUID VELOCITY AND FLUID MOMENTUM FLUX CONVERSION           024210
2415                DO 903 I=1,8                                            024220
              C P8                                                          024230
                    VEL(I,J)=VEL(I,J)*.3048                                 024240
                    VELH(I,J)=VELH(I,J)*1.488                               024250
              903   CONTINUE                                                024260
2420          906   CONTINUE                                                024270
              C ENGLISH TO METRIC CONVERSION CONSTANTS                      024280
              C P9                                                          024290
                    CON(1)=.06895                                           024300
                    CON(2)=.00006308                                        024310
2425                CON(3)=.00006308                                        024320
                    CON(4)=1.0                                              024330
                    CON(5)=1.0                                              024340
                    CON(6)=1.0                                              024350
                    CON(7)=.3048                                            024360
2430                CON(8)=.3048                                            024370
                    CON(9)=.06895                                           024380
                    CON(10)=1.3558                                          024390
                    CON(11)=1.3558                                          024400
                    CON(12)=1.3558                                          024410
2435          C CONVERSION OF PUMP PERFORMANCE DATA TO METRIC UNITS          024420
                    DO 9600 I=1,12                                          024430
              C P10                                                         024440
                    DRIF(I)=DRIF(I)*CON(I)                                  024450
                    DAC(I)=DAC(I)*CON(I)                                    024460
2440                DRAL(I)=DRAL(I)*CON(I)                                  024470
                    PRA(I)=PRA(I)*CON(I)                                    024480
                    DAL(I)=DAL(I)*CON(I)                                    024490
                    SPRA(I)=SPRA(I)*CON(I)                                  024500
                    ERR(I)=ERR(I)*CON(I)                                    024510
2445                IF(I.GT.8)GOTO 9600                                     024520
              C P11                                                         024530
                    PRA(I+12)=PRA(I+12)*CON(I)                              024540
                    PRA(I+22)=PRA(I+22)*CON(I)                              024550
                    DRAL(I+12)=DRAL(I+12)*CON(I)                            024560
2450                DRIF(I+12)=DRIF(I+12)*CON(I)                            024570
                    SPRA(I+12)=SPRA(I+12)*CON(I)                            024580
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                      DRIF(I+22)=DRIF(I+22)*CON(I)                              024590
                      SPRA(I+22)=SPRA(I+22)*CON(I)                              024600
                      ERR(I+12)=ERR(I+12)*CON(I)                                024610
2455                  ERR(I+22)=ERR(I+22)*CON(I)                                024620
                9600  CONTINUE                                                  024630
                C P12                                                           024640
                      SV1=SV1*CON(7)                                            024650
                      SV2=SV2*CON(7)                                            024660
2460                  SV3=SV3*CON(8)                                            024670
                      SV4=SV4*CON(8)                                            024680
                      DO 907 I=1,5                                              024690
                C P13                                                           024700
                      SSAT(I)=SSAT(I)*.06895                                    024710
2465                  DSAT(I)=DSAT(I)*.06895                                    024720
                      TSAT(I)=(TSAT(I)-32.)*5./9.                               024730
                      TDAT(I)=(TDAT(I)-32.)*5./9.                               024740
                907   CONTINUE                                                  024750
                C P14                                                           024760
2470                  VOLM=VOLM*.00006308                                       024770
                      PSET=PSET*.06895                                          024780
                C END BLOCK P                                                   024790
                7600  CONTINUE                                                  024800
                      ENDFILE IF                                                024810
2475                  GOTO 108                                                  024820
                556   STOP                                                      024830
                      END                                                       024840
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
12347 ETRY12

VARIABLES		SN	TYPE	RELOCATION				
35425	AA		REAL	ARRAY	35324	AAA	REAL	
35325	AAB		REAL		35326	AAC	REAL	
35327	AAD		REAL		35330	AAE	REAL	
35331	AAF		REAL		35275	AAP	REAL	
35307	AAPDE		REAL		35514	AB	REAL	ARRAY
35541	ABB		REAL	ARRAY	35617	ABG	REAL	ARRAY
35530	AC		REAL	ARRAY	35420	ADD	REAL	ARRAY
35304	ADDE		REAL		35413	ADS	REAL	ARRAY
35303	ADSE		REAL		35640	ANORM	REAL	ARRAY
35406	APD		REAL	ARRAY	35261	APDE	REAL	
35401	APS		REAL	ARRAY	35232	APSE	REAL	
35342	BB		REAL		35341	BC	REAL	
35653	BD		REAL	ARRAY	35332	BE	REAL	
35333	BF		REAL		35334	BG	REAL	
36067	C		REAL	ARRAY	35253	CAL1	REAL	
35254	CAL2		REAL		35255	CAL3	REAL	
35335	CE		REAL		35336	CF	REAL	
35337	CG		REAL		37104	CON	REAL	ARRAY
34774	COND		REAL		35231	CS	REAL	
34743	D		REAL		37257	DAC	REAL	ARRAY

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VARIABLES	SN	TYPE	RELOCATION
37121	DAL	REAL	ARRAY
34742	DD	REAL	
37325	DPH	REAL	ARRAY
34710	DQ3	REAL	
34711	DQ5	REAL	
37161	DRIF	REAL	ARRAY
34676	DUM	REAL	
37426	E	REAL	ARRAY
34725	EL	REAL	
35357	ESPD	REAL	
37422	ETM10	REAL	ARRAY
37402	ETM2	REAL	ARRAY
37406	ETM4	REAL	ARRAY
37412	ETM6	REAL	ARRAY
37416	ETM8	REAL	ARRAY
35360	ETOR	REAL	
34772	E2	REAL	
37560	FRT	REAL	ARRAY
35132	HATS	REAL	
35022	HCOND	REAL	
35200	HDGDE	REAL	
35113	HFPD	REAL	
35106	HFPS	REAL	
35074	HFTD	REAL	
35101	HFTD1	REAL	
35173	HFTSE	REAL	
35272	HG	REAL	
35140	HGATS1	REAL	
35315	HGDAE	REAL	
35314	HGDDE	REAL	
35313	HGDSE	REAL	
35127	HGPD1	REAL	
35122	HGPS1	REAL	
35176	HGTDE	REAL	
35064	HGTS	REAL	
35071	HGTS1	REAL	
35057	HIE	REAL	
35037	HIJG	REAL	
35056	HIT	REAL	
35312	HMAE	REAL	
35311	HMDE	REAL	
35310	HMSE	REAL	
35252	HPT	REAL	
37565	HRT	REAL	ARRAY
34761	HSCME	REAL	
34754	HSCMT1	REAL	
35014	HSGE	REAL	
35240	HSP	REAL	
35013	HSSE	REAL	
35245	HST	REAL	
35227	HTS	REAL	
35251	HX	REAL	
34643	I	INTEGER	
34702	ICALL1	INTEGER	
34716	IDATE	INTEGER	
35340	IF	INTEGER	
34663	IFLOW	INTEGER	
37244	DNCRM	REAL	ARRAY
34765	DP	REAL	
34706	DQ2	REAL	
34707	DQ4	REAL	
37265	DRAL	REAL	ARRAY
37237	DSAT	REAL	ARRAY
37333	DZZ	REAL	ARRAY
34723	E1	REAL	
3734C	ERR	REAL	ARRAY
37400	ETM1	REAL	ARRAY
37424	ETM11	REAL	ARRAY
37404	ETM3	REAL	ARRAY
3741C	ETM5	REAL	ARRAY
37414	ETM7	REAL	ARRAY
37420	ETM9	REAL	ARRAY
34771	E1	REAL	
34764	FA	REAL	
34740	FRTE	REAL	
35136	HATS1	REAL	
35023	HCONDE	REAL	
35177	HDGSE	REAL	
35125	HFPD1	REAL	
35120	HFPS1	REAL	
35175	HFTDE	REAL	
35062	HFTS	REAL	
35067	HFTS1	REAL	
35134	HGATS	REAL	
37623	HGDA	REAL	ARRAY
37616	HGDD	REAL	ARRAY
37611	HGDS	REAL	ARRAY
35115	HGPD	REAL	
35110	HGPS	REAL	
35076	HGTD	REAL	
35103	HGTD1	REAL	
35174	HGTSE	REAL	
35054	HI	REAL	
35035	HIJ	REAL	
35055	HIP	REAL	
37604	HMA	REAL	ARRAY
37577	HMD	REAL	ARRAY
37572	HMS	REAL	ARRAY
35236	HP	REAL	
35256	HPTE	REAL	
34741	HRTE	REAL	
34751	HSCMT	REAL	
35002	HSG	REAL	
35007	HSG1	REAL	
3500C	HSS	REAL	
35005	HSS1	REAL	
35243	HT	REAL	
35230	HTSE	REAL	
35234	HY	REAL	
34735	IBLHCEL	INTEGER	
34703	ICALL2	INTEGER	
3472C	IDAY	INTEGER	
34665	IFLOS	INTEGER	
34701	IJJ	INTEGER	

VARIABLES	SN	TYPE	RELOCATION				
34661	ILAB	INTEGER		34717	IMC	INTEGER	
34675	IPAGE	INTEGER		35361	ISF	INTEGER	
34664	ISFLG	INTEGER		3466C	ITEST	INTEGER	
34715	ITIME	INTEGER		35362	IWF	INTEGER	
34662	IWFLG	INTEGER		34721	IYR	INTEGER	
34632	IZERO	INTEGER		34657	J	INTEGER	
34745	J1	INTEGER		34746	J2	INTEGER	
34747	J3	INTEGER		34714	K	INTEGER	
37630	KCA	INTEGER	ARRAY	37727	KDD	INTEGER	ARRAY
37662	KDP	INTEGER	ARRAY	34654	KFP	INTEGER	
37716	KGD	INTEGER	ARRAY	37647	KP	INTEGER	ARRAY
37705	KRTD	INTEGER	ARRAY	37741	KSM	INTEGER	ARRAY
37734	KT	INTEGER	ARRAY	37714	KTM	INTEGER	ARRAY
34737	KI	INTEGER		35343	L	INTEGER	
34736	M	INTEGER		35400	MF	INTEGER	
34713	MJ	INTEGER		35363	N	INTEGER	
34650	NDD	INTEGER		34645	NDP	INTEGER	
34653	NGD	INTEGER		34635	NDTEST	INTEGER	
34644	NP	INTEGER		35276	NRN	INTEGER	
34646	NRTD	INTEGER		34656	NS	INTEGER	
34652	NSM	INTEGER		34651	NT	INTEGER	
34642	NTCA	INTEGER		34647	NTM	INTEGER	
34637	NZERO	INTEGER		40626	PA	REAL	ARRAY
34673	PABS	REAL		40610	PAC	REAL	ARRAY
35273	PAE	REAL		35130	PAPS	REAL	
35270	PC	REAL		35142	PD	REAL	
40633	PDA	REAL	ARRAY	35305	PDAE	REAL	
40645	PDMD	REAL	ARRAY	35267	PDMDE	REAL	
35263	PDMDP	REAL		35265	PDMDT	REAL	
34700	PDO	REAL		35072	PDP	REAL	
35077	PDP1	REAL		40021	PR	REAL	ARRAY
37743	PRA	REAL	ARRAY	35364	PRT1	REAL	
35375	PRT10	REAL		35376	PRT11	REAL	
35365	PRT2	REAL		35366	PRT3	REAL	
35367	PRT4	REAL		35370	PRT5	REAL	
35371	PRT6	REAL		35372	PRT7	REAL	
35373	PRT8	REAL		35374	PRT9	REAL	
35271	PR6	REAL		35141	PS	REAL	
40621	PSD	REAL	ARRAY	34734	PSDE	REAL	
34666	PSET	REAL		4064C	PSMD	REAL	ARRAY
35250	PSMDE	REAL		35241	PSMDP	REAL	
35246	PSMDT	REAL		34677	PSO	REAL	
35060	PSP	REAL		34671	PSPD	REAL	
35065	PSP1	REAL		34776	PST	REAL	
35003	PST1	REAL		3475C	PWC	REAL	
34752	PWO1	REAL		35233	PY	REAL	
40652	R	REAL	ARRAY	35153	RATS	REAL	
35171	RATSE	REAL		35155	RATS1	REAL	
35172	RDATSE	REAL		40772	RDD	REAL	ARRAY
35301	RDDE	REAL		35170	RDPE	REAL	
35167	RDSE	REAL		35147	RFTD	REAL	
35165	RFTDE	REAL		35152	RFTD1	REAL	
35143	RFTS	REAL		35163	RFTSE	REAL	
35144	RFTS1	REAL		35154	RGATS	REAL	
35156	RGATS1	REAL		35151	RGTD	REAL	
35166	RGTDE	REAL		35150	RGTD1	REAL	
35145	RGTS	REAL		35164	RGTSE	REAL	

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VARIABLES	SN	TYPE	RELOCATION
35146	RGTS1	REAL	
40765	RSD	REAL	ARRAY
35020	RSTC	REAL	
35015	RTG	REAL	
35016	RTG1	REAL	
34760	RTLE	REAL	
35043	RTLT	REAL	
35041	RTL2	REAL	
35012	RTSE	REAL	
34775	SCOND	REAL	
34744	SDP	REAL	
34767	SK	REAL	
42211	SPRA	REAL	ARRAY
35021	ST1	REAL	
35354	SV2	REAL	
35356	SV4	REAL	
34724	T	REAL	
42274	TDAT	REAL	ARRAY
35220	TERM2	REAL	
35222	TERM4	REAL	
35224	TERM6	REAL	
35212	TFL	REAL	
42301	TSAT	REAL	ARRAY
34726	TSDE	REAL	
35123	TSPD1	REAL	
35116	TSPS1	REAL	
35351	T6	REAL	
42313	UNORM	REAL	ARRAY
42333	VAPSE	REAL	ARRAY
35135	VATS1	REAL	
35266	VDMDE	REAL	
35264	VDMDT	REAL	
42514	VELE	REAL	ARRAY
42604	VELHE	REAL	ARRAY
35124	VFPD1	REAL	
35117	VFPS1	REAL	
35160	VFTDE	REAL	
35061	VFTS	REAL	
35066	VFTS1	REAL	
35133	VGATS	REAL	
42376	VGDA	REAL	ARRAY
42371	VGDD	REAL	ARRAY
42364	VGDS	REAL	ARRAY
35114	VGPD	REAL	
35107	VGPS	REAL	
35075	VGTD	REAL	
35102	VGTD1	REAL	
35161	VGTSE	REAL	
34755	VG1	REAL	
35034	VIJ	REAL	
42357	VMA	REAL	ARRAY
42352	VMD	REAL	ARRAY
42345	VMS	REAL	ARRAY
34667	VOID	REAL	
34672	VOLS	REAL	
35274	VPAE	REAL	
35306	VPDAE	REAL	
41105	RS	REAL	ARRAY
35277	RSDE	REAL	
40777	RT	REAL	ARRAY
35017	RTGE	REAL	
34757	RTL	REAL	
35042	RTLP	REAL	
35040	RTL1	REAL	
3501C	RTS	REAL	
35011	RTS1	REAL	
3477C	SD	REAL	
34766	SFA	REAL	
41643	SP	REAL	ARRAY
42267	SSAT	REAL	ARRAY
35353	SV1	REAL	
35355	SV3	REAL	
35024	SY	REAL	
34674	TBAR	REAL	
35217	TERM1	REAL	
35221	TERM3	REAL	
35223	TERM5	REAL	
35225	TERM7	REAL	
35213	TFLE	REAL	
42306	TSD	REAL	ARRAY
35111	TSPD	REAL	
35104	TSPS	REAL	
35344	T5	REAL	
35352	T7	REAL	
42340	VAPDE	REAL	ARRAY
35131	VATS	REAL	
42403	VDMD	REAL	ARRAY
35262	VDMDP	REAL	
42434	VEL	REAL	ARRAY
42524	VELH	REAL	ARRAY
35112	VFPD	REAL	
35105	VFPS	REAL	
35073	VFTD	REAL	
3510C	VFTD1	REAL	
35157	VFTSE	REAL	
34731	VG	REAL	
35137	VGATS1	REAL	
35323	VGDAE	REAL	
35322	VGDDE	REAL	
35321	VGDSE	REAL	
35126	VGPD1	REAL	
35121	VGPS1	REAL	
35162	VGTDE	REAL	
35063	VGTS	REAL	
35070	VGTS1	REAL	
35032	VG2	REAL	
35036	VIJG	REAL	
3532C	VMAE	REAL	
35317	VMDE	REAL	
35316	VMSE	REAL	
34670	VOLM	REAL	
42410	VPA	REAL	ARRAY
42427	VPDA	REAL	ARRAY
34727	VPTL	REAL	

VARIABLES SN TYPE RELOCATION

34753	VPTL1	REAL		3503C	VPTL2	REAL			
42422	VRDD	REAL	ARRAY	35302	VRDDE	REAL			
42415	VRSD	REAL	ARRAY	3530C	VRSDE	REAL			
35001	VSG	REAL		3500E	VSG1	REAL			
42326	VSMD	REAL	ARRAY	35247	VSMDE	REAL			
35235	VSMDP	REAL		35242	VSMDT	REAL			
35237	VSP	REAL		34777	VSS	REAL			
35004	VSS1	REAL		35244	VST	REAL			
35053	VWLE	REAL		34733	V1	REAL			
35345	V5	REAL		35346	V6	REAL			
35347	V7	REAL		3535C	V8	REAL			
35047	WA	REAL		35046	WD	REAL			
42621	WI	REAL	ARRAY	3505C	WIE	REAL			
35044	WL	REAL		35052	WLE	REAL			
42626	WO	REAL	ARRAY	35051	WOE	REAL			
42640	WS	REAL	ARRAY	35025	WSE	REAL			
35045	WSU	REAL		42614	WT	REAL	ARRAY		
35026	WTE	REAL		42633	WW	REAL	ARRAY		
34773	WWE	REAL		35377	X	REAL			
34732	XHG	REAL		34756	XHG1	REAL			
35033	XHG2	REAL		3473C	XHP	REAL			
35027	XHP1	REAL		35031	XHP2	REAL			
35211	XKL	REAL		35202	XKS	REAL			
35204	XKSE	REAL		35201	XKW	REAL			
35203	XKWE	REAL		34762	XK9	REAL			
35206	XLS	REAL		35210	XLSE	REAL			
35205	XLW	REAL		35207	XLWE	REAL			
35257	XPD	REAL		3526C	XPDE	REAL			
35216	XPS	REAL		35226	XPSE	REAL			
34722	XTIM	REAL		34704	XTM	REAL			
34705	XTS	REAL		35214	X1	REAL			
35215	X2	REAL		34763	Y	REAL			
34633	ZDATE	REAL		42705	ZDD	REAL	ARRAY		
42660	ZDP	REAL	ARRAY	34712	ZER	REAL			
34631	ZFILE	REAL		42721	ZGD	REAL	ARRAY		
34655	ZMF	REAL		42645	ZP	REAL	ARRAY		
42717	ZSM	REAL	ARRAY	42712	ZT	REAL	ARRAY		
34634	ZTIME	REAL		42703	ZTM	REAL	ARRAY		
34640	ZZDATE	REAL		34636	ZZFILE	REAL			
34641	ZZTIME	REAL							

FILE NAMES MODE

4130	INPUT		2054	OUTPUT	FMT	6204	TAPE10	10260	TAPE11
0	TAPE3	MIXED	2054	TAPE6					

EXTERNALS TYPE ARGS

ALOG	REAL	1 LIBRARY	CONNEC		1	
DATE	REAL	1	EOF	REAL	1	
EXP	REAL	1 LIBRARY	FLOW		11	
PSL	REAL	1	REVER		2	
SATUR		7	SQRT	REAL	1	LIBRARY
SRSORT		7	TIME	REAL	1	
TSL	REAL	1	VPT1	REAL	2	
VPT2	REAL	2				

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INLINE FUNCTIONS TYPE ARGS
ABS REAL 1 INTRIN

STATEMENT LABELS

34377	1	FMT		0	2			0	3				
0	4			0	5			12653	10				
12552	50			13417	66			13424	70				
25225	77	FMT		0	100			16765	101				
16763	102			16761	103			0	104				
16771	105			16777	106			12571	107				
12356	108			0	117			0	120				
12645	121			25434	122	FMT		25470	130	FMT			
25473	131	FMT		25475	132	FMT		25477	133	FMT			
12703	140			25516	141	FMT		12715	144				
0	149			0	159			12772	172				
12774	173			13005	178			0	183				
13044	188			13060	192			0	200				
13124	201			13153	205			0	217				
13300	220			13275	221			13250	227				
0	239			13434	242			13443	246				
13452	250			0	274			0	282				
13532	283			13553	285			13600	287				
13606	288			0	295			13634	298				
13735	332			13751	338			13753	340				
13760	343			13764	345			13765	360				
13775	369			14001	371			14111	389				
14116	396			14134	403			14140	405				
14141	431			14151	437			14155	439				
14323	471			14650	482			14653	494				
14660	497			14664	551			24420	556				
0	557		INACTIVE	15057	604			15074	624				
15261	652			15267	653			15310	654				
15455	680			15473	682			15511	688				
15516	689			15530	690			15701	703				
15740	707			15743	709			15766	711				
0	714			0	720			0	721				
0	722			0	723			15770	727				
0	729			0	733			0	737				
0	753			16310	789			16370	793				
0	852			0	876			0	877				
0	903			0	906			0	907				
21356	946			21406	947			21441	948				
21471	949			31263	1000	FMT	NO REFS	31265	1001	FMT	NO REFS		
31267	1002	FMT		31300	1003	FMT		31305	1004	FMT			
31317	1005	FMT	NO REFS	31321	1006	FMT		31335	1007	FMT			
31330	1008	FMT		31337	1010	FMT		31347	1012	FMT			
31356	1014	FMT		31364	1016	FMT		31371	1017	FMT			
31377	1018	FMT		31404	1019	FMT		31412	1021	FMT			
31417	1024	FMT		31423	1025	FMT		31427	1026	FMT			
31433	1027	FMT		31437	1028	FMT		31443	1029	FMT			
31447	1030	FMT		31454	1031	FMT		31461	1032	FMT			
31464	1034	FMT		31470	1036	FMT		31475	1038	FMT			
31502	1040	FMT		31506	1042	FMT		31513	1044	FMT			
31520	1046	FMT		31525	1048	FMT		31535	1050	FMT			
31547	1060	FMT		31560	1062	FMT		31564	1064	FMT			
31572	1066	FMT		31577	1068	FMT		16757	1080				
16767	1088			17001	1094			0	1095				

STATEMENT LABELS

31604	1118	FMT	31611	1121	FMT		0	1465			
0	1467		31616	1500	FMT		31630	1502	FMT		
31640	1504	FMT	31645	1506	FMT		31653	1512	FMT		
31662	1514	FMT	31671	1516	FMT		31677	1520	FMT		
31705	1522	FMT	31712	1530	FMT		31716	1532	FMT		
31724	1534	FMT	31732	1536	FMT		31737	1538	FMT		
31746	1540	FMT	31755	1542	FMT		31764	1544	FMT		
31773	1546	FMT	32002	1548	FMT		32011	1550	FMT		
32017	1552	FMT	32025	1554	FMT		32033	1556	FMT		
32041	1558	FMT	32047	1560	FMT		32056	1562	FMT		
32065	1570	FMT	0	1572			32072	1580	FMT		
32076	1610	FMT	32102	1612	FMT		32107	1614	FMT		
32114	1616	FMT	32122	1618	FMT		32130	1630	FMT		
32141	1632	FMT	32147	1634	FMT		32152	1635	FMT		
32156	1636	FMT	32163	1638	FMT		32170	1640	FMT		
32176	1642	FMT	32203	1643	FMT		32210	1644	FMT		
32215	1645	FMT	32222	1646	FMT		32227	1647	FMT		
32234	1650	FMT	32240	1652	FMT		32244	1654	FMT		
32251	1655	FMT	32257	1656	FMT		32264	1657	FMT		
32272	1658	FMT	32276	1659	FMT		32302	1660	FMT		
32306	1661	FMT	32313	1662	FMT		32317	1663	FMT		
32325	1664	FMT	32331	1665	FMT		32337	1666	FMT		
32342	1667	FMT	32347	1668	FMT		32352	1671	FMT		
32360	1672	FMT	32366	1673	FMT		32374	1674	FMT		
32402	1675	FMT	32410	1676	FMT		32413	1677	FMT		
32421	1678	FMT	32427	1680	FMT		32433	1681	FMT		
32440	1682	FMT	32444	1683	FMT		32451	1688	FMT		
32456	1690	FMT	32464	1692	FMT		32470	1694	FMT		
32474	1695	FMT	32500	1696	FMT		32503	1698	FMT		
32507	1702	FMT	32513	1704	FMT		32517	1705	FMT		
32523	1706	FMT	32530	1708	FMT		32535	1710	FMT		
32543	1712	FMT	32552	1714	FMT		32560	1720	FMT		
32566	1730	FMT	32573	1800	FMT		32576	1810	FMT		
32603	1820	FMT	32610	1830	FMT		23171	6001			
23221	6002		23254	6003			23304	6004			
0	6005		34403	6010	FMT	NO REFS	34405	6011	FMT		
34411	6012	FMT	34414	6013	FMT		34420	6014	FMT		
34423	6015	FMT	34426	6016	FMT		34432	6017	FMT		
34435	6018	FMT	22271	6021			22351	6022			
22440	6023		22442	6024			22475	6025			
22477	6026		22541	6030			22543	6031			
22561	6032		22563	6033			22621	6034			
22623	6035		22641	6036			22643	6037			
22674	6038		22676	6039			22552	6057			
22571	6059		22632	6064			22651	6067			
20702	7455		20734	7457			20700	7477			
20713	7479		20621	7487			20642	7489			
0	7500	INACTIVE	20630	7501			20632	7502			
20722	7503		20724	7504			21020	7505			
21022	7506		24413	7600			0	7905			
0	7908		0	8000			20156	8001			
20162	8002		20171	8003			20175	8004			
0	8005		20266	8006			26566	8500	FMT		
26574	8501	FMT	26600	8502	FMT		26604	8503	FMT		
26610	8504	FMT	26614	8505	FMT		26622	8506	FMT		
26630	8507	FMT	26636	8508	FMT		26644	8509	FMT		
26652	8510	FMT	26660	8513	FMT		26665	8517	FMT		

STATEMENT LABELS

26672	8519	FMT	26674	8520	FMT	26702	8521	FMT			
26711	8522	FMT	26716	8523	FMT	26723	8524	FMT			
26730	8525	FMT	26735	8526	FMT	26742	8527	FMT			
26747	8528	FMT	26754	8529	FMT	26761	8530	FMT			
32615	8531	FMT	32624	8532	FMT	32630	8533	FMT			
26766	8534	FMT	26771	8535	FMT	26774	8536	FMT			
26777	8537	FMT	27001	8538	FMT	27010	8539	FMT			
27016	8540	FMT	27024	8541	FMT	27031	8542	FMT			
27037	8543	FMT	27045	8544	FMT	27053	8545	FMT			
27061	8548	FMT	20606	8952		20610	8954				
0	8989		16741	8992		25767	9008	FMT			
25772	9009	FMT	25775	9010	FMT	26002	9011	FMT			
26007	9012	FMT	26014	9013	FMT	26021	9014	FMT			
26026	9015	FMT	26033	9016	FMT	26040	9017	FMT			
26045	9018	FMT	26052	9019	FMT	26057	9020	FMT			
0	9021		0	9022		0	9023				
0	9024		0	9025		17635	9026				
17676	9027		0	9028		0	9029				
0	9030		0	9042		0	9047				
32635	9066	FMT	32642	9067	FMT	24364	9600				

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES		
12500		*	I	91 91	4B	EXT REFS		
12557	104	*	I	108 111	11B	EXT REFS		
12612	100		I	127 130	2B	OPT		
12620	117		I	131 135	3B	OPT		
12640	120	*	I	143 147	5B	EXT REFS		
12650	10		I	150 156	4B	OPT		
12657	877	*	IJJ	161 1133	3726B	EXT REFS	NOT INNER	
12674	144	*	I	176 188	24B	EXT REFS		
12725	149		I	193 197	5B	OPT		
12752	159		I	205 209	3B	OPT		
12757	192	*	I	216 250	104B	EXT REFS	NOT INNER	
13015	183		J	235 239	5B	OPT		
13072	200		I	252 259	21B	OPT		
13154	217	*	I	279 298	56B	EXT REFS		
13271	220		I	315 322	10B	OPT		
13312	239		I	323 350	74B	OPT		
13462	274		I	372 384	26B	OPT		
13524	282		I	386 397	16B	OPT		
13544	288	*	I	399 413	45B	EXT REFS		
13617	295		I	415 420	7B	OPT		
14641	551		I	700 713	24B	OPT		
15755	714		I	952 955	3B	OPT		
16052	733		I	982 985	3B	OPT		
16113	753		I	998 1002	4B	OPT		
16500	852		I	1100 1103	4B	OPT		
16576	876		I	1128 1131	4B	OPT		
16606	2	*	I	1136 1163	65B	EXT REFS	NOT INNER	
16617	3		J	1144 1151	12B	OPT		
16651	4		J	1155 1158	10B	OPT		
17005	1095		I	1227 1230	2B	OPT		
17014	5		I	1232 1236	5B	OPT		
17026	7905		K	1240 1244	3B	OPT		
17036	7908		I	1245 1249	3B	OPT		
17110	9030		I	1284 1290	11B	OPT		
17166	9021	*	I	1317 1333	111B	EXT REFS		

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES		
17300	9022	*	I	1334 1349	103B		EXT REFS	
17404	9023	*	I	1350 1359	34B		EXT REFS	
17441	9024	*	I	1360 1376	103B		EXT REFS	
17545	9025	*	I	1377 1386	34B		EXT REFS	
17602	9026	*	I	1387 1397	36B		EXT REFS	
17643	9027	*	I	1399 1409	36B		EXT REFS	
17702	9028	*	I	1410 1419	34B		EXT REFS	
17737	9029	*	I	1420 1430	36B		EXT REFS	
20027	9042		I	1453 1456	2B	OPT		
20035	9047		I	1457 1460	2B	OPT		
20043	8989		L	1461 1465	5B	OPT		
20135	8000		L	1489 1538	121B	OPT		
20262	8005		L	1539 1545	7B	OPT		
20463	1465		I	1653 1659	5B	OPT		
20514	1467		I	1668 1671	3B	OPT		
20533	7600	*	N	1677 2473	3663B		EXT REFS	NOT INNER
21140		*	I	1857 1857	10B		EXT REFS	
21154		*	I	1858 1858	10B		EXT REFS	
21170		*	I	1859 1859	10B		EXT REFS	
21204		*	I	1860 1860	10B		EXT REFS	
21222		*	I	1862 1862	10B		EXT REFS	
21242		*	I	1865 1865	10B		EXT REFS	
21256		*	I	1866 1866	10B		EXT REFS	
21274		*	I	1868 1868	10B		EXT REFS	
21310		*	I	1869 1869	10B		EXT REFS	
21330		*	I	1873 1873	10B		EXT REFS	
21344		*	I	1874 1874	10B		EXT REFS	
21361		*	I	1877 1877	10B		EXT REFS	
21375		*	I	1878 1878	10B		EXT REFS	
21413		*	I	1881 1881	10B		EXT REFS	
21427		*	I	1882 1882	10B		EXT REFS	
21444		*	I	1885 1885	10B		EXT REFS	
21460		*	I	1886 1886	10B		EXT REFS	
21474		*	I	1888 1888	10B		EXT REFS	
21510		*	I	1889 1889	10B		EXT REFS	
21524		*	I	1890 1890	10B		EXT REFS	
21540		*	I	1891 1891	10B		EXT REFS	
21554		*	I	1892 1892	10B		EXT REFS	
21570		*	I	1893 1893	10B		EXT REFS	
21604		*	I	1894 1894	10B		EXT REFS	
21620	1572	*	J	1896 1907	40B		EXT REFS	NOT INNER
21642		*	I	1906 1906	10B		EXT REFS	
21674		*	I	1914 1914	10B		EXT REFS	
21710		*	I	1915 1915	10B		EXT REFS	
21747		*	I	1928 1928	10B		EXT REFS	
21763		*	I	1929 1929	10B		EXT REFS	
21777		*	I	1930 1930	10B		EXT REFS	
22015		*	I	1932 1932	10B		EXT REFS	
22031		*	I	1933 1933	10B		EXT REFS	
22045		*	I	1934 1934	10B		EXT REFS	
22063		*	I	1936 1936	10B		EXT REFS	
22077		*	I	1937 1937	10B		EXT REFS	
22113		*	I	1938 1938	10B		EXT REFS	
22133		*	I	1941 1941	7B		EXT REFS	
22146		*	I	1942 1942	7B		EXT REFS	
22163		*	I	1944 1944	7B		EXT REFS	
22176		*	I	1945 1945	7B		EXT REFS	

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES	
22215		*	I	1949 1949	7B	EXT REFS	
22230		*	I	1950 1950	7B	EXT REFS	
22245		*	I	1952 1952	7B	EXT REFS	
22260		*	I	1953 1953	7B	EXT REFS	
22276		*	I	1958 1958	7B	EXT REFS	
22311		*	I	1959 1959	7B	EXT REFS	
22326		*	I	1961 1961	7B	EXT REFS	
22341		*	I	1962 1962	7B	EXT REFS	
22360		*	I	1967 1967	7B	EXT REFS	
22373		*	I	1968 1968	7B	EXT REFS	
22410		*	I	1970 1970	7B	EXT REFS	
22423		*	I	1971 1971	7B	EXT REFS	
22445		*	I	1981 1981	7B	EXT REFS	
22460		*	I	1982 1982	7B	EXT REFS	
22502		*	I	1992 1992	7B	EXT REFS	
22515		*	I	1993 1993	7B	EXT REFS	
22755		*	I	2266 2266	10B	EXT REFS	
22771		*	I	2267 2267	10B	EXT REFS	
23005		*	I	2268 2268	10B	EXT REFS	
23021		*	I	2269 2269	10B	EXT REFS	
23037		*	I	2271 2271	10B	EXT REFS	
23055		*	I	2273 2273	10B	EXT REFS	
23071		*	I	2274 2274	10B	EXT REFS	
23107		*	I	2276 2276	10B	EXT REFS	
23123		*	I	2277 2277	10B	EXT REFS	
23143		*	I	2281 2281	10B	EXT REFS	
23157		*	I	2282 2282	10B	EXT REFS	
23174		*	I	2285 2285	10B	EXT REFS	
23210		*	I	2286 2286	10B	EXT REFS	
23226		*	I	2289 2289	10B	EXT REFS	
23242		*	I	2290 2290	10B	EXT REFS	
23257		*	I	2293 2293	10B	EXT REFS	
23273		*	I	2294 2294	10B	EXT REFS	
23307		*	I	2296 2296	10B	EXT REFS	
23323		*	I	2297 2297	10B	EXT REFS	
23337		*	I	2298 2298	10B	EXT REFS	
23353		*	I	2299 2299	10B	EXT REFS	
23367		*	I	2300 2300	10B	EXT REFS	
23403		*	I	2301 2301	10B	EXT REFS	
23417		*	I	2302 2302	10B	EXT REFS	
23431	6005	*	J	2303 2314	34B	EXT REFS	NOT INNER
23447		*	I	2313 2313	10B	EXT REFS	
23477		*	I	2320 2320	10B	EXT REFS	
23513		*	I	2321 2321	10B	EXT REFS	
23535		*	I	2326 2326	10B	EXT REFS	
23551		*	I	2327 2327	10B	EXT REFS	
23565		*	I	2328 2328	10B	EXT REFS	
23601		*	I	2329 2329	10B	EXT REFS	
23615		*	I	2330 2330	10B	EXT REFS	
23631		*	I	2331 2331	10B	EXT REFS	
23645		*	I	2332 2332	10B	EXT REFS	
23661		*	I	2333 2333	10B	EXT REFS	
23675		*	I	2334 2334	10B	EXT REFS	
23711		*	I	2335 2335	7B	EXT REFS	
23724		*	I	2336 2336	7B	EXT REFS	
23737		*	I	2337 2337	7B	EXT REFS	
23752		*	I	2338 2338	7B	EXT REFS	

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
23765		* I	2339 2339	7B	EXT REFS
24000		* J	2340 2340	7B	EXT REFS
24013		* I	2341 2341	7B	EXT REFS
24026		* I	2342 2342	7B	EXT REFS
24041		* I	2343 2343	7B	EXT REFS
24054		* I	2344 2344	7B	EXT REFS
24067		* I	2345 2345	7B	EXT REFS
24102		* I	2346 2346	7B	EXT REFS
24115		* I	2347 2347	7B	EXT REFS
24130		* I	2348 2348	7B	EXT REFS
24143		* I	2349 2349	7B	EXT REFS
24156		* I	2350 2350	7B	EXT REFS
24171	906	* J	2367 2420	131B	NOT INNER
24176	720	I	2370 2374	6B	OPT
24212	721	I	2376 2380	6B	OPT
24226	722	I	2382 2386	5B	OPT
24241	723	I	2388 2392	5B	OPT
24254	729	I	2394 2398	5B	OPT
24267	737	I	2400 2404	5B	OPT
24313	903	I	2415 2419	4B	OPT
24342	9600	I	2436 2456	23B	OPT
24400	907	I	2462 2468	7B	OPT

STATISTICS

PROGRAM LENGTH	30770B	12792
BUFFER LENGTH	11746B	5094

61300B CM USED

```
      SUBROUTINE REVER      73/172  OPT=1                    FTN 4.7+476        79/06/06. 14.34.48       PAGE     1

     1          C REVERSE FLOW SUBROUTINE                                                          024850
                C 1R                                                                               024860
                      SUBROUTINE REVER(A,B)                                                        024870
                      TEMP=A                                                                       024880
     5                A=B                                                                          024890
                      B=TEMP                                                                       024900
                      RETURN                                                                       024910
                      END                                                                          024920


      SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    3  REVER

VARIABLES     SN  TYPE           RELOCATION
    0  A          REAL                F.P.          0  B         REAL                F.P.
   11  TEMP       REAL

STATISTICS
  PROGRAM LENGTH                 128       10
        52000B CM USED
```

```
      C ORIFICE FLOW SUBROUTINE                                          024930
      C 1F                                                               024940
            SUBROUTINE FLOW(DP,P,T,D,DO,VPTL,I,W,XK9,Y,FA)               024950
            REAL K,K1,K2,K3,K4,K9                                        024960
            REAL K8                                                      024970
            IF(I.EQ.2)GOTO 1878                                          024980
      C 2F                                                               024990
            V=VPTL                                                       025000
            Y=1.                                                         025010
            GOTO 1880                                                    025020
      C 3F                                                               025030
      1878  V=VPTD(P,T)                                                  025040
            Y=1.-(.41+.35*((DO/D)**4.))*DP/(1.26*P)                      025050
      C 4F                                                               025060
      1880  CALL VISC(P,T,I,VIS)                                         025070
            FA=.998721+1.78502E-5*T+2.39695E-9*T*T                       025080
            B=DO/D                                                       025090
            K9=.6                                                        025100
            K=.6                                                         025110
            K1=0.                                                        025120
            K2=0.                                                        025130
            K3=0.                                                        025140
            K4=0.                                                        025150
            K1=(.5993+.007/D)+(.364+.076/(D**.5))*(B**4.)                025160
            IF((.07+.5/D-B).LE..0)GOTO 1892                              025170
      C 5F                                                               025180
            K2=.4*((1.6-1./D)**5.)*((.07+.5/D-B)**2.5)                   025190
      1892  IF((.5-B).LE..0)GOTO 1894                                    025200
      C 6F                                                               025210
            K3=-(.009+.034/D)*((.5-B)**1.5)                              025220
      1894  IF ((B-.7).LE..0)GOTO 1896                                   025230
      C 7F                                                               025240
            K4=(65./(D*D)+3.)*((B-.7)**2.5)                              025250
      C 8F                                                               025260
      1896  A=DO*(83C.-50CC.*B+900C.*B*B-4200.*B*B*B+530./SQRT(D))       025270
            RO=1.E6*DO/15.                                               025280
            K8=(K1+K2+K3+K4)/(1.+A/RO)                                   025290
      1899  IF(DP.LT..0)GOTO 1902                                        025300
      C 9F                                                               025310
            W=359.*K9*DO*DO*FA*Y*SQRT(27.673*DP/V)                       025320
            GOTO 1903                                                    025330
      C 10F                                                              025340
      1902  W=-359.*K9*DO*DO*FA*Y*SQRT(ABS(27.673*DP/V))                 025350
      C 11F                                                              025360
      1903  R=ABS(15.28*W/(VIS*DO))                                      025370
      C 12F                                                              025380
            IF(R.LT.1000.) R=1000.                                       025390
      C 13F                                                              025400
            K=K8*(1.+A/R)                                                025410
            IF((ABS(K-K9)).LT..0001)GOTO 1910                            025420
      C 14F                                                              025430
            K9=K                                                         025440
            XK9=K9                                                       025450
            GOTO 1899                                                    025460
      1910  XK9=K9                                                       025470
            RETURN                                                       025480
            END                                                          025490
```

320056

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 FLOW

VARIABLES	SN	TYPE	RELOCATION					
275	A	REAL		274	B	REAL		
0	D	REAL	F.P.	0	DD	REAL	F.P.	
0	DP	REAL	F.P.	0	FA	REAL	F.P.	
0	I	INTEGER	F.P.	263	K	REAL		
264	K1	REAL		265	K2	REAL		
266	K3	REAL		267	K4	REAL		
271	K8	REAL		270	K9	REAL		
0	P	REAL	F.P.	277	R	REAL		
276	RD	REAL		0	T	REAL	F.P.	
272	V	REAL		273	VIS	REAL		
0	VPTL	REAL	F.P.	0	W	REAL	F.P.	
0	XK9	REAL	F.P.	0	Y	REAL	F.P.	

EXTERNALS	TYPE	ARGS			
SQRT	REAL	1	LIBRARY	VISC	4
VPTD	REAL	2			

INLINE FUNCTIONS	TYPE	ARGS	
ABS	REAL	1	INTRIN

STATEMENT LABELS

13	1878	31	1880	73	1892		
103	1894	113	1896	136	1899		
151	1902	163	1903	203	1910		

STATISTICS
PROGRAM LENGTH 3008 192
520008 CM USED

320057

```
      C VISCOSITY OF WATER AND STEAM FOR PRESSURES LESS THAN CRITICAL          025500
      C 1V                                                                     025510
            SUBROUTINE VISC (P,T,I,VIS)                                        025520
            IF(I.EQ.2)GOTO 1932                                                025530
      C 2V                                                                     025540
            VIS=VISL(P,T)                                                      025550
            GOTO 1945                                                          025560
      C 3V                                                                     025570
      1932  VIS=VISV(P,T)                                                      025580
      1945  CONTINUE                                                           025590
            RETURN                                                             025600
            END                                                                025610
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 VISC

VARIABLES	SN	TYPE	RELOCATION				
0 I		INTEGER	F.P.	0 P	REAL		F.P.
0 T		REAL	F.P.	C VIS	REAL		F.P.

EXTERNALS	TYPE	ARGS			
VISL	REAL	2	VISV	REAL	2

STATEMENT LABELS
16 1932 23 1945

STATISTICS
PROGRAM LENGTH 278 23
520008 CM USED

320058

```
      C STEAM TABLE SUBROUTINES                                          025620
      C 1SR                                                              025630
            SUBROUTINE SRSORT(P,T,V,H,ISAT,VG,HG)                        025640
            ISAT=1                                                       025650
      C  ASSUME TEMP ALWAYS LESS THAN 705.5                              025660
      C       IF(T.GT.705.47)GOTO 1957                                   025670
      C 2SR                                                              025680
            T1=T                                                         025690
            PSAT=PSL(T1)                                                 025700
            IF(P.EQ.PSAT)GOTO 1972                                       025710
            IF(T.LE.662.0)GOTO 1962                                      025720
      C  ASSUME TEMP ALWAYS LESS THAN 662                                025730
      C       IF(P.GT.PSAT)GOTO 1970                                     025740
      C 3SR                                                              025750
      C 1957  P23=P23T(T)                                                025760
      C       IF(P.GT.P23)GOTO 1967                                      025770
      C 4SR                                                              025780
      1959  V=VPT2(P,T)                                                  025790
            H=H2E(DMY)                                                   025800
            RETURN                                                       025810
      1962  IF(T.LT.25.0)GOTO 1976                                       025820
            IF(P.LT.PSAT)GOTO 1959                                       025830
      C 5SR                                                              025840
            V=VPT1(P,T)                                                  025850
            H=H1E(DMY)                                                   025860
            RETURN                                                       025870
      C 6SR                                                              025880
      C 1967  V=VPT3D(P,T)                                               025890
      C 7SR                                                              025900
      C 1968  H=HVT3(V,T)                                                025910
      C       RETURN                                                     025920
      C 8SR                                                              025930
      C 1970  V=VPT3L(P,T)                                               025940
      C       GOTO 1968                                                  025950
      C 9SR                                                              025960
      1972  ISAT=2                                                       025970
            K=1                                                          025980
            CALL SATUR(P,T,V,H,VG,HG,K)                                  025990
            RETURN                                                       026000
      C 10SR                                                             026010
      1976  ISAT=3                                                       026020
            RETURN                                                       026030
            END                                                          026040
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 SRSORT

VARIABLES	SN	TYPE	RELOCATION				
107	DMY	REAL		C	H	REAL	F.P.
0	HG	REAL	F.P.	0	ISAT	INTEGER	F.P.
110	K	INTEGER		C	P	REAL	F.P.

```
VARIABLES      SN  TYPE            RELOCATION
  106  PSAT        REAL                              0  T          REAL                F.P.
  105  T1          REAL                              C  V          REAL                F.P.
    0  VG          REAL                 F.P.

EXTERNALS              TYPE    ARGS
       H1E         REAL       1                         H2E        REAL         1
       PSL         REAL       1                         SATUR                   7
       VPT1        REAL       2                         VPT2       REAL         2

STATEMENT LABELS
   17  1959                          30  1962                          45  1972
   62  1976

STATISTICS
  PROGRAM LENGTH               111B       73
          52000B CM USED
```

```
              SUBROUTINE SATUR(P,T,VF,HF,VG,HG,K)                      026050
              GOTO(1981,1983,1985),K                                   026060
        C 1SA                                                          026070
        1981  T=TSL(P)                                                 026080
              GOTO 1985                                                026090
        C 2SA                                                          026100
        1983  T1=T                                                     026110
              P=PSL(T1)                                                026120
        C  ASSUME ALL TEMP LESS THAN 662                               026130
        1985  CONTINUE                                                 026140
        C 3SA                                                          026150
              VF=VPT1(P,T)                                             026160
              HF=H1E(DMY)                                              026170
              VG=VPT2(P,T)                                             026180
              HG=H2E(DMY)                                              026190
              RETURN                                                   026200
              END                                                      026210
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

     2      I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
```

```
        SYMBOLIC REFERENCE MAP (R=1)

 ENTRY POINTS
     3  SATUR

 VARIABLES       SN  TYPE            RELOCATION
    61  DMY          REAL                              C  HF        REAL               F.P.
     0  HG           REAL                  F.P.        0  K         INTEGER            F.P.
     0  P            REAL                  F.P.        C  T         REAL               F.P.
    60  T1           REAL                              0  VF        REAL               F.P.
     0  VG           REAL                  F.P.

 EXTERNALS             TYPE     ARGS
        H1E      REAL          1                          H2E       REAL          1
        PSL      REAL          1                          TSL       REAL          1
        VPT1     REAL          2                          VPT2      REAL          2

 STATEMENT LABELS
    15  1981                         22  1983                              26  1985

 STATISTICS
   PROGRAM LENGTH                62B       50
          52000B CM USED
```

Appendix 3.3A

PSSR CODE LISTING FOR FORWARD FLOW TESTS

```
      OVERLAY(PSSR,0,0)                                                  PSSR     2
      PROGRAM PSSR(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE10,TAPE20,  FWDN     1
     1  TAPE21)                                                         FWDN     2
      DIMENSION  NUM(2),FLWM(2),ALFM(2),RATIM(2),OBRATIM(2),DPPMP(6),    PSSR     4
     1PDWN(6),PUPS(6), DIFPR(6), PMDPIO(6), DPIOMLL(6), DPUPTIN(6)  ,    PSSR     5
     2SVMXUP(6), SVMXDN(6), SVGDUPA(6), SVGDDNA(6), VMXUP(6), VMXDN(6),  PSSR     6
     3SEALOT(6), SEALIN(6), TOTWTR(6),TOTSTM(6), AECLDP(6),PNH(2),       PSSR     7
     4 DATE(3), PH(2), ABR(2) ,                                          RM04     1
     5 VLNDISG(6),VLNSUCG(6),HTLL(2),HTFF(2),HSFF(2),HSLL(2),            RM18     1
     6 UGD1(6),UGD2(6),UGD3(6),DGD1(6),DGD2(6),DGD3(6)                   FWDN     5
      INTEGER DATE                                                       RMP      3
      REAL NUS, NUM                                                      PSSR     9
      DATA TYPE/3HFWD/                                                   FWDN     6
      DATA BLNK/7H       /                                               FWDN     7
      DATA SPDR,FLWR,TRQR,HEADR/4500., 3500., 308., 252. /               PSSR    10
      DATA RKUP, RKDN, C1 /0.69, 0.15, 9265.0 /                          PSSR    11
C--   READ TEST ID NO. + DATE OF TEST                                    PSSR    12
      REWIND 10                                                          RMP      4
 9800 READ(5,9100)NTLO,NTHI                                              RM02     1
      IF(NTLO.LT.0) GO TO 501                                            RM02     2
      IF(NTLO.GT.0.AND.NTHI.GT.0) GO TO 9200                             RM02     3
      NTLO=100                                                           RM02     4
      NTHI= 9998                                                         RM02     5
 9200 DO 10000 JJ=1,9999                                                 RM02     6
      READ( 10, 6010) NT, DATE                                           RM02     7
      IF(EOF(10))501,502                                                 RMP      6
 502  CONTINUE                                                           RMP      7
      IMM=0                                                              RM01     1
5002  CONTINUE                                                           RM01     2
      READ(10,9009)IMM                                                   RM01     3
      IF(IMM.EQ.32)GO TO 5001                                            RM01     4
      GO TO 5002                                                         RM01     5
5001  CONTINUE                                                           RM01     6
      IF(NT.GE.NTLO.AND.NT.LE.NTHI) GO TO 9300                           RM02     8
      CALL SKIPL(12,250)                                                 WK78363  1
      READ(10,6010) DUM3,DUM4                                            WK78363  2
      IF(EOF(10)) 9998,9998                                              WK78363  3
 9998 CONTINUE                                                           WK78363  4
      GO TO 10000                                                        RM02    10
9300  CONTINUE                                                           RM02    11
      CALL SKIPL(534,9)                                                  RM01     7
      CALL SKIPL(535,4)                                                  RM01     8
      CALL SKIPL(536,1)                                                  RM01     9
      CALL SKIPL(537,8)                                                  RM01    10
      CALL SKIPL(536,4)                                                  RM01    11
      CALL SKIPL(534,2)                                                  WK78363  5
      READ(10,1    )PRS,PRM                                              RMP      8
      READ(10,6011) FLWS,FLWM(2)                                         RM01    12
      READ(10,1    )ALFS,ALFM(2)                                         RMP     10
      READ(10,6012) ALFM(1)                                              RMP     11
      READ(10,1    ) SPDS,SPDM                                           RMP     12
      READ(10,6012) PH(1)                                                RMP     13
      READ(10,6012) PH(2)                                                RMP     14
      CALL SKIPL(12,1)                                                   RMP     15
      READ(10,6012) PHYTRQ                                               RMP     16
      READ(10,6012)TRQFM                                                 FWDN     8
      READ(10,6012) PSHTRQ                                               RMP     18
```

```
                CALL SKIPL(12,22)                                   RM01      13
                CALL SKIPL(14,11)                                   RM01      14
 60             READ (10,6017)SV1,SV2                               RM01      15
                READ (10,6017)SV3,SV4                               RM01      16
                CALL SKIPL(16,3)                                    RM01      17
                READ(10,6016)(PUPS(I),I=1,5)                        RMP       22
                CALL SKIPL(16,1)                                    RMP       23
 65             READ(10,6016)(PDWN(I),I=1,5)                        RMP       24
                CALL SKIPL(16,19)                                   RMP       25
                READ(10,6016)(DPUPTIN(I),I=1,5)                     RMP       26
                CALL SKIPL(16,1)                                    RMP       27
                READ(10,6016)(AECLDP(I),I=1,5)                      RMP       28
 70             CALL SKIPL(16,2)                                    RMP       29
                READ(10,6016)(RMDPIO(I),I=1,5)                      RMP       30
                READ(10,6016)(TOTWTR(I),I=1,5)                      RMP       31
                READ(10,6016)(TOTSTM(I),I=1,5)                      RMP       32
                READ(10,6016)(SEALIN(I),I=1,5)                      RMP       33
 75             READ(10,6016)(SEALOT(I),I=1,5)                      RMP       34
                CALL SKIPL(16,2)                                    RMP       35
                READ(10,6016)(DPPMP(I),I=1,5)                       RMP       36
                READ(10,6018)(SVMXUP(I),I=1,5)                      RM01      18
                READ(10,6018)(SVMXDN(I),I=1,5)                      RM01      19
 80             READ(10,6018)( UGD1(I),I=1,5)                       RM01      20
                READ(10,6018)( UGD2(I),I=1,5)                       RM01      21
                READ(10,6018)( UGD3(I),I=1,5)                       RM01      22
                READ(10,6018)( DGD1(I),I=1,5)                       RM01      23
                READ(10,6018)( DGD2(I),I=1,5)                       RM01      24
 85             READ(10,6018)( DGD3(I),I=1,5)                       RM01      25
                CALL SKIPL( 18, 3 )                                 RM01      26
                READ(10,6016)(VMXUP(I),I=1,5)                       RMP       44
                READ(10,6016)(VMXDN(I),I=1,5)                       RMP       45
                READ(10,6016)(VLNSUCG(I),I=1,5)                     RM09       1
 90             READ(10,6016)(VLNDISG(I),I=1,5)                     RM09       2
                CALL SKIPL(16,12)                                   FWDN      17
                CALL SKIPL(1,1  )                                   RM01      27
                CALL SKIPL(13, 1)                                   RM01      28
                CALL SKIPL( 1, 1)                                   RM01      29
 95             CALL SKIPL(12, 1)                                   RM01      30
                CALL SKIPL( 1, 1)                                   RM01      31
                CALL SKIPL(12, 7)                                   RM01      32
                CALL SKIPL(15, 1)                                   RM01      33
                CALL SKIPL(12,10)                                   RM01      34
100             CALL SKIPL(15, 1)                                   RM01      35
                CALL SKIPL(12, 9)                                   RM01      36
                CALL SKIPL(14,11)                                   RM01      37
                CALL SKIPL(17, 2)                                   RM01      38
                CALL SKIPL(16,38)                                   RM01      39
105             CALL SKIPL(18,11)                                   RM01      40
                CALL SKIPL(16,16)                                   RM01      41
                READ(10,6010)DUM1,DUM2                              WK78363    6
                IF(EOF(10))9999,9999                                WK78363    7
           9999 CONTINUE                                            WK78363    8
110              DO 5003 I=1,5                                      RM01      42
                 SVGDUPA(I)= UGD2(I)                                RM01      43
                 SVGDDNA(I)= DGD2(I)                                RM01      44
           5003  CONTINUE                                          RM01      45
                C                                                   RMP       47
```

330002

```
          FLWM(1)= FLWM(2)                                          RMP      48
      IDP= 1                                                        RMP      49
C------                                                             PSSR     57
C------  FIRST TWO--PUMP HYDRAULIC AND SHAFT TORQUES,FTLB           PSSR     58
C------  SECOND TWO-- PUMP HEAD(GD),  PUMP HEAD(ORIF)               PSSR     59
C--                                                                 PSSR     60
C--   WRITE ALL INPUT DATA                                          PSSR     61
      WRITE(6,1001)                                                 PSSR     62
      WRITE(6,601)                                                  PSSR     63
      WRITE(6,1005)NT,DATE                                          RMP      50
      WRITE(6,602)                                                  PSSR     65
      WRITE(6,700) PRS, FLWS,SPDS, ALFS                             PSSR     66
      WRITE(6,603)                                                  PSSR     67
      WRITE(6,703) PRM,BLNK, FLWM(2), SPDM,ALFM                     RN14      1
      IF (IDP .EQ . 0) GO TO 701                                    PSSR     70
      WRITE (6, 605 )                                               PSSR     71
      WRITE (6, 700 )DPPMP                                          PSSR     72
      GO TO 702                                                     PSSR     73
  701 CONTINUE                                                      PSSR     74
  702 WRITE (6, 606)                                                PSSR     75
      WRITE (6, 700)PDWN                                            PSSR     76
      WRITE (6, 700)PUPS                                            PSSR     77
      WRITE (6, 608)                                                PSSR     78
      WRITE (6, 700)PMDPIO                                          PSSR     79
      WRITE (6, 609)                                                PSSR     80
      WRITE (6, 700)DPUPTIN                                         PSSR     81
      WRITE (6, 610)                                                PSSR     82
      WRITE (6, 700)SVMXUP                                          PSSR     83
      WRITE (6, 611)                                                PSSR     84
      WRITE (6,700)SVMXDN                                           PSSR     85
      IGD=0                                                         FWDN     18
      IF(SVGDUPA(1).EQ.UGD1(1))IGD=1                                FWDN     19
      IF(SVGDUPA(1).EQ.UGD2(1))IGD=2                                FWDN     20
      IF(SVGDUPA(1).EQ.UGD3(1))IGD=3                                FWDN     21
      IF(IGD.EQ.0) WRITE(6,612)                                     FWDN     22
      IF(IGD.EQ.1) WRITE(6,801)                                     FWDN     23
      IF(IGD.EQ.2) WRITE(6,802)                                     FWDN     24
      IF(IGD.EQ.3) WRITE(6,803)                                     FWDN     25
      WRITE (6,700)SVGDUPA                                          PSSR     87
      IGD=0                                                         FWDN     26
      IF(SVGDDNA(1).EQ.DGD1(1)) IGD=1                               FWDN     27
      IF(SVGDDNA(1).EQ.DGD2(1)) IGD=2                               FWDN     28
      IF(SVGDDNA(1).EQ.DGD3(1)) IGD=3                               FWDN     29
      IF(IGD.EQ.0) WRITE(6,613)                                     FWDN     30
      IF(IGD.EQ.1) WRITE(6,901)                                     FWDN     31
      IF(IGD.EQ.2) WRITE(6,902)                                     FWDN     32
      IF(IGD.EQ.3) WRITE(6,903)                                     FWDN     33
      WRITE(6,700)SVGDDNA                                           PSSR     89
      WRITE(6,614)                                                  PSSR     90
      WRITE(6,700)VMXUP                                             PSSR     91
      WRITE(6,615)                                                  PSSR     92
      WRITE(6,700)VMXDN                                             PSSR     93
      WRITE(6,616)                                                  PSSR     94
      WRITE(6,700)SEALOT                                            PSSR     95
      WRITE(6,617)                                                  PSSR     96
      WRITE(6,700)SEALIN                                            PSSR     97
      WRITE(6,618)                                                  PSSR     98
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                WRITE(6,700)TOTWTR                                      PSSR      99
                WRITE(6,619)                                            PSSR     100
                WRITE(6,700)TOTSTM                                      PSSR     101
175             WRITE(6,620)                                            PSSR     102
                WRITE(6,700)AECLDP                                      PSSR     103
                WRITE(6,621)                                            PSSR     104
                WRITE(6,700)PHYTRQ, PSHTRQ, PH                          PSSR     105
                WRITE(6,800)                                            PSSR     106
180         C--                                                         PSSR     107
            C--- PROCESS SET POINT DATA                                  PSSR     108
                   NUS = FLWS/FLWR                                      PSSR     109
                   ALNS= SPDS/SPDR                                      PSSR     110
               IF(ABS(ALNS).LE.0.000001)ALNS=0.000001                   RMP       51
185                RATIS = NUS/ALNS                                     PSSR     112
               IF(ABS(NUS).LE.0.000001)NUS=0.000001                     RMP       52
                   OBRATIS= ALNS/NUS                                    PSSR     114
            C--- PROCESS MEASURED  DATA                                 PSSR     115
                   NUM(1) = FLWM(1)/FLWR                                PSSR     116
190                NUM(2) = FLWM(2)/FLWR                                PSSR     117
                   ALNM   = SPDM /SPDR                                  PSSR     118
               IF(ABS(ALNM).LE.0.000001)ALNM=0.000001                   RMP       53
               IF(ABS(NUM(1)).LE.0.000001)NUM(1)=0.000001               RMP       54
               IF(ABS(NUM(2)).LE.0.000001)NUM(2)=0.000001               RMP       55
195                RATIM(1) = NUM(1)/ALNM                               PSSR     120
                   RATIM(2) = NUM(2)/ALNM                               PSSR     121
                   OBRATIM(1) = 1./ RATIM(1)                            PSSR     124
                   OBRATIM(2) = 1.0/RATIM(2)                            PSSR     125
            C-- PRINT  THE ABOVE VALUES--                               PSSR     126
200                WRITE (6,1001)                                       PSSR     127
                  WRITE (6,1005) NT, DATE                               PSSR     128
                  WRITE (6,1010)                                        PSSR     129
                  WRITE (6,1015) PRS,ALFS,NUS,ALNS,RATIS,OBRATIS        PSSR     130
                 WRITE(6,1020) PRM,ALFM(1),BLNK,ALNM,BLNK,BLNK          RM14       2
205               WRITE (6,1025) PRM,ALFM(2), NUM(2),ALNM, RATIM(2),OBRATIM(2)  PSSR 132
            C                                                           PSSR     133
                   IF( IDP. EQ. 0) GO TO 138                            PSSR     134
            C--- PROCESS DPPMP(I)  DATA                                 PSSR     135
                   SUM=0.0                                              PSSR     136
210                DO 101 I=1,5                                         PSSR     137
                   SUM= SUM+ DPPMP(I)                                   PSSR     138
             101   CONTINUE                                             PSSR     139
                   DPPMP(6) =SUM/5.0                                    PSSR     140
             138   CONTINUE                                             PSSR     141
215         C--                                                         PSSR     142
            C--- PROCESS DWNSTREM + UPSTREM PRESSURES                   PSSR     143
                   DIF =0.0                                             PSSR     144
                   DO 102  I=1,5                                        PSSR     145
                   DIFPR(I) =  PDWN(I) -PUPS(I)                         PSSR     146
220          102   DIF =DIF + DIFPR(I)                                  PSSR     147
                   DIFPR(6) = DIF/5.0                                   PSSR     148
            C--- PROCESS    PMDPIO(I) DATA                              PSSR     149
                   SUM=0.0                                              PSSR     150
                   DO 103  I= 1,5                                       PSSR     151
225          103   SUM =SUM + PMDPIO(I)                                 PSSR     152
                   PMDPIO(6) = SUM/5.0                                  PSSR     153
                 IF( IDP. EQ. 0) GO TO 105                              PSSR     154
                   DO  104  I=1,5                                       PSSR     155
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      104      DPIOMLL(I) =  PMDPIO(I) - DPPMP(I)                              PSSR      156
230            GO TO 106                                                       PSSR      157
       105     CONTINUE                                                        PSSR      158
               DO  107 I=1,5                                                   PSSR      159
      107      DPIOMLL(I) =  PMDPIO(I) - DIFPR(I)                              PSSR      160
               DPIOMLL(6) =  PMDPIO(6) - DIFPR(6)                              PSSR      161
235            GO TO 108                                                       PSSR      162
      106      DPIOMLL(6) =  PMDPIO(6) - DPPMP(6)                              PSSR      163
       108     CONTINUE                                                        PSSR      164
      C--- PROCESS    DPUPTIN(I) DATA                                          PSSR      165
               SUM= 0.0                                                        PSSR      166
240            DO 109 I=1,5                                                    PSSR      167
      109      SUM= SUM + DPUPTIN(I)                                           PSSR      168
               DPUPTIN(6) = SUM/5.0                                            PSSR      169
      C--- PROCESS SVMXUP(I), SVMXDN(I), SVGDUPA(I), SVGDDNA(I) DATA           PSSR      170
               SUMA=0.0                                                        PSSR      171
245            SUMB=0.0                                                        PSSR      172
               SUMC=0.0                                                        PSSR      173
               SUMD=0.0                                                        PSSR      174
               DO 111 I=1,5                                                    PSSR      175
               SUMA= SUMA + SVMXUP(I)                                          PSSR      176
250            SUMB= SUMB + SVMXDN(I)                                          PSSR      177
               SUMC= SUMC + SVGDUPA(I)                                         PSSR      178
               SUMD= SUMD + SVGDDNA(I)                                         PSSR      179
       111     CONTINUE                                                        PSSR      180
               SVMXUP(6) = SUMA/5.0                                            PSSR      181
255            SVMXDN(6) = SUMB/5.0                                            PSSR      182
               SVGDUPA(6) = SUMC/5.0                                           PSSR      183
               SVGDDNA(6) = SUMD/5.0                                           PSSR      184
             DENUP= 1.0/SVMXUP(6)                                              RM23        1
      C--- PROCESS  VMXUP(I) , VMXDN(I) DATA                                   PSSR      185
260   CALCULATE     THE AVERAGE VALUES FOR FLUID VELOCITIES                     PSSR      186
               SUMA =0.                                                        PSSR      187
               SUMB =0.                                                        PSSR      188
              SUMC=0.0                                                         FWDN       34
              SUMD=0.0                                                         FWDN       35
265             DO 112  I=1,5                                                  PSSR      189
                SUMA = SUMA + VMXUP(I)                                        PSSR      190
                SUMB = SUMB + VMXDN(I)                                        PSSR      191
              SUMC=VLNDISG(I)+SUMC                                             FWDN       36
              SUMD=VLNSUCG(I)+SUMD                                             FWDN       37
270    112      CONTINUE                                                       PSSR      192
               VMXUP(6) = SUMA/5.0                                             PSSR      193
               VMXDN(6) = SUMB/5.0                                             PSSR      194
             VLNDISG(6)=SUMC/5.0                                               FWDN       38
             VLNSUCG(6)=SUMD/5.0                                               FWDN       39
275   CALCULATE  DP(UPSTR TO INLET MEAS)                                        PSSR      195
               DPUPCAL = RKUP / SVMXUP(6) *VMXUP(6)**2/C1                      PSSR      196
               DPDNCAL = RKDN / SVMXDN(6) *VMXDN(6)**2/C1                      PSSR      197
      CALCULATE  K-VALUES FROM MEASURED   DP-VALUES                            PSSR      198
      C--                                                                      PSSR      199
280            RKUPMS = RKUP* DPUPTIN(6)/DPUPCAL                               PSSR      200
               RKDNMS = RKDN* (DPIOMLL(6)- DPUPTIN(6)) / DPDNCAL               PSSR      201
      C--- PROCESS  SEALOT(I) +SEALIN(I) FLOW RATE DATA                         PSSR      202
               SUMO =0.0                                                       PSSR      203
               SUMI =0.0                                                       PSSR      204
285            DO 113  I=1,5                                                   PSSR      205
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                SUMO = SUMO + SEALOT(I)                                          PSSR      206
                SUMI = SUMI + SEALIN(I)                                          PSSR      207
 113            CONTINUE                                                         PSSR      208
               CALCULATE AVERAGE FLOW RATES IN + OUT OF SEAL                     PSSR      209
290             SEALOT(6) = SUMO /5.0                                            PSSR      210
                SEAL IN(6) = SUMI /5.0                                           PSSR      211
               CHECK FOR DIRECTION + MAGNITUDE OF NET FLOW                       PSSR      212
                SEALNT= SEALOT(6) -SEALIN(6)                                     PSSR      213
               C--- PROCESS  TOTWTR(I) + TOTSTM(I) , FLOW RATE DATA                PSSR      214
295             SUMW=0.0                                                         PSSR      215
                SUMS=0.0                                                         PSSR      216
                DO 114 I=1,5                                                     PSSR      217
                SUMW= SUMW + TOTWTR(I)                                           PSSR      218
                SUMS= SUMS +TOTSTM(I)                                            PSSR      219
300             CONTINUE                                                         PSSR      220
                TOTWTR(6) = SUMW/5.0                                             PSSR      221
                TOTSTM(6) = SUMS/5.0                                             PSSR      222
                TOTLPFL   = TOTWTR(6) + TOTSTM(6)                                PSSR      223
               CALCULATE PERCENT SEAL LEAK FLOW W.R.T TOTAL LOOP-FLOW.           PSSR      224
305             PRCNT     = SEALNT /TOTLPFL  *100.0                              PSSR      225
               CHECK * IF PRCNT IS +VE, DESIRABLE * FLOW LEAKS FROM PUMP TO SEAL PSSR      226
               CHECK * IF PRCNT IS -VE, UNDESIRABLE*FLOW LEAKS FROM SEAL TO PUMP PSSR      227
               C--                                                               PSSR      228
               C--- PROCESS  AECLDP(I) MEASUREMENT DATA                          PSSR      229
310            C--PICK THE MAX + MIN VALUES                                      PSSR      230
                DPMAX= AECLDP(1)                                                 PSSR      231
                DPMIN= AECLDP(1)                                                 PSSR      232
                DO 115  I=2,5                                                    PSSR      233
                DPMAX= AMAX1 ( DPMAX,AECLDP(I))                                  PSSR      234
315             DPMIN= AMIN1 ( DPMIN,AECLDP(I))                                  PSSR      235
 115            CONTINUE                                                         PSSR      236
               C--                                                               PSSR      237
               C--CALCULATE THE AVERAGE VALUE FOR UPSTREAM PRESSURE              WK78363    9
                SUMP = 0.0                                                       WK78363    10
320             DO 126 I = 1,5                                                   WK78363    11
  126           SUMP = SUMP + PUPS(I)                                            WK78363    12
                PUPS(6) = SUMP/5.0                                               WK78363    13
               C--TOTAL HEAD  CALCULATIONS FOR FORWARD FLOW                      FWDN       40
               C--- LEG TO LEG, GD                                               FWDN       41
325             DHPLLGD =(PUPS(6) +DPPMP(6))*144.0* SVGDDNA(6)-PUPS(6)*144.0     FWDN       42
               1 *SVGDUPA(6)                                                     FWDN       43
                VELHGD  =(VLNDISG(6)**2.0 -VLNSUCG(6)**2.0) /2./32.2             FWDN       44
                DHTLLGD = DHPLLGD + VELHGD +1.0                                  FWDN       45
                HTLL(1) =DHTLLGD/HEADR                                           FWDN       46
330            C--- FLANGE  TO FLANGE , GD                                        FWDN       47
                DHPFFGD =(PUPS(6)-DPUPTIN(6) +PMDPIO(6))*144.0 *SVGDDNA(6)       FWDN       48
               1- (PUPS(6) -DPUPTIN(6)) *144.0*SVGDUPA(6)                        FWDN       49
                DHTFFGD =DHPFFGD + VELHGD +1.0                                   FWDN       50
                HTFF(1) =DHTFFGD/HEADR                                           FWDN       51
335            C--- LEG TO LEG , ORIFICE                                          FWDN       52
                DHPLLOR =(PUPS(6) + DPPMP(6)) *144.0*SVMXDN(6)-PUPS(6)*144.0     FWDN       53
               1* SVMXUP(6)                                                      FWDN       54
                VELHOR  = (VMXDN(6)**2.0 -VMXUP(6)**2.0)/2./32.2                 FWDN       55
                DHTLLOR = DHPLLOR +VELHOR +1.0                                   FWDN       56
340             HTLL(2) =DHTLLOR/HEADR                                           FWDN       57
               C--  FLANGE  TO  FLANGE , ORIFICE                                 FWDN       58
                DHPFFOR = (PUPS(6)-DPUPTIN(6)+PMDPIO(6))*144.0*SVMXDN(6)         FWDN       59
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                1- (PUPS(6) -DPUPTIN(6)) *144.0 *SVMXUP(6)                FWDN      60
                 DHTFFOR=DHPFFOR*VELHOR*1.0                               RM03       1
345              HTFF(2) =DHTFFOR/HEADR                                   FWDN      62
           C--STATIC HEAD CALCULATIONS                                    FWDN      63
           C-- FLANGE  TO FLANGE , GD                                     FWDN      64
                 HSFFGD  = DHPFFGD                                        WK78363   14
                 HSFF(1)= HSFFGD/HEADR                                    FWDN      66
350        C-- FLANGE TO FLANGE ,ORIFICE                                  FWDN      67
                 HSFFOR  = DHPFFOR                                        WK78363   15
                 HSFF(2)= HSFFOR/HEADR                                    FWDN      69
           C-- LEG TO LEG,ORIFICE                                         RM18       2
                 HSLL(2) = DHPLLOR/HEADR                                  WK78363   16
355        C-- LEG TO LEG ,GD                                             RM18       4
                 HSLL(1) = DHPLLGD/HEADR                                  WK78363   17
           C--PRINT OUT THE VALUES  DP ETC.,                              PSSR      238
                  WRITE(6,1030)                                         PSSR      239
                  IF (IDP.NE. 0  )GO TO 116                             PSSR      240
360               DO  117 I=1, 6                                        PSSR      241
                  DPPMP(I) =10000000.0                                  PSSR      242
            117   CONTINUE                                              PSSR      243
            116   WRITE (6,1035) DPPMP                                  PSSR      244
                  WRITE (6,1040) DIFPR                                  PSSR      245
365               WRITE (6,1045) PMDPIO                                 PSSR      246
                  WRITE(6,1050)DPIOMLL                                  PSSR      247
                  WRITE(6,1055)DPUPTIN                                  PSSR      248
                  WRITE(6,1060)DPUPCAL,RKUP,DPDNCAL,RKDN                PSSR      249
                  WRITE(6,1065)RKUPMS ,RKDNMS                           PSSR      250
370               IF( PRCNT .LE.0.0) GO TO 118                          PSSR      251
                  WRITE (6,1070) PRCNT                                  PSSR      252
                  GO TO 119                                             PSSR      253
            118   WRITE (6,1075) PRCNT                                  PSSR      254
            119   CONTINUE                                              PSSR      255
375               WRITE (6,1080) DPMAX , DPMIN                          PSSR      256
           C--- PROCESS  HEAD * TORQUE DATA                              PSSR      257
                 PNH(1)= PH(1)/ HEADR                                   PSSR      258
                 PNH(2)= PH(2)/ HEADR                                   PSSR      259
           C--CALCULATE HYDR.TORQUES* 1-GD, 2-ORIF                      PSSR      260
380              DENA1=2.0/ (SVGDUPA(6)+SVGDDNA(6))                     RM23       2
                 DENA2= 2.0/ (SVMXUP(6)+SVMXDN(6))                      RM23       3
                 BTA1= PHYTRQ/TRQR*62.3/DENA1                           RM10       3
                 BTA2= PHYTRQ/TRQR*62.3/DENA2                           RM10       4
           C--CALCULATE  BTA (SHAFT TORQE)*                             PSSR      263
385               BTASH2 = BTA2 * PSHTRQ /PHYTRQ                        PSSR      264
                  BTASH1 = BTA1 * PSHTRQ /PHYTRQ                        PSSR      265
                  WRITE( 6,1110)                                        PSSR      266
                 WRITE( 6,1111) PNH(2), PNH(1)                          PSSR      267
                  WRITE( 6,1112) BTA2, BTA1                             PSSR      268
390               WRITE( 6,1113) BTASH2, BTASH1                         PSSR      269
                  WRITE(6, 1130)                                        PSSR      270
           CALCULATE HOMOLOGOUS RATIOS*                                 PSSR      271
           C-- FIRST CHECK  NU/ALN IS LT OR EQ.1   OR  GT 1.0           PSSR      272
                 RPM=SPDM                                               PSSR      273
395              ABR(1)= ABS(RAT1M(1))                                  RM04       2
                 ABR(2)= ABS(RAT1M(2))                                  RM14       3
                 IF((ABR(1).LE.1.0).OR.(ABR(2).LE.1.0)) GO TO 121       PSSR      291
           C--                                                          PSSR      292
           CALCULATE ALL THE VALUES                                     PSSR      293
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                        ISET= 4                                          PSSR      294
                     ZTA2  = PNH(2)/NUM(2)**2                            PSSR      295
                     ZTA1  = PNH(1)/NUM(1)**2                            PSSR      296
                  HSFN2= HSFF(2)/NUM(2)**2                               FWDN       70
                  HSFN1=HSFF(1)/NUM(1)**2                                FWDN       71
                  HTFN2=HTFF(1)/NUM(2)**2                                FWDN       72
                  HTFN1=HTFF(1)/NUM(1)**2                                FWDN       73
                  HTLN2=HTLL(2)/NUM(2)**2                                FWDN       74
                  HTLN1=HTLL(1)/NUM(1)**2                                FWDN       75
                  HSLN2=HSLL(2)/NUM(2)**2                                RM18        6
                  HSLN1= HSLL(1)/NUM(1)**2                               RM18        7
                     PSI2  = BTA2 / NUM(2)**2                            PSSR      297
                     PSI1  = BTA1 / NUM(1)**2                            PSSR      298
                         GO TO 122                                       PSSR      299
           121           ISET =2                                         PSSR      300
           122        DELT2 = PNH(2)/ALNM**2                             PSSR      301
                      DELT1 = PNH(1)/ ALNM**2                            PSSR      302
                  HSFA2=HSFF(2)/ALNM**2                                  FWDN       76
                  HSFA1=HSFF(1)/ALNM**2                                  FWDN       77
                  HTFA2=HTFF(2)/ALNM**2                                  FWDN       78
                  HTFA1=HTFF(1)/ALNM**2                                  FWDN       79
                  HTLA2=HTLL(2)/ALNM**2                                  FWDN       80
                  HTLA1=HTLL(1)/ALNM**2                                  FWDN       81
                  HSLA2= HSLL(2)/ALNM**2                                 RM18        8
                  HSLA1= HSLL(1)/ALNM**2                                 RM18        9
               C--                                                       PSSR      303
                     EPS2  = BTA2 / ALNM**2                              PSSR      304
                     EPS1  = BTA1 / ALNM**2                              PSSR      305
               C--                                                       PSSR      306
                     IF (ISET .EQ. 4) GO TO 123                          PSSR      307
               C-- NU/ALN  IS.LE.1 .. WRITE ONLY TWO SETS OF VALUES      PSSR      308
                  WRITE(6,1120) RATIM(2), BLNK                           RM14        4
                   WRITE(6, 1121)                                        PSSR      310
                  WRITE(6,1122) DELT2,DELT1                              RM04        4
                   WRITE(6,1123)                                         PSSR      312
                  WRITE(6,1124) EPS2,EPS1                                RM04        5
                   WRITE(6,1125)                                         PSSR      314
                         GO TO 124                                       PSSR      315
           123           CONTINUE                                        PSSR      316
               C-- NU/ALN IS.GT. 1.0, WRITE OUT ALL HOMOLOGOUS RATIOS    PSSR      317
                  WRITE(6,1126) RATIM(2), BLNK                           RM14        5
                  WRITE(6,1127) OBRATIM(2), BLNK                         RM14        6
                  WRITE(6,1128) DELT2,DELT1                              RM04        6
                  WRITE(6,1129) ZTA2,ZTA1                                RM04        7
                  WRITE(6,1131) EPS2,EPS1                                RM04        8
                  WRITE(6,1132) PSI2,PSI1                                RM04        9
           124       CONTINUE                                            PSSR      324
               CALCULATE EFFICIENCIES INPERCENT                          FWDN       82
                  EFM= PHYTRQ/PSHTRQ                                     FWDN       83
                  EFH2=.84355*NUM(2)/ALNM*(PNH(2)+(1.0/252.0))/BTA2      WK78363    18
                  EFH1=.84355*NUM(1)/ALNM*(PNH(1)+(1.0/252.0))/BTA1      WK78363    19
                  SIGN= PHYTRQ*TRQFM                                     FWDN       86
                  IF(SIGN.GT.0.0) GO TO 960                              FWDN       87
                  EFM= 1.0/EFM                                           FWDN       88
                  EFH2= 1.0/EFH2                                         FWDN       89
                  EFH1= 1.0/ EFH1                                        FWDN       90
            960   CONTINUE                                               FWDN       91
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      EFTOT2= EFM* EFH2 *100.0                                                  FWDN       92
      EFTOT1=EFM*EFH1 *100.0                                                    FWDN       93
       EFM= EFM*100.0                                                           FWDN       94
      EFH2= EFH2* 100.0                                                         FWDN       95
      EFH1= EFH1* 100.0                                                         FWDN       96
CWRITE THE TOTAL AND STATIC HEADS....                                           FWDN       97
      WRITE(6,1001)                                                             FWDN       98
      WRITE(6,951)HTLL(2), HTLL(1), HTFF(2), HTFF(1)                            FWDN       99
 951  FORMAT(1H ,*NORMALIZED TOTAL+STATIC HEADS USING LOCAL DENSITIES*/         RM18       10
     11H , *-------------------------------------------------*/                 RM18       11
     2       1H ,*                    LEG TO LEG         FLNG TO FLNG*/       FWDN      102
     3       1H ,*                  ORIF (OR GD )       ORIF (OR GD )*/       FWDN      103
     4       1H ,*HT*,14X, F6.3, *(*, F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)        FWDN      104
      WRITE(6,952) HSLL(2),HSLL(1),HSFF(2),HSFF(1)                              RM18       12
 952  FORMAT(1H ,*HS*,14X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)            FWDN      106
CWRITE THE HOMOLOGOUS RATIOS BASED ON TOT + STAT HEADS FOR LL + FF              FWDN      107
      IF( ISET. EQ. 4) GO TO 923                                                FWDN      108
C--NU/ALN IS LE 1.0, WRITE ONLY TWO SETS                                        FWDN      109
       WRITE( 6,953) HTLA2, HTLA1, HTFA2, HTFA1                                 FWDN      110
 953  FORMAT(1H ,*HOMOLOGOUS RATIOS BASED ON TOT + STAT HEADS*/                 FWDN      111
     1       1H ,42(*-*),/                                                      FWDN      112
     2       1H ,*HT/ALN2*,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)        FWDN      113
      WRITE(6,954)HSLA2,HSLA1,HSFA2,HSFA1                                       RM18       13
 954  FORMAT(1H ,*HS/ALN2*,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)        FWDN      115
      GO TO 924                                                                 FWDN      116
 923  WRITE(6,953) HTLA2,HTLA1,HTFA2,HTFA1                                      FWDN      117
      WRITE(6,956) HTLN2,HTLN1,HTFN2,HTFN1                                      FWDN      118
      WRITE(6,957)HSLA2,HSLA1,HSFA2,HSFA1                                       RM18       14
      WRITE(6,958)HSLN2,HSLN1,HSFN2,HSFN1                                       RM18       15
 955  FORMAT(1H ,*HT/ALN2*,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)        FWDN      121
 956  FORMAT(1H ,*HT/NU2 *,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)        FWDN      122
 957  FORMAT(1H ,*HS/ALN2*,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)        FWDN      123
 958  FORMAT(1H ,*HS/NU2 *,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,//)       FWDN      124
CWRITE OUT THE EFFICIENCIES                                                     FWDN      125
CWRITE OUT THE EFFICIENCIES                                                     FWDN      126
 924   CONTINUE                                                                 FWDN      127
      IF(SIGN.LT.0.0) GO TO 925                                                 FWDN      128
      SUBPRD= SIGN* EFH2                                                        FWDN      129
      IF(SUBPRD. LT. 0.0) GO TO 926                                             FWDN      130
      WRITE( 6,980)                                                             FWDN      131
 980  FORMAT(1H ,*EFFICIENCIES (PUMPING)*/ 1H ,24(*-*))                         FWDN      132
      GO TO 927                                                                 FWDN      133
 926  CONTINUE                                                                  FWDN      134
      WRITE(6,981)                                                              FWDN      135
 981  FORMAT(1H ,*EFFICIENCIES (PUMPING DISSIPATION)*/ 1H ,34(*-*))             FWDN      136
      GO TO 927                                                                 FWDN      137
 925  SUBPRD= SIGN* EFM                                                         FWDN      138
      IF(SUBPRD.LT.0.0) GO TO 928                                               FWDN      139
      WRITE( 6,982)                                                             FWDN      140
 982  FORMAT(1H ,*EFFICIENCIES (TURBINING DISSIPATION)*/1H ,34(*-*))            FWDN      141
      GO TO 927                                                                 FWDN      142
 928  WRITE( 6,983)                                                             FWDN      143
 983  FORMAT( 1H ,*EFFICIENCIES (TURBINING)*/ 1H ,24(*-*))                      FWDN      144
 927  CONTINUE                                                                  FWDN      145
      WRITE(6,959)EFM,EFH2,EFH1,EFTOT2,EFTOT1                                   FWDN      146
 959  FORMAT(1H ,*MECHANICAL    HYDRAULIC           TOTAL*,/                    FWDN      147
     1       1H ,1X,F7.2,3X,F7.2,*(*,F7.2,*)*,2X,F7.2,*(*,F7.2,*)*,/)          WK78363    20
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      C--                                                                    PSSR      325
515         MPRM=PRM                                                         RM25        1
            IF((PRM-MPRM).GE.0.5) MPRM= MPRM+1                               RM28        1
            IF(ABS(RAT1M(2)).LT.1.0) GO TO 7500                              FWDN      149
            WRITE(20,7000)NT,DATE,TYPE,MPRM,ALFM(2),DPPMP(6),PMDPIO(6) ,     RM25        2
           1              DPUPTIN(6),NUM(2),ALNM, RAT1M(2),OBRAT1M(2),      FWDN      151
520        2 PNH(2),BTA2,DELT2,ZTA2,EPS2,PSI2,DENUP                         RM23        4
            GO TO 7501                                                       FWDN      153
       7500 WRITE(20,7001)NT,DATE,TYPE,MPRM,ALFM(2),DPPMP(6),PMDPIO(6) ,     RM25        3
           1              DPUPTIN(6),NUM(2),ALNM, RAT1M(2),OBRAT1M(2),      FWDN      155
           2 PNH(2),BTA2,DELT2,BLNK,EPS2,BLNK,DENUP                          RM23        5
525    7501 CONTINUE                                                         FWDN      157
       7001  FORMAT(1X,I4,3I2,A3,I5  ,F7.3,3(F7.2),7(F7.3),A7,F7.3,A7,F7.3)  RM25        4
       7000  FORMAT(1X,I4,3I2,A3,I5  ,F7.3,3(F7.2),11(F7.3))                 RM25        5
      C                                                                      FWDN      160
            DO 125 I=1,6                                                     PSSR      326
530         DPPMP(I)=0.0                                                     PSSR      327
            PDWN(I) =0.0                                                     PSSR      328
            PUPS(I) =0.0                                                     PSSR      329
            PMDPIO(I)=0.0                                                    PSSR      330
            DPUPTIN(I)=0.0                                                   PSSR      331
535         SVMXUP(I) =0.0                                                   PSSR      332
            SVMXDN(I) =0.0                                                   PSSR      333
            SVGDUPA(I)=0.0                                                   PSSR      334
            SVGDDNA(I)=0.0                                                   PSSR      335
           VMXUP(I)=0.0                                                      PSSR      336
540        VMXDN(I)= 0.0                                                     PSSR      337
            SEALOT(I)= 0.0                                                   PSSR      338
            SEALIN(I)= 0.0                                                   PSSR      339
            TOTWTR(I)= 0.0                                                   PSSR      340
            TOTSTM(I) = 0.0                                                  PSSR      341
545         AECLDP(I)=0.0                                                    PSSR      342
       125  CONTINUE                                                         PSSR      343
           IF(NT.EQ.NTHI) GO TO 9800                                         RM02       12
      10000 CONTINUE                                                         RM02       13
           GO TO 9800                                                        RM02       14
550    9100   FORMAT(2 I5)                                                   RM02       15
       110     FORMAT( I5, A10, A5  )                                        PSSR      345
       120     FORMAT(4F10.4)                                                PSSR      346
       130     FORMAT(6F10.4)                                                PSSR      347
      C***                                                                   PSSR      348
555    136     FORMAT( I5)                                                   PSSR      349
       1005 FORMAT(2X,*TEST NO.*,2X,I4,*   DATE  *,2(I2,*/*),I2)             RM23        8
      C                                                                      RMP        57
        1   FORMAT(1X,2F10.3)                                                RM01       46
       6011  FORMAT(1X,2F10.3)                                               RM01       47
560    6012  FORMAT(1X,F10.3 )                                               RM01       48
       6010  FORMAT(1X,4I10  )                                               RM01       49
       6016  FORMAT(1X,5F11.3)                                               RM01       50
       6017  FORMAT(1X,2F8.2 )                                               RM01       51
       6018  FORMAT(1X,5F8.5 )                                               RM01       52
565    9009  FORMAT(1X,I3    )                                               RM01       53
       1010  FORMAT( 1H,5X,*OP.PARAMETERS*,3X,*P(PSIA)*, 5X,*ALF*,8X,*NU*,   PSSR      351
          1 7X, *ALN*, 5X,*NU/ALN*, 4X,*ALN/NU*,/1H,83(*-*))                 PSSR      352
       1015 FORMAT(1H,5X,*   SET POINT*,4X,F6.1,5(4X,F6.3))                  PSSR      353
       1020 FORMAT(1H,5X,*  MEAS.POINT*, /1H,15X,*GD*,4X,                    RM14        7
570       1 F6.1, 4X,F6.3,3X,A7,4X,F6.3,3X,A7,3X,A7)                         RM14        8
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330010

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      1025  FORMAT(1H,5X,*        ORIF*,4X,F6.1,5(4X,F6.3),//)                    PSSR      356
      C--                                                                         PSSR      357
       135     FORMAT(5F10.4)                                                     PSSR      358
       140     FORMAT(5F10.5)                                                     PSSR      359
575    145     FORMAT(5F10.2)                                                     PSSR      360
      C--                                                                         PSSR      361
       1030 FORMAT(1H,5X,*   POINT NO.*, 6X,*1*,  9X, *2*,  9X,*3*,  9X, *4*,   PSSR      362
           1   9X, *5*, 8X, *AVE* ,/1H,*PUMP DP LG-LG,PSI*)                       PSSR      363
       1035  FORMAT(1H,4X,*PER DP SENSOR*, 6F10.3)                              PSSR      364
580    1040  FORMAT(1H ,  *PER P(DIS)-P(SUC)*,6F10.3)                           FWDN      161
       1045  FORMAT(1H,2X ,*PUMP DP(IN-OUT)*, 6F10.3)                           PSSR      366
       1050  FORMAT(1H,*DP(IN-OUT)-DP(LL)*,6F10.3)                              PSSR      367
       1055  FORMAT(1H ,  *DP MEA(SUC.LG-IN)*,6F10.3,/)                         FWDN      162
       1060  FORMAT(1H ,  *CALC.DP(SUC.LG-IN)....=*,F7.3,* FOR K-SUCT=*,F6.3,/  FWDN      163
585         1       1H ,  *CALC.DP(OUT-DIS.LG)...=*,F7.3,* FOR K-DISCH=*,F6.3,  FWDN      164
           2//)                                                                   FWDN      165
       1065  FORMAT(1H ,  *K-SUCT FROM MEAS.DP(SUC.LG-IN)....   =*,F7.3,/       FWDN      166
           1       1H ,*K-DISCH FROM MEAS.DP(IN-OUT)-DP(SUC.LG-IN)-DP(LL)=*,    FWDN      167
           2       F7.3,//)                                                       FWDN      168
590    C                                                                          FWDN      169
       1070  FORMAT(1H,*SEAL INJ FLOW* ,2X,*OUT GREATER THAN IN--(DESIRABLE)*,   PSSR      374
           1 3X,*BY*,F7.3,1X,*PRCNT OF LOOP FLOW*,/)                            FWD3        5
       1075  FORMAT(1H,*SEAL INJ FLOW* ,2X,*OUT LESS THAN IN--(UNDESIRABLE)*,    PSSR      376
           1  3X,*BY*, F8.3,*  PERCENT*,/)                                       PSSR      377
595    1080  FORMAT(1H,*AECL DP*,20X,F8.3,*MAX  TO  *,F8.3,*MIN*,//  ,          PSSR      378
           1 1H,80(*-*))                                                        PSSR      379
      CALCULATE NORMALIZED HEAD + TORQUE                                         PSSR      380
       1110  FORMAT(1H,*NORMALIZED*,16X,*TEST*,14X,*B-J MAP*,/                   PSSR      381
           1 1H,*PARAMETER*, 14X, *ORIF(OR GD)*,/                               PSSR      382
600        2 1H,*----------*, 10X,*--------------*,7X,*-------------*,/)        PSSR      383
       1111 FORMAT(1H,*H(HEAD)*, 14X, F6.3,*(*, F6.3,*)*,//)                    PSSR      384
       1112 FORMAT( 1H,*BTAH(HYD.TRQ)*, 8X, F6.3,*(*, F6.3,*)*,)                PSSR      385
       1113 FORMAT( 1H,*BTAS(SHAFT TRQ)*, 6X, F6.3,*(*, F6.3,*)*,//)            PSSR      386
       1130 FORMAT(1H ,*HOMOL.*,9X,*TEST*/                                      RM04       11
605         1       1H ,*RATIOS*,6X,*ORIF(OR GD)*/                             RM04       12
            2       1H ,*-------*,3X,16(*-*))                                  RM04       13
      C WRITE THIS WHEN NU/ALN IS LE 1.0                                         PSSR      390
       1120 FORMAT(1H,*NU/ALN*,3X,F7.3,*(*,A7,*)*,/)                            RM14        9
       1121  FORMAT( 1H,*ALN/NU*//)                                            PSSR      392
610    1122 FORMAT(1H ,*H/ALN2*3X,F7.3,*(*,F7.3,*)* )                           RM04       14
       1123  FORMAT(1H,*H/NU2*//)                                              PSSR      394
       1124 FORMAT(1H ,*BTAH/ALN2*,F7.3,*(*,F7.3,*)* )                          RM04       15
       1125   FORMAT( 1H,*BTAH/NU2*//)                                         PSSR      396
      C                                                                          PSSR      397
615   C WRITE THIS (ALL) WHEN NU/ ALN IS GT 1.0                                  PSSR      398
       1126 FORMAT(1H,*NU/ALN*,3X,F7.3,*(*,A7,*)*,/)                            RM14       10
       1127 FORMAT(1H,*ALN/NU*,3X,F7.3,*(*,A7,*)*,/)                            RM14       11
       1128 FORMAT(1H0,*H/ALN2*,3X,F7.3,*(*,F7.3,*)* )                          RM04       16
       1129 FORMAT(1H ,*H/NU2*,4X,F7.3,*(*,F7.3,*)*/)                           RM04       17
620    1131 FORMAT(1H0,*BTAH/ALN2*,F7.3,*(*,F7.3,*)* )                          RM04       18
       1132 FORMAT(1H ,*BTAH/NU2*,1X,F7.3,*(*,F7.3,*)*/ )                       RM04       19
      C                                                                          PSSR      405
      C--                                                                        PSSR      406
       150    FORMAT(4F10.3)                                                    PSSR      407
625   C--                                                                        PSSR      408
       1001  FORMAT( 1H1,20X,*REVIEW OF STEADY STATE DATA FOR*,/                PSSR      409
           1  1H ,28X,*CE/EPRI PUMP TESTS      */                             FWD3        6
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     2 1H ,30X,*(FORWARD FLOW)*,/)                                     FWD3       7
C--                                                                    PSSR     411
C--                                                                    PSSR     412
C--                                                                    PSSR     413
 700  FORMAT(1H ,6F13.5)                                               PSSR     414
 703 FORMAT(1H ,F13.5,6X,A7,4F13.5)                                    RM14      12
 601 FORMAT(1H ,  *INPUT DATA---*/)                                    PSSR     415
 602 FORMAT(1H ,  *SET POINT DATA=*/                                   PSSR     416
    1      1H ,  *   PRS          FLWS          SPDS           ALFS*/  PSSR     417
    2      1H ,  *   PSIA         GPM           RPM * )                PSSR     418
 603 FORMAT(1H ,  *MEAS.POINT DATA=*/                                  PSSR     419
    1      1H ,  *   PRSM         FLWM(1)       FLWM(2)        SPDM    PSSR     420
    2      ALFM(1)      ALFM(2) * )                                    PSSR     421
 604 FORMAT(1H ,  *CONTROL VARIABLE  =*,I5/                            PSSR     422
    1      1H ,  *POINT    1           2             3            4    PSSR     423
    2        5*/)                                                      PSSR     424
605  FORMAT(1H ,  *DPPMP(I),FROM NORM SUCT TO NORM DISCH*)             FWDN     170
606  FORMAT(1H ,  *NORM DISCH + SUCT LEG PRES(PSIA),PDWN(I),PUPS(I)*)  FWDN     171
608  FORMAT(1H ,  *PUMP DP(NORM SUCT-NORM DISCH),PMDPIO(I)*)           FWDN     172
609  FORMAT(1H ,  *SUCT TEST SECT-NORM INLET DP, DPUPTIN(I)*)          FWDN     173
610  FORMAT(1H ,  *SP.VOL MIXING TEE,NORM SUCT (CFT/LBM),SVMXUP(I)*)   RM01      54
611  FORMAT(1H ,  *SP.VOL MIXING TEE,NORM DISCH,SVMXDN(I)*)            RM01      55
612  FORMAT(1H ,  *SP.VOL AT NORM SUCT ,AVERAGE FROM GD,SVGDUPA(I)*)   RM01      56
801  FORMAT(1H ,  *SP.VOL AT NORM SUCT ,FROM GD1, SVGDUPA(I)*)         RM01      57
802  FORMAT(1H ,  *SP.VOL AT NORM SUCT ,FROM GD2, SVGDUPA(I)*)         RM01      58
803  FORMAT(1H ,  *SP.VOL AT NORM SUCT ,FROM GD3, SVGDUPA(I)*)         RM01      59
901  FORMAT(1H ,  *SP.VOL AT NORM DISCH,FROM GD1, SVGDDNA(I)*)         RM01      60
902  FORMAT(1H ,  *SP.VOL AT NORM DISCH,FROM GD2, SVGDDNA(I)*)         RM01      61
903  FORMAT(1H ,  *SP.VOL AT NORM DISCH,FROM GD3, SVGDDNA(I)*)         RM01      62
613  FORMAT(1H ,  *SP.VOL AT NORM DISCH,AVERAGE FROM GD,SVGDDNA(I)*)   RM01      63
614  FORMAT(1H ,  *VELOCITY MIXING TEE,NORM SUCTION (FT/SEC),VMXUP(I)*) RM01     64
615  FORMAT(1H ,  *VELOCITY MIXING TEE,NORM DISCH,VMXDN(I)*)           RM01      65
616   FORMAT(1H ,*SEAL INJ OUT FLOW RATE(PPS),SEALOT(I)*)              RM01      66
617   FORMAT(1H ,*SEAL INJ IN  FLOW RATE(PPS),SEALIN(I)*)              RM01      67
618   FORMAT(1H ,*TOT WATER FLOW RATE IN LOOP(PPS),TOTWTR(I)*)         RM01      68
619  FORMAT(1H ,*TOT STM FLOW RATE IN LOOP(PPS),TOTSTM(I)*)            RM01      69
 620 FORMAT(1H ,  *AECL DP MEASUREMENTS*)                              PSSR     439
 621 FORMAT(1H ,  *PUMP TORQUE AND HEAD DATA*/                         PSSR     440
    1      1H ,  *    PHYTRQ        PSHTRQ        PH(1)        PH(2)*/ PSSR     441
    2      1H ,  *    (FTLB)        (FTLB)        (FT)         (FT)*)  PSSR     442
 800 FORMAT(1H0,      *NOTE.....FOR THE VARIABLES WITH DEMENSION LENGTH PSSR    443
    1 2, 1-REFERS TO GD MEAS.*/1H ,52X,*2-REFERS TO ORIF.*)            PSSR     444
C--                                                                    PSSR     445
 501 STOP                                                              RMP       63
        END                                                            PSSR     446
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CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
37	I	9998	THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.
108	I	9999	THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS DEF LINE REFERENCES
132 PSSR 2

VARIABLES SN TYPE RELOCATION

4735 ABR REAL ARRAY
REFS 4 2*397 DEFINED 395 396

4720 AECLDP REAL ARRAY
REFS 4 176 311 312 314 315
DEFINED 69 545

4544 ALFM REAL ARRAY
REFS 4 128 204 205 518 522
DEFINED 49 50

4404 ALFS REAL
REFS 126 203 DEFINED 49

4426 ALMM REAL
REFS 192 195 196 204 205 415 416
417 418 419 420 421 422 423 424
426 427 449 450 518 522
DEFINED 191 192

4423 ALNS REAL
REFS 184 185 187 203 DEFINED 183 184

1707 BLNK REAL
REFS 128 3*204 431 440 441 2*522
DEFINED 14

4475 BTASH1 REAL
REFS 390 DEFINED 386

4474 BTASH2 REAL
REFS 390 DEFINED 385

4472 BTA1 REAL
REFS 386 389 412 427 450
DEFINED 382

4473 BTA2 REAL
REFS 385 389 411 426 449 518 522
DEFINED 383

1716 C1 REAL
REFS 276 277 DEFINED 16

4730 DATE INTEGER ARRAY
REFS 4 11 124 201 518 522
DEFINED 25

4515 DELT1 REAL
REFS 433 442 DEFINED 416

4514 DELT2 REAL
REFS 433 442 518 522 DEFINED 415

4470 DENA1 REAL
REFS 382 DEFINED 380

4471 DENA2 REAL
REFS 383 DEFINED 381

4435 DENUP REAL
REFS 518 522 DEFINED 258

5005 DGD1 REAL ARRAY
REFS 4 155 DEFINED 83

5013 DGD2 REAL ARRAY
REFS 4 112 156 DEFINED 84

5021 DGD3 REAL ARRAY
REFS 4 157 DEFINED 85

4457 DHPFFGD REAL
REFS 333 348 DEFINED 331

4464 DHPFFOR REAL
REFS 344 351 DEFINED 342

4454 DHPLLGD REAL
REFS 328 356 DEFINED 325

4461 DHPLLOR REAL
REFS 339 354 DEFINED 336

4460 DHTFFGD REAL
REFS 334 DEFINED 333

4465 DHTFFOR REAL
REFS 345 DEFINED 344

4456 DHTLLGD REAL
REFS 329 DEFINED 328

4463 DHTLLOR REAL
REFS 340 DEFINED 339

4430 DIF REAL
REFS 220 221 DEFINED 217 220

4574 DIFPR REAL ARRAY
REFS 4 220 233 234 364
DEFINED 219 221

4437 DPDNCAL REAL
REFS 281 368 DEFINED 277

4610 DPIOMLL REAL ARRAY
REFS 4 281 366 DEFINED 229 233 234
236

4451 DPMAX REAL
REFS 314 375 DEFINED 311 314

4452 DPMIN REAL
REFS 315 375 DEFINED 312 315

4552 DPPMP REAL ARRAY
REFS 4 131 211 229 236 325 336
363 518 522 DEFINED 77 213 361 530

4436 DPUPCAL REAL
REFS 280 368 DEFINED 276

4616 DPUPTIN REAL ARRAY
REFS 4 140 241 280 281 2*331 2*342
367 518 522 DEFINED 67 242 534

VARIABLES		SN	TYPE	RELOCATION								
4417	DUM1	*	REAL		DEFINED	107						
4420	DUM2	*	REAL		DEFINED	107						
4377	DUM3	*	REAL		DEFINED	36						
4400	DUM4	*	REAL		DEFINED	36						
4532	EFH1		REAL		REFS	455	458	461	511	DEFINED	450	455
					461							
4531	EFH2		REAL		REFS	454	457	460	494	511		
					DEFINED	449	454	460				
4530	EFM		REAL		REFS	453	457	458	459	503	511	
					DEFINED	448	453	459				
4535	EFTOT1		REAL		REFS	511	DEFINED	458				
4534	EFTOT2		REAL		REFS	511	DEFINED	457				
4527	EPS1		REAL		REFS	435	444	DEFINED	427			
4526	EPS2		REAL		REFS	435	444	518	522	DEFINED	426	
4542	FLWM		REAL	ARRAY	REFS	4	115	128	189	190		
					DEFINED	48	115					
1711	FLWR		REAL		REFS	182	189	190	DEFINED	15		
4403	FLWS		REAL		REFS	126	182	DEFINED	48			
1713	HEADR		REAL		REFS	329	334	340	345	349	352	354
					356	377	378	DEFINED	15			
4517	HSFA1		REAL		REFS	479	484	DEFINED	418			
4516	HSFA2		REAL		REFS	479	484	DEFINED	417			
4757	HSFF		REAL	ARRAY	REFS	4	403	404	417	418	2*470	
					DEFINED	349	352					
4466	HSFFGD		REAL		REFS	349	DEFINED	348				
4467	HSFFOR		REAL		REFS	352	DEFINED	351				
4503	HSFN1		REAL		REFS	485	DEFINED	404				
4502	HSFN2		REAL		REFS	485	DEFINED	403				
4525	HSLA1		REAL		REFS	479	484	DEFINED	424			
4524	HSLA2		REAL		REFS	479	484	DEFINED	423			
4761	HSLL		REAL	ARRAY	REFS	4	409	410	423	424	2*470	
					DEFINED	354	356					
4511	HSLN1		REAL		REFS	485	DEFINED	410				
4510	HSLN2		REAL		REFS	485	DEFINED	409				
4521	HTFA1		REAL		REFS	475	482	DEFINED	420			
4520	HTFA2		REAL		REFS	475	482	DEFINED	419			
4755	HTFF		REAL	ARRAY	REFS	4	405	406	419	420	2*464	
					DEFINED	334	345					
4505	HTFN1		REAL		REFS	483	DEFINED	406				
4504	HTFN2		REAL		REFS	483	DEFINED	405				
4523	HTLA1		REAL		REFS	475	482	DEFINED	422			
4522	HTLA2		REAL		REFS	475	482	DEFINED	421			
4753	HTLL		REAL	ARRAY	REFS	4	407	408	421	422	2*464	
					DEFINED	329	340					
4507	HTLN1		REAL		REFS	483	DEFINED	408				
4506	HTLN2		REAL		REFS	483	DEFINED	407				
4416	I		INTEGER		REFS	63	65	67	69	71	72	73
					74	75	77	78	79	80	81	82
					83	84	85	87	88	89	90	2*111
					2*112	211	3*219	220	225	3*229	3*233	241
					249	250	251	252	266	267	268	269
					286	287	298	299	314	315	321	361
					530	531	532	533	534	535	536	537
					538	539	540	541	542	543	544	545
					DEFINED	63	65	67	69	71	72	73
					74	75	77	78	79	80	81	82
					83	84	85	87	88	89	90	110

VARIABLES	SN	TYPE	RELOCATION							
				210	218	224	228	232	240	248	265
				285	297	313	320	360	529		
4421 IDP		INTEGER		REFS	129	207	227	359	DEFINED	116	
4422 IGD		INTEGER		REFS	149	150	151	152	158	159	160
				161	DEFINED	145	146	147	148	154	155
				156	157						
4376 IMM		INTEGER		REFS	31	DEFINED	28	30			
4477 ISET		INTEGER		REFS	429	473	DEFINED	400	414		
4374 JJ	*	INTEGER		DEFINED	24						
4537 MPRM		INTEGER		REFS	2*516	518	522	DEFINED	515	516	
4375 NT		INTEGER		REFS	2*34	124	201	518	522	547	
				DEFINED	25						
4373 NTHI		INTEGER		REFS	21	34	547	DEFINED	19	23	
4372 NTLO		INTEGER		REFS	20	21	34	DEFINED	19	22	
4540 NUM		REAL	ARRAY	REFS	4	12	193	194	195	196	205
				401	402	403	404	405	406	407	408
				409	410	411	412	449	450	518	522
				DEFINED	189	190	193	194			
4371 NUS		REAL		REFS	12	185	186	187	203		
				DEFINED	182	186					
4550 OBRAT1M		REAL	ARRAY	REFS	4	205	441	518	522		
				DEFINED	197	198					
4425 OBRAT1S		REAL		REFS	203	DEFINED	187				
4560 PDWN		REAL	ARRAY	REFS	4	135	219	DEFINED	65	531	
4733 PH		REAL	ARRAY	REFS	4	178	377	378	DEFINED	52	53
4407 PHYTRQ		REAL		REFS	178	382	383	385	386	448	451
				DEFINED	55						
4602 PMDPIO		REAL	ARRAY	REFS	4	138	225	229	233	234	236
				331	342	365	518	522	DEFINED	71	226
				533							
4726 PNH		REAL	ARRAY	REFS	4	2*388	401	402	415	416	449
				450	518	522	DEFINED	377	378		
4450 PRCNT		REAL		REFS	370	371	373	DEFINED	305		
4402 PRM		REAL		REFS	128	204	205	515	516		
				DEFINED	47						
4401 PRS		REAL		REFS	126	203	DEFINED	47			
4411 PSMTRQ		REAL		REFS	178	385	386	448	DEFINED	57	
4513 PSI1		REAL		REFS	445	DEFINED	412				
4512 PSI2		REAL		REFS	445	518	DEFINED	411			
4566 PUPS		REAL	ARRAY	REFS	4	136	219	321	2*325	2*331	2*336
				2*342	DEFINED	63	322	532			
4546 RAT1M		REAL	ARRAY	REFS	4	197	198	205	395	396	431
				440	517	518	522	DEFINED	195	196	
4424 RAT1S		REAL		REFS	203	DEFINED	185				
1715 RKDN		REAL		REFS	277	281	368	DEFINED	16		
4441 RKDNMS		REAL		REFS	369	DEFINED	281				
1714 RKUP		REAL		REFS	276	280	368	DEFINED	16		
4440 RKUPMS		REAL		REFS	369	DEFINED	280				
4476 RPM	*	REAL		DEFINED	394						
4676 SEALIN		REAL	ARRAY	REFS	4	170	287	293	DEFINED	74	291
				542							
4444 SEALNT		REAL		REFS	305	DEFINED	293				
4670 SEALOT		REAL	ARRAY	REFS	4	168	286	293	DEFINED	75	290
				541							
4533 SIGN		REAL		REFS	452	493	494	503	DEFINED	451	
4406 SPDM		REAL		REFS	128	191	394	DEFINED	51		
1710 SPDR		REAL		REFS	183	191	DEFINED	15			

VARIABLES	SN	TYPE	RELOCATION								
4405 SPDS		REAL		REFS	126	183	DEFINED	51			
4536 SUBPRD		REAL		REFS	495	504	DEFINED	494	503		
4427 SUM		REAL		REFS	211	213	225	226	241	242	
				DEFINED	209	211	223	225	239	241	
4431 SUMA		REAL		REFS	249	254	266	271	DEFINED	244	249
				261	266						
4432 SUMB		REAL		REFS	250	255	267	272	DEFINED	245	250
				262	267						
4433 SUMC		REAL		REFS	251	256	268	273	DEFINED	246	251
				263	268						
4434 SUMD		REAL		REFS	252	257	269	274	DEFINED	247	252
				264	269						
4443 SUMI		REAL		REFS	287	291	DEFINED	284	287		
4442 SUMO		REAL		REFS	286	290	DEFINED	283	286		
4453 SUMP		REAL		REFS	321	322	DEFINED	319	321		
4446 SUMS		REAL		REFS	299	302	DEFINED	296	299		
4445 SUMW		REAL		REFS	298	301	DEFINED	295	298		
4646 SVGDDNA		REAL	ARRAY	REFS	4	155	156	157	162	252	325
				331	380	DEFINED	112	257	538		
4640 SVGDUPA		REAL	ARRAY	REFS	4	146	147	148	153	251	325
				331	380	DEFINED	111	256	537		
4632 SVMXDN		REAL	ARRAY	REFS	4	144	250	277	336	342	381
				DEFINED	79	255	536				
4624 SVMXUP		REAL	ARRAY	REFS	4	142	249	258	276	336	342
				381	DEFINED	78	254	535			
4412 SV1	*	REAL		DEFINED	60						
4413 SV2	*	REAL		DEFINED	60						
4414 SV3	*	REAL		DEFINED	61						
4415 SV4	*	REAL		DEFINED	61						
4447 TOTLPFL		REAL		REFS	305	DEFINED	303				
4712 TOTSTM		REAL	ARRAY	REFS	4	174	299	303	DEFINED	73	302
				544							
4704 TOTWTR		REAL	ARRAY	REFS	4	172	298	303	DEFINED	72	301
				543							
4410 TRQFM		REAL		REFS	451	DEFINED	56				
1712 TRQR		REAL		REFS	382	383	DEFINED	15			
1706 TYPE		REAL		REFS	518	522	DEFINED	13			
4763 UGD1		REAL	ARRAY	REFS	4	146	DEFINED	80			
4771 UGD2		REAL	ARRAY	REFS	4	111	147	DEFINED	81		
4777 UGD3		REAL	ARRAY	REFS	4	148	DEFINED	82			
4455 VELHGD		REAL		REFS	328	333	DEFINED	327			
4462 VELHOR		REAL		REFS	339	344	DEFINED	338			
4737 VLNDISG		REAL	ARRAY	REFS	4	268	327	DEFINED	90	273	
4745 VLNSUCG		REAL	ARRAY	REFS	4	269	327	DEFINED	89	274	
4662 VMXDN		REAL	ARRAY	REFS	4	166	267	277	338		
				DEFINED	88	272	540				
4654 VMXUP		REAL	ARRAY	REFS	4	164	266	276	338		
				DEFINED	87	271	539				
4501 ZTA1		REAL		REFS	443	DEFINED	402				
4500 ZTA2		REAL		REFS	443	518	DEFINED	401			

FILE NAMES		MODE								
0 INPUT										
20 OUTPUT										
40 TAPE10	FMT		READS	25	30	36	47	48	49	50	51
			52	53	55	56	57	60	61	63	65
			67	69	71	72	73	74	75	77	78

FILE NAMES MODE

			79	80	81	82	83	84	85	87	88
			89	90	107	MOTION	18				
60	TAPE20	FMT	WRITES	518	522						
100	TAPE21										
0	TAPE5	FMT	READS	19							
20	TAPE6	FMT	WRITES	122	123	124	125	126	127	128	130
			131	134	135	136	137	138	139	140	141
			142	143	144	149	150	151	152	153	158
			159	160	161	162	163	164	165	166	167
			168	169	170	171	172	173	174	175	176
			177	178	179	200	201	202	203	204	205
			358	363	364	365	366	367	368	369	371
			373	375	387	388	389	390	391	431	432
			433	434	435	436	440	441	442	443	444
			445	463	464	470	475	479	482	483	484
			485	496	500	505	508	511			

EXTERNALS	TYPE	ARGS	REFERENCES								
EOF	REAL	1	26	37	108						
SKIPL		2	35	41	42	43	44	45	46	54	58
			59	62	64	66	68	70	76	86	91
			92	93	94	95	96	97	98	99	100
			101	102	103	104	105	106			

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES						
ABS	REAL	1	INTRIN	184	186	192	193	194	395	396	517
AMAX1	REAL	0	INTRIN	314						
AMIN1	REAL	0	INTRIN	315						

STATEMENT LABELS			DEF LINE	REFERENCES		
3402	1	FMT	558	47	49	51
0	101		212	210		
0	102		220	218		
0	103		225	224		
0	104		229	228		
747	105		231	227		
761	106		236	230		
0	107		233	232		
763	108		237	235		
0	109		241	240		
3363	110	FMT NO REFS	551			
0	111		253	248		
0	112		270	265		
0	113		288	285		
0	114		300	297		
0	115		316	313		
1233	116		363	359		
0	117		362	360		
1255	118		373	370		
1257	119		374	372		
3366	120	FMT NO REFS	552			
1347	121		414	397		
1350	122		415	413		
1410	123		438	429		
1424	124		446	437		
0	125		546	529		
0	126		321	320		

STATEMENT LABELS				DEF LINE	REFERENCES								
3370	130	FMT	NO REFS	553									
3461	135	FMT	NO REFS	573									
3372	136	FMT	NO REFS	555									
712	138			214	207								
3463	140	FMT	NO REFS	574									
3465	145	FMT	NO REFS	575									
3762	150	FMT	NO REFS	624									
1563	501			671	20	26							
0	502		INACTIVE	27	26								
4007	601	FMT		634	123								
4013	602	FMT		635	125								
4031	603	FMT		638	127								
4046	604	FMT	NO REFS	641									
4062	605	FMT		644	130								
4070	606	FMT		645	134								
4077	608	FMT		646	137								
4105	609	FMT		647	139								
4113	610	FMT		648	141								
4122	611	FMT		649	143								
4130	612	FMT		650	149								
4203	613	FMT		657	158								
4212	614	FMT		658	163								
4221	615	FMT		659	165								
4227	616	FMT		660	167								
4235	617	FMT		661	169								
4243	618	FMT		662	171								
4252	619	FMT		663	173								
4260	620	FMT		664	175								
4264	621	FMT		665	177								
4000	700	FMT		632	126	131	135	136	138	140	142	144	153
					162	164	166	168	170	172	174	176	178
441	701			133	129								
441	702			134	132								
4003	703	FMT		633	128								
4304	800	FMT		668	179								
4137	801	EMT		651	150								
4145	802	FMT		652	151								
4153	803	FMT		653	152								
4161	901	FMT		654	159								
4167	902	FMT		655	160								
4175	903	FMT		656	161								
1467	923			482	473								
1477	924			492	481								
1510	925			503	493								
1505	926			499	495								
1520	927			510	498	502	507						
1516	928			508	504								
2763	951	FMT		465	464								
3030	952	FMT		471	470								
3046	953	FMT		476	475	482							
3073	954	FMT		480	479								
3137	955	FMT	NO REFS	486									
3147	956	FMT		487	483								
3157	957	FMT		488	484								
3167	958	FMT		489	485								
3255	959	FMT		512	511								
1445	960			456	452								

STATEMENT LABELS			DEF LINE	REFERENCES							
3202	980	FMT	497	496							
3213	981	FMT	501	500							
3225	982	FMT	506	505							
3237	983	FMT	509	508							
3764	1001	FMT	626	122	200	463					
3374	1005	FMT	556	124	201						
3422	1010	FMT	566	202							
3435	1015	FMT	568	203							
3442	1020	FMT	569	204							
3453	1025	FMT	571	205							
3467	1030	FMT	577	358							
3502	1035	FMT	579	363							
3506	1040	FMT	580	364							
3513	1045	FMT	581	365							
3520	1050	FMT	582	366							
3525	1055	FMT	583	367							
3532	1060	FMT	584	368							
3547	1065	FMT	587	369							
3564	1070	FMT	591	371							
3577	1075	FMT	593	373							
3611	1080	FMT	595	375							
3621	1110	FMT	598	387							
3640	1111	FMT	601	388							
3646	1112	FMT	602	389							
3654	1113	FMT	603	390							
3674	1120	FMT	608	431							
3701	1121	FMT	609	432							
3704	1122	FMT	610	433							
3711	1123	FMT	611	434							
3714	1124	FMT	612	435							
3721	1125	FMT	613	436							
3724	1126	FMT	616	440							
3731	1127	FMT	617	441							
3736	1128	FMT	618	442							
3743	1129	FMT	619	443							
3662	1130	FMT	604	391							
3750	1131	FMT	620	444							
3755	1132	FMT	621	445							
160	5001		33	31							
153	5002		29	32							
0	5003		113	110							
3410	6010	FMT	561	25	36	107					
3404	6011	FMT	559	48							
3406	6012	FMT	560	50	52	53	55	56	57		
3412	6016	FMT	562	63	65	67	69	71	72	73	74	75
				77	87	88	89	90				
3414	6017	FMT	563	60	61							
3416	6018	FMT	564	78	79	80	81	82	83	84	85	
3354	7000	FMT	527	518								
3345	7001	FMT	526	522								
1536	7500		522	517								
1540	7501		525	521								
3420	9009	FMT	565	30								
3361	9100	FMT	550	19								
144	9200		24	21								
173	9300		40	34								
135	9800		19	547	549							

STATEMENT LABELS			DEF LINE	REFERENCES
0	9998	INACTIVE	38	2*37
0	9999	INACTIVE	109	2*108
1560	10000		548	24 39

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES	EXT REFS	EXITS	NOT INNER
145	10000	*	JJ	24 548	1416B				
406	5003		I	110 113	4B	INSTACK			
704	101		I	210 212	3B	INSTACK			
716	102		I	218 220	5B	INSTACK			
731	103		I	224 225	3B	INSTACK			
742	104		I	228 229	3B	INSTACK			
752	107		I	232 233	3B	INSTACK			
767	109		I	240 241	3B	INSTACK			
1002	111		I	248 253	11B	INSTACK			
1027	112		I	265 270	11B	INSTACK			
1064	113		I	285 288	5B	INSTACK			
1102	114		I	297 300	5B	INSTACK			
1123	115		I	313 316	6B	INSTACK			
1135	126		I	320 321	3B	INSTACK			
1227	117		I	360 362	3B	INSTACK			
1543	125		I	529 546	12B	INSTACK			

STATISTICS		
PROGRAM LENGTH	4706B	2502
BUFFER LENGTH	1218	81

```
      SUBROUTINE SKIPL(NF,NL)                                    RMP    65
      DIMENSION DUM1(80)                                         RM02   16
      IF(NF.EQ.12)GO TO 12                                       RMP    66
      IF(NF.EQ.14)GO TO 14                                       RMP    67
      IF(NF.EQ.16)GO TO 16                                       RMP    68
      IF(NF.EQ.1) GO TO 101                                      RM01   70
      IF(NF.EQ.13)GO TO 13                                       RM01   71
      IF(NF.EQ.15)GO TO 15                                       RM01   72
      IF(NF.EQ.18)GO TO 18                                       RM01   73
      IF(NF.EQ.17)GO TO 17                                       RM01   74
      IF(NF.EQ.534) GO TO 534                                    RM01   75
      IF(NF.EQ.535) GO TO 535                                    RM01   76
      IF(NF.EQ.536) GO TO 536                                    RM01   77
      IF(NF.EQ.537) GO TO 537                                    RM01   78
   12 DO 2 I=1,NL                                                RMP    69
      READ(10,6012) DUM1                                         RMP    70
    2 CONTINUE                                                   RMP    71
      GO TO 100                                                  RMP    72
   14 DO 4 I=1,NL                                                RMP    73
      READ(10,6014) DUM1                                         RMP    74
    4 CONTINUE                                                   RMP    75
      GO TO 100                                                  RMP    76
   16 DO 6 I=1,NL                                                RMP    77
      READ(10,6016) DUM1                                         RMP    78
    6 CONTINUE                                                   RMP    79
      GO TO 100                                                  RM01   79
  101 DO 21 I=1,NL                                               RM01   80
   21 READ(10, 1)DUM1                                            RM01   81
      GO TO 100                                                  RM01   82
   13 DO 23 I=1,NL                                               RM01   83
   23 READ(10,6013)DUM1                                          RM01   84
      GO TO 100                                                  RM01   85
   15 DO 25 I=1,NL                                               RM01   86
   25 READ(10,6015)DUM1                                          RM01   87
      GO TO 100                                                  RM01   88
   18 DO 28 I=1,NL                                               RM01   89
   28 READ(10,6018)DUM1                                          RM01   90
      GO TO 100                                                  RM01   91
   17 DO 27 I=1,NL                                               RM01   92
   27 READ(10,6017)DUM1                                          RM01   93
      GO TO 100                                                  RM01   94
  534 DO 1534 I=1,NL                                             RM01   95
 1534 READ(10,8534) DUM1                                         RM01   96
      GO TO 100                                                  RM01   97
  535 DO 1535  I=1,NL                                            RM01   98
 1535 READ(10, 8535) DUM1                                        RM01   99
      GO TO 100                                                  RM01  100
  536 DO 1536 I=1,NL                                             RM01  101
 1536 READ(10,8536) DUM1                                         RM01  102
      GO TO 100                                                  RM01  103
  537 DO 1537 I=1,NL                                             RM01  104
 1537 READ(10, 8537) DUM1                                        RM01  105
  100 CONTINUE                                                   RMP    80
    1 FORMAT(1X,80A1)                                            RM02   17
 6012 FORMAT(1X,80A1)                                            RM02   18
 6013 FORMAT(1X,80A1)                                            RM02   19
 6014 FORMAT(1X,80A1)                                            RM02   20
```

```
                6015  FORMAT(1X,80A1)                                  RM02      21
                6016  FORMAT(1X,80A1)                                  RM02      22
     60         6017  FORMAT(1X,80A1)                                  RM02      23
                6018  FORMAT(1X,80A1)                                  RM02      24
                8534  FORMAT(1X,80A1)                                  RM02      25
                8535  FORMAT(1X,80A1)                                  RM02      26
                8536  FORMAT(1X,80A1)                                  RM02      27
     65         8537  FORMAT(1X,80A1)                                  RM02      28
                      RETURN                                           RMP       84
                      END                                              RMP       85
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
3	SKIPL	1	66

VARIABLES	SN	TYPE	RELOCATION								
300	DUM1	REAL	ARRAY	REFS	2	DEFINED	16	20	24	28	31
				34	37	40	43	46	49	52	
277	I	INTEGER		DEFINED	15	19	23	27	30	33	36
				39	42	45	48	51			
0	NF	INTEGER	F.P.	REFS	3	4	5	6	7	8	9
				10	11	12	13	14	DEFINED	1	
0	NL	INTEGER	F.P.	REFS	15	19	23	27	30	33	36
				39	42	45	48	51	DEFINED	1	

FILE NAMES	MODE								
TAPE10	FMT	READS	16	20	24	28	31	34	37	40
		43	46	49	52					

STATEMENT LABELS			DEF LINE	REFERENCES							
247	1	FMT	54	28							
0	2		17	15							
0	4		21	19							
0	6		25	23							
41	12		15	3							
71	13		30	7							
47	14		19	4							
77	15		33	8							
55	16		23	5							
113	17		39	10							
105	18		36	9							
0	21		28	27							
0	23		31	30							
0	25		34	33							
0	27		40	39							
0	28		37	36							
151	100		53	18	22	26	29	32	35	38	41	44
				47	50						
63	101		27	6							
121	534		42	11							
127	535		45	12							
135	536		48	13							

STATEMENT LABELS			DEF LINE	REFERENCES
143	537		51	14
0	1534		43	42
0	1535		46	45
0	1536		49	48
0	1537		52	51
251	6012	FMT	55	16
253	6013	FMT	56	31
255	6014	FMT	57	20
257	6015	FMT	58	34
261	6016	FMT	59	24
263	6017	FMT	60	40
265	6018	FMT	61	37
267	8534	FMT	62	43
271	8535	FMT	63	46
273	8536	FMT	64	49
275	8537	FMT	65	52

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
42	2	* I	15 17	58	EXT REFS
50	4	* I	19 21	58	EXT REFS
56	6	* I	23 25	58	EXT REFS
64	21	* I	27 28	58	EXT REFS
72	23	* I	30 31	58	EXT REFS
100	25	* I	33 34	58	EXT REFS
106	28	* I	36 37	58	EXT REFS
114	27	* I	39 40	58	EXT REFS
122	1534	* I	42 43	58	EXT REFS
130	1535	* I	45 46	58	EXT REFS
136	1536	* I	48 49	58	EXT REFS
144	1537	* I	51 52	58	EXT REFS

STATISTICS

PROGRAM LENGTH	437B	287

Appendix 3.3B

PSSR CODE LISTING FOR REVERSE FLOW TESTS

```
      OVERLAY(PSSR,0,0)                                                  PSSR    2
      PROGRAM PSSR(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE10,TAPE20,  REVN    1
     1  TAPE21)                                                         REVN    2
      DIMENSION  NUM(2),FLWM(2),ALFM(2),RATIM(2),OBRATIM(2),DPPMP(6),    PSSR    4
     1PDWN(6),PUPS(6), DIFPR(6), PMDPIO(6), DPIOMLL(6), DPUPTIN(6)  ,    PSSR    5
     2SVMXUP(6), SVMXDN(6), SVGDUPA(6), SVGDDNA(6), VMXUP(6), VMXDN(6),  PSSR    6
     3SEALOT(6), SEALIN(6), TOTWTR(6),TOTSTM(6), AECLDP(6),PNH(2),       PSSR    7
     4 DATE(3), PH(2), ABR(2) ,                                          RM07    1
     5 VLNDI56(6),VLNSUCG(6),HTLL(2),HTFF(2),HSFF(2),HSLL(2),            RM19    1
     6 UGD1(6),UGD2(6),UGD3(6),DGD1(6),DGD2(6),DGD3(6)                   REVN    5
      INTEGER DATE                                                       RMP     3
      REAL NUS, NUM                                                      PSSR    9
      DATA TYPE/3HREV/                                                   REVN    6
      DATA BLNK/7H       /                                               REVN    7
      DATA SPDR,FLWR,TRQR,HEADR/4500., 3500., 308., 252. /               PSSR   10
      DATA RKUP, RKDN, C1 /0.69, 0.15, 9265.0 /                          PSSR   11
C--   READ TEST ID NO. + DATE OF TEST                                    PSSR   12
      REWIND 10                                                          RMP     4
 9800 READ(5,9100) NTLO,NTHI                                             RMRV    1
      IF(NTLO.LT.0) GO TO 501                                            RMRV    2
      IF(NTLO.GT.0.AND.NTHI.GT.0) GO TO 9200                             RMRV    3
      NTLO=100                                                           RMRV    4
      NTHI=9998                                                          RMRV    5
 9200 DO 10000 JJ=1,9999                                                 RMRV    6
      READ( 10,6010) NT,DATE                                             RMRV    7
         IF(EOF(10))501,502                                              PMPREV  1
 502     CONTINUE                                                        PMPREV  2
      IMM=0                                                              RMRV    8
5002  CONTINUE                                                           RMRV    9
      READ(10,9009)IMM                                                   RMRV   10
      IF(IMM.EQ.32)GO TO 5001                                            RMRV   11
      GO TO 5002                                                         RMRV   12
5001  CONTINUE                                                           RMRV   13
      IF(NT.GE.NTLO.AND.NT.LE.NTHI) GO TO 9300                           RMRV   14
      CALL SKIPL(12,250)                                                 WK78363 1
      READ(10,6010) DUM3,DUM4                                            WK78363 2
      IF(EOF(10)) 9998,9998                                              WK78363 3
 9998 CONTINUE                                                           WK78363 4
      GO TO 10000                                                        RMRV   16
 9300 CONTINUE                                                           RMRV   17
      CALL SKIPL(534,9)                                                  RMRV   18
      CALL SKIPL(535,4)                                                  RMRV   19
      CALL SKIPL(536,1)                                                  RMRV   20
      CALL SKIPL(537,8)                                                  RMRV   21
      CALL SKIPL(536,4)                                                  RMRV   22
      CALL SKIPL(534,2)                                                  WK78363 5
      CALLSKIPL(12,11)                                                   RMRV   23
      READ(10,1    )PRS,PRM                                              RMP     6
      READ(10,6011) FLWS,FLWM(2)                                         RMRV   24
      READ(10,1    )ALFS,ALFM(2)                                         RMP     8
      READ(10,6012) ALFM(1)                                              RMP     9
      READ(10,1    ) SPDS,SPDM                                           RMP    10
      READ(10,6012) PH(1)                                                RMP    11
      READ(10,6012) PH(2)                                                RMP    12
      CALL SKIPL(12,1)                                                   RMP    13
      READ(10,6012) PHYTRQ                                               RMP    14
      READ(10,6012)TRQFM                                                 REVN    8
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                READ(10,6012) PSHTRQ                                    RMP       16
                CALL SKIPL(12,11)                                       RMRV      25
 60             CALL SKIPL(14,11)                                       RMRV      26
                READ (10,6017)SV1,SV2                                   RMRV      27
                READ (10,6017)SV3,SV4                                   RMRV      28
                CALL SKIPL(16,3)                                        RMRV      29
                READ(10,6016)(PDWN(I),I=1,5)                            RMRV      30
 65             CALL SKIPL(16,1)                                        RMP       21
                READ(10,6016)(PUPS(I),I=1,5)                            RMRV      31
                CALL SKIPL(16,19)                                       RMP       23
                READ(10,6016)(DPUPTIN(I),I=1,5)                         RMP       24
                CALL SKIPL(16,1)                                        RMP       25
 70             READ(10,6016)(AECLDP(I),I=1,5)                          RMP       26
                CALL SKIPL(16,2)                                        RMP       27
                READ(10,6016)(PMDPIO(I),I=1,5)                          RMP       28
                READ(10,6016)(TOTWTR(I),I=1,5)                          RMP       29
                READ(10,6016)(TOTSTM(I),I=1,5)                          RMP       30
 75             READ(10,6016)(SEALIN(I),I=1,5)                          RMP       31
                READ(10,6016)(SEALOT(I),I=1,5)                          RMP       32
                CALL SKIPL(16,2)                                        RMP       33
                READ(10,6016)(DPPMP(I),I=1,5)                           RMP       34
                READ(10,6018)(SVMXDN(I),I=1,5)                          RMRV      32
 80             READ(10,6018)(SVMXUP(I),I=1,5)                          RMRV      33
                READ(10,6018)( DGD1(I),I=1,5)                           RMRV      34
                READ(10,6018)( DGD2(I),I=1,5)                           RMRV      35
                READ(10,6018)( DGD3(I),I=1,5)                           RMRV      36
                READ(10,6018)( UGD1(I),I=1,5)                           RMRV      37
 85             READ(10,6018)( UGD2(I),I=1,5)                           RMRV      38
                READ(10,6018)( UGD3(I),I=1,5)                           RMRV      39
                CALL SKIPL( 18, 3 )                                     RMRV      40
                READ(10,6016)(VMXDN(I),I=1,5)                           RMRV      41
                READ(10,6016)(VMXUP(I),I=1,5)                           RMRV      42
 90             READ(10,6016)(VLNSUCG(I),I=1,5)                         RMRV      43
                READ(10,6016)(VLNDISG(I),I=1,5)                         RMRV      44
                CALL SKIPL(16,12)                                       REVN      17
                CALL SKIPL(1,1  )                                       RMRV      45
                CALL SKIPL(13, 1)                                       RMRV      46
 95             CALL SKIPL( 1, 1)                                       RMRV      47
                CALL SKIPL(12, 1)                                       RMRV      48
                CALL SKIPL( 1, 1)                                       RMRV      49
                CALL SKIPL(12, 7)                                       RMRV      50
                CALL SKIPL(15, 1)                                       RMRV      51
100             CALL SKIPL(12,10)                                       RMRV      52
                CALL SKIPL(15, 1)                                       RMRV      53
                CALL SKIPL(12, 9)                                       RMRV      54
                CALL SKIPL(14,11)                                       RMRV      55
                CALL SKIPL(17, 2)                                       RMRV      56
105             CALL SKIPL(16,38)                                       RMRV      57
                CALL SKIPL(18,11)                                       RMRV      58
                CALL SKIPL(16,16)                                       RMRV      59
                READ(10,6010)DUM1,DUM2                                  WK78363    6
                IF(EOF(10))9999,9999                                    WK78363    7
110          9999 CONTINUE                                              WK78363    8
                 DO 5003 I=1,5                                          RMRV      60
                 SVGDUPA(I)= UGD2(I)                                    RMRV      61
                 SVGDDNA(I)= DGD2(I)                                    RMRV      62
             5003  CONTINUE                                            RMRV      63
```

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      C                                                                 RMP      45
      C                                                                 REV1      1
            FLWM(1)= FLWM(2)                                            RMP      46
           IDP= 1                                                       RMP      47
      C------                                                           PSSR     57
      C------  FIRST TWO--PUMP HYDRAULIC AND SHAFT TORQUES,FTLB         PSSR     58
      C------  SECOND TWO-- PUMP HEAD(GD),  PUMP HEAD(ORIF)             PSSR     59
      C--                                                               PSSR     60
      C--   WRITE ALL INPUT DATA                                        PSSR     61
            WRITE(6,1001)                                               PSSR     62
            WRITE(6,601)                                                PSSR     63
            WRITE(6,1005)NT,DATE                                        RMP      48
            WRITE(6,602)                                                PSSR     65
            WRITE(6,700) PRS, FLWS,SPDS, ALFS                           PSSR     66
            WRITE(6,603)                                                PSSR     67
            WRITE(6,703) PRM,BLNK, FLWM(2), SPDM,ALFM                   RM15      1
            IF (IDP .EQ . 0) GO TO 701                                  PSSR     70
            WRITE (6, 605 )                                             PSSR     71
            WRITE (6, 700 )DPPMP                                        PSSR     72
            GO TO 702                                                   PSSR     73
       701  CONTINUE                                                    PSSR     74
       702  WRITE (6, 606)                                              PSSR     75
            WRITE (6, 700)PDWN                                          PSSR     76
            WRITE (6, 700)PUPS                                          PSSR     77
            WRITE (6, 608)                                              PSSR     78
            WRITE (6, 700)PMDPIO                                        PSSR     79
            WRITE (6, 609)                                              PSSR     80
            WRITE (6, 700)DPUPTIN                                       PSSR     81
            WRITE (6, 610)                                              PSSR     82
            WRITE (6, 700)SVMXUP                                        PSSR     83
            WRITE (6, 611)                                              PSSR     84
            WRITE (6,700)SVMXDN                                         PSSR     85
            IGD=0                                                       REVN     18
            IF(SVGDUPA(1).EQ.UGD1(1))IGD=1                              REVN     19
            IF(SVGDUPA(1).EQ.UGD2(1))IGD=2                              REVN     20
            IF(SVGDUPA(1).EQ.UGD3(1))IGD=3                              REVN     21
            IF(IGD.EQ.0) WRITE(6,612)                                   REVN     22
            IF(IGD.EQ.1) WRITE(6,801)                                   REVN     23
            IF(IGD.EQ.2) WRITE(6,802)                                   REVN     24
            IF(IGD.EQ.3) WRITE(6,803)                                   REVN     25
            WRITE (6,700)SVGDUPA                                        PSSR     87
            IGD=0                                                       REVN     26
            IF(SVGDDNA(1).EQ.DGD1(1)) IGD=1                             REVN     27
            IF(SVGDDNA(1).EQ.DGD2(1)) IGD=2                             REVN     28
            IF(SVGDDNA(1).EQ.DGD3(1)) IGD=3                             REVN     29
            IF(IGD.EQ.0) WRITE(6,613)                                   REVN     30
            IF(IGD.EQ.1) WRITE(6,901)                                   REVN     31
            IF(IGD.EQ.2) WRITE(6,902)                                   REVN     32
            IF(IGD.EQ.3) WRITE(6,903)                                   REVN     33
            WRITE(6,700)SVGDDNA                                         PSSR     89
            WRITE(6,614)                                                PSSR     90
            WRITE(6,700)VMXUP                                           PSSR     91
            WRITE(6,615)                                                PSSR     92
            WRITE(6,700)VMXDN                                           PSSR     93
            WRITE(6,616)                                                PSSR     94
            WRITE(6,700)SEALOT                                          PSSR     95
            WRITE(6,617)                                                PSSR     96
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      WRITE(6,700)SEALIN                                                PSSR      97
      WRITE(6,618)                                                      PSSR      98
      WRITE(6,700)TOTWTR                                                PSSR      99
175   WRITE(6,619)                                                      PSSR     100
      WRITE(6,700)TOTSTM                                                PSSR     101
      WRITE(6,620)                                                      PSSR     102
      WRITE(6,700)AECLDP                                                PSSR     103
      WRITE(6,621)                                                      PSSR     104
180   WRITE(6,700)PHYTRQ, PSHTRQ, PH                                    PSSR     105
      WRITE(6,800)                                                      PSSR     106
      WRITE(6,1133)                                                     REVN      34
1133  FORMAT(1H0,  *NOTE--HERE NORM INLET IS CALLED IN(BUT CALLED OUT BY REVN      35
     1 KDL REVERSE FLOW PRINTOUTS)*/                                    REVN      36
185   2       1H ,  *      SIMILARLY NORM OUTLET HERE IS CALLED OUT* /)  REVN      37
C--                                                                     PSSR     107
C--- PROCESS SET POINT DATA                                             PSSR     108
      NUS = FLWS/FLWR                                                   PSSR     109
      ALNS= SPDS/SPDR                                                   PSSR     110
190   IF(ABS(ALNS).LE.0.000001) ALNS= 0.000001                          PMPREV     3
      RATIS = NUS/ALNS                                                  PSSR     112
      IF(ABS(NUS).LE.0.000001) NUS= 0.000001                            PMPREV     4
      OBRATIS= ALNS/NUS                                                 PSSR     114
C--- PROCESS MEASURED  DATA                                             PSSR     115
195   NUM(1) = FLWM(1)/FLWR                                             PSSR     116
      NUM(2) = FLWM(2)/FLWR                                             PSSR     117
      ALNM   = SPDM /SPDR                                               PSSR     118
      IF(ABS(ALNM).LE.0.000001) ALNM= 0.000001                          PMPREV     5
      IF(ABS(NUM(1)).LE.0.000001)NUM(1)=0.000001                        PMPREV     6
200   IF(ABS(NUM(2)).LE.0.000001)NUM(2)=0.000001                        PMPREV     7
      RATIM(1) = NUM(1)/ALNM                                            PSSR     120
      RATIM(2) = NUM(2)/ALNM                                            PSSR     121
      OBRATIM(1) = 1./ RATIM(1)                                         PSSR     124
      OBRATIM(2) = 1.0/RATIM(2)                                         PSSR     125
205   C-- PRINT  THE ABOVE VALUES--                                     PSSR     126
       WRITE (6,1001)                                                   PSSR     127
      WRITE (6,1005) NT, DATE                                           PSSR     128
      WRITE (6,1010)                                                    PSSR     129
      WRITE (6,1015) PRS,ALFS,NUS,ALNS,RATIS,OBRATIS                    PSSR     130
210   WRITE(6,1020) PRM,ALFM(1),BLNK,ALNM,BLNK,BLNK                     RM15       2
      WRITE (6,1025) PRM,ALFM(2), NUM(2),ALNM, RATIM(2),OBRATIM(2)      PSSR     132
C                                                                       PSSR     133
      IF( IDP. EQ. 0) GO TO 138                                         PSSR     134
C--- PROCESS DPPMP(I)  DATA                                             PSSR     135
215   SUM=0.0                                                           PSSR     136
      DO 101 I=1,5                                                      PSSR     137
      SUM= SUM+ DPPMP(I)                                                PSSR     138
 101  CONTINUE                                                          PSSR     139
      DPPMP(6) =SUM/5.0                                                 PSSR     140
220   138  CONTINUE                                                     PSSR     141
C--                                                                     PSSR     142
C--- PROCESS DWNSTREM + UPSTREM PRESSURES                               PSSR     143
      DIF =0.0                                                          PSSR     144
      DO 102  I=1,5                                                     PSSR     145
225   DIFPR(I)= PUPS(I)-PDWN(I)                                         REV5       1
 102  DIF =DIF + DIFPR(I)                                               PSSR     147
      DIFPR(6) = DIF/5.0                                                PSSR     148
C--- PROCESS    PMDPIO(I) DATA                                          PSSR     149
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                SUM=0.0                                                          PSSR      150
230             DO 103  I= 1,5                                                   PSSR      151
 103            SUM =SUM + PMDPIO(I)                                             PSSR      152
                PMDPIO(6) = SUM/5.0                                              PSSR      153
              IF( IDP. EQ. 0) GO TO 105                                          PSSR      154
                DO  104  I=1,5                                                   PSSR      155
235      104    DPIOMLL(I) =  PMDPIO(I) - DPPMP(I)                               PSSR      156
                GO TO 106                                                        PSSR      157
 105            CONTINUE                                                         PSSR      158
                DO  107 I=1,5                                                    PSSR      159
         107    DPIOMLL(I) =  PMDPIO(I) - DIFPR(I)                               PSSR      160
240             DPIOMLL(6) =  PMDPIO(6) - DIFPR(6)                               PSSR      161
                GO TO 108                                                        PSSR      162
         106    DPIOMLL(6) =  PMDPIO(6) - DPPMP(6)                               PSSR      163
 108            CONTINUE                                                         PSSR      164
         C--- PROCESS    DPUPTIN(I) DATA                                         PSSR      165
245             SUM= 0.0                                                         PSSR      166
                DO 109 I=1,5                                                     PSSR      167
         109    SUM= SUM + DPUPTIN(I)                                            PSSR      168
                DPUPTIN(6) = SUM/5.0                                             PSSR      169
         C--- PROCESS SVMXUP(I), SVMXDN(I), SVGDUPA(I), SVGDDNA(I) DATA          PSSR      170
250             SUMA=0.0                                                         PSSR      171
                SUMB=0.0                                                         PSSR      172
                SUMC=0.0                                                         PSSR      173
                SUMD=0.0                                                         PSSR      174
                DO 111 I=1,5                                                     PSSR      175
255             SUMA= SUMA + SVMXUP(I)                                           PSSR      176
                SUMB= SUMB + SVMXDN(I)                                           PSSR      177
                SUMC= SUMC + SVGDUPA(I)                                          PSSR      178
                SUMD= SUMD + SVGDDNA(I)                                          PSSR      179
 111            CONTINUE                                                         PSSR      180
260             SVMXUP(6) = SUMA/5.0                                             PSSR      181
                SVMXDN(6) = SUMB/5.0                                             PSSR      182
                SVGDUPA(6) = SUMC/5.0                                            PSSR      183
                SVGDDNA(6) = SUMD/5.0                                            PSSR      184
              DENUP= 1.0/SVMXUP(6)                                               RM23        1
265      C--- PROCESS  VMXUP(I) , VMXDN(I) DATA                                   PSSR      185
         CALCULATE     THE AVERAGE VALUES FOR FLUID VELOCITIES                   PSSR      186
                SUMA =0.                                                         PSSR      187
                SUMB =0.                                                         PSSR      188
               SUMC=0.0                                                          REVN       39
270            SUMD=0.0                                                          REVN       40
                DO 112  I=1,5                                                    PSSR      189
                SUMA = SUMA + VMXUP(I)                                           PSSR      190
                SUMB = SUMB + VMXDN(I)                                           PSSR      191
              SUMC=VLNDISG(I)+SUMC                                               REVN       41
275           SUMD=VLNSUCG(I)+SUMD                                               REVN       42
 112            CONTINUE                                                         PSSR      192
                VMXUP(6) = SUMA/5.0                                              PSSR      193
                VMXDN(6) = SUMB/5.0                                              PSSR      194
               VLNDISG(6)=SUMC/5.0                                               REVN       43
280            VLNSUCG(6)=SUMD/5.0                                               REVN       44
         CALCULATE  DP(UPSTR TO INLET MEAS)                                      PSSR      195
                DPUPCAL = RKUP / SVMXUP(6) *VMXUP(6)**2/C1                       PSSR      196
                DPDNCAL = RKDN / SVMXDN(6) *VMXDN(6)**2/C1                       PSSR      197
         CALCULATE  K-VALUES FROM MEASURED   DP-VALUES                           PSSR      198
285      C--                                                                     PSSR      199
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                RKUPMS = RKUP* DPUPTIN(6)/DPUPCAL                                  PSSR      200
              RKDNMS=RKDN*(DPPMP(6)-PMDPIO(6)-DPUPTIN(6))/DPDNCAL                  PMPREV      8
            C--- PROCESS  SEALOT(I) +SEALIN(I) FLOW RATE DATA                      PSSR      202
                SUMO =0.0                                                          PSSR      203
290             SUMI =0.0                                                          PSSR      204
                DO 113  I=1,5                                                      PSSR      205
                SUMO = SUMO + SEALOT(I)                                            PSSR      206
                SUMI = SUMI + SEALIN(I)                                            PSSR      207
 113            CONTINUE                                                           PSSR      208
295         CALCULATE AVERAGE FLOW RATES IN + OUT OF SEAL                          PSSR      209
                SEALOT(6) = SUMO /5.0                                              PSSR      210
                SEAL IN(6) = SUMI /5.0                                             PSSR      211
            CHECK FOR DIRECTION + MAGNITUDE OF NET FLOW                            PSSR      212
                SEALNT= SEALOT(6) -SEALIN(6)                                       PSSR      213
300         C--- PROCESS  TOTWTR(I) + TOTSTM(I) , FLOW RATE DATA                     PSSR      214
                SUMW=0.0                                                           PSSR      215
                SUMS=0.0                                                           PSSR      216
                DO 114 I=1,5                                                       PSSR      217
                SUMW= SUMW + TOTWTR(I)                                             PSSR      218
305             SUMS= SUMS +TOTSTM(I)                                              PSSR      219
 114            CONTINUE                                                           PSSR      220
                TOTWTR(6) = SUMW/5.0                                               PSSR      221
                TOTSTM(6) = SUMS/5.0                                               PSSR      222
                TOTLPFL   = TOTWTR(6) + TOTSTM(6)                                  PSSR      223
310         CALCULATE PERCENT SEAL LEAK FLOW W.R.T TOTAL LOOP-FLOW.                PSSR      224
                PRCNT     = SEALNT /TOTLPFL  *100.0                                PSSR      225
            CHECK * IF PRCNT IS +VE, DESIRABLE * FLOW LEAKS FROM PUMP TO SEAL      PSSR      226
            CHECK * IF PRCNT IS -VE, UNDESIRABLE*FLOW LEAKS FROM SEAL TO PUMP      PSSR      227
            C--                                                                    PSSR      228
315         C--- PROCESS  AECLDP(I) MEASUREMENT DATA                               PSSR      229
            C--PICK THE MAX + MIN VALUES                                           PSSR      230
                DPMAX= AECLDP(1)                                                   PSSR      231
                DPMIN= AECLDP(1)                                                   PSSR      232
                DO 115  I=2,5                                                      PSSR      233
320             DPMAX= AMAX1 ( DPMAX,AECLDP(I))                                    PSSR      234
                DPMIN= AMIN1 ( DPMIN,AECLDP(I))                                    PSSR      235
 115            CONTINUE                                                           PSSR      236
            C--                                                                    PSSR      237
            C--CALCULATE THE AVERAGE VALUE FOR DOWNSTREAM PRESSURE                 WK78363     9
325             SUMP = 0.0                                                         WK78363    10
                DO 126 I = 1,5                                                     WK78363    11
              126 SUMP = SUMP + PDWN(I)                                            WK78363    12
                PDWN(6) = SUMP/5.0                                                 WK78363    13
            C--TOTAL HEAD CALCS FOR REVERSE FLOW                                   REVN       45
330         C---LEG TO LEG GD--                                                    REVN       46
                DHPLLGD =(PDWN(6)+DPPMP(6))*144.0*SVGDUPA(6)-PDWN(6)*144.0*SVGDDNA REVN       47
               1(6)                                                                REVN       48
                VELHGD=  (VLNDISG(6)**2.0-VLNSUCG(6)**2.0)/2./32.2                 REVN       49
                DHTLLGD= DHPLLGD+VELHGD + 1.0                                      REVN       50
335         C-- NORMALIZED TOTAL HEAD,LG TO LG, HTLL(1),HTLL(2)                    REVN       51
                HTLL(1)= DHTLLGD/HEADR                                             REVN       52
            C-- LEG TO LEG ORIFICE                                                 REVN       53
                DHPLLOR =( PDWN(6)+ DPPMP(6))*144.0*SVMXUP(6)                      REVN       54
               1 -PDWN(6)*144.0 *SVMXDN(6)                                         REVN       55
340             VELHOR  =(VMXUP(6)**2.0 -VMXDN(6)**2.0)/2./32.2                    REVN       56
                DHTLLOR =DHPLLOR +VELHOR +1.0                                      REVN       57
                HTLL(2) = DHTLLOR /HEADR                                           REVN       58
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      C-- FLANGE TO FLANGE  GD                                                REVN      59
            DHPFFGD=(PDWN(6)+DPUPTIN(6)+PMDPIO(6))*144.0*SVGDUPA(6)           RM23       2
345         1 - (PDWN(6)+DPUPTIN(6))*144.0*SVGDDNA(6)                         RM23       3
            DHTFFGD = DHPFFGD+ VELHGD +1.0                                    REVN      62
            HTFF(1) = DHTFFGD /HEADR                                          REVN      63
      C-- FLANGE  TO FLANGE  ORIFICE                                          REVN      64
            DHPFFOR= (PDWN(6)+ DPUPTIN(6)+PMDPIO(6))*144.0*SVMXUP(6)          RM23       4
350         1-(PDWN(6)+ DPUPTIN(6))*144.0*SVMXDN(6)                           RM23       5
            DHTFFOR = DHPFFOR +VELHOR +1.0                                    REVN      67
            HTFF(2) = DHTFFOR /HEADR                                          REVN      68
      C--STATIC HEAD ,REVERSE FLOW                                            REVN      69
      C-- LEG TO LEG+ORIFICE                                                  RM19       2
355         HSLL(2) = DHPLLOR/HEADR                                           WK78363   14
      C-- LEG TO LEG ,GD                                                      RM19       4
            HSLL(1) = DHPLLGD/HEADR                                           WK78363   15
      C-- FLANGE TO FLANGE  GD                                                REVN      70
            HSFFGD  = DHPFFGD                                                 WK78363   16
360         HSFF(1) =HSFFGD/HEADR                                             REVN      72
      C-- FLANGE TO FLANGE ,ORIFICE                                           REVN      73
            HSFFOR  = DHPFFOR                                                 WK78363   17
            HSFF(2) =HSFFOR/ HEADR                                            REVN      75
      C--PRINT OUT THE VALUES  DP ETC.,                                       PSSR      238
365         WRITE(6,1030)                                                     PSSR      239
            IF (IDP.NE. 0  )GO TO 116                                         PSSR      240
            DO  117 I=1, 6                                                    PSSR      241
            DPPMP(I) =10000000.0                                              PSSR      242
      117   CONTINUE                                                          PSSR      243
370   116   WRITE (6,1035) DPPMP                                              PSSR      244
            WRITE (6,1040) DIFPR                                              PSSR      245
            WRITE (6,1045) PMDPIO                                             PSSR      246
            WRITE(6,1050)DPIOMLL                                              PSSR      247
            WRITE(6,1055)DPUPTIN                                              PSSR      248
375         WRITE(6,1060)DPUPCAL,RKUP,DPDNCAL,RKDN                            PSSR      249
            WRITE(6,1065)RKUPMS ,RKDNMS                                       PSSR      250
            IF( PRCNT .LE.0.0) GO TO 118                                      PSSR      251
            WRITE (6,1070) PRCNT                                              PSSR      252
            GO TO 119                                                         PSSR      253
380   118   WRITE (6,1075) PRCNT                                              PSSR      254
      119   CONTINUE                                                          PSSR      255
            WRITE (6,1080) DPMAX , DPMIN                                      PSSR      256
      C---- PROCESS  HEAD + TORQUE DATA                                       PSSR      257
            PNH(1)= PH(1)/ HEADR                                              PSSR      258
385         PNH(2)= PH(2)/ HEADR                                              PSSR      259
      C--CALCULATE HYDR.TORQUES* 1-GD, 2-ORIF                                 PSSR      260
            DENA1=2.0/ (SVGDUPA(6)+SVGDDNA(6))                                RM23       6
            DENA2= 2.0/ (SVMXUP(6)+SVMXDN(6))                                 RM23       7
            BTA1= PHYTRQ/TRQR*62.3/DENA1                                      RM10       3
390         BTA2= PHYTRQ/TRQR*62.3/DENA2                                      RM10       4
      C--CALCULATE  BTA (SHAFT TORQE)*                                        PSSR      263
            BTASH2 = BTA2 * PSHTRQ /PHYTRQ                                    PSSR      264
            BTASH1 = BTA1 * PSHTRQ /PHYTRQ                                    PSSR      265
            WRITE( 6,1110)                                                    PSSR      266
395         WRITE( 6,1111) PNH(2), PNH(1)                                     PSSR      267
            WRITE( 6,1112) BTA2, BTA1                                         PSSR      268
            WRITE( 6,1113) BTASH2, BTASH1                                     PSSR      269
            WRITE(6, 1130)                                                    PSSR      270
      CALCULATE HOMOLOGOUS RATIOS*                                            PSSR      271
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400         C-- FIRST CHECK  NU/ALN IS LT OR EQ.1   OR  GT 1.0                  PSSR      272
                  RPM=SPDM                                                     PSSR      273
                  ABR(1)= ABS(RAT1M(1))                                        RM07        2
                  ABR(2)= ABS(RAT1M(2))                                        RM15        3
                  IF((ABR(1).LE.1.0).OR.(ABR(2).LE.1.0)) GO TO 121             PSSR      291
405         C--                                                                PSSR      292
            CALCULATE ALL THE VALUES                                           PSSR      293
                       ISET= 4                                                 PSSR      294
                     ZTA2  = PNH(2)/NUM(2)**2                                  PSSR      295
                     ZTA1  = PNH(1)/NUM(1)**2                                  PSSR      296
410               HSFN2= HSFF(2)/NUM(2)**2                                     REVN       76
                  HSFN1=HSFF(1)/NUM(1)**2                                      REVN       77
                  HTFN2=HTFF(1)/NUM(2)**2                                      REVN       78
                  HTFN1=HTFF(1)/NUM(1)**2                                      REVN       79
                  HTLN2=HTLL(2)/NUM(2)**2                                      REVN       80
415               HTLN1=HTLL(1)/NUM(1)**2                                      REVN       81
                  HSLN2=HSLL(2)/NUM(2)**2                                      RM19        6
                  HSLN1= HSLL(1)/NUM(1)**2                                     RM19        7
                     PSI2  = BTA2 / NUM(2)**2                                  PSSR      297
                     PSI1  = BTA1 / NUM(1)**2                                  PSSR      298
420                      GO TO 122                                             PSSR      299
             121         ISET =2                                               PSSR      300
             122      DELT2 = PNH(2)/ALNM**2                                   PSSR      301
                      DELT1 = PNH(1)/ ALNM**2                                  PSSR      302
                  HSFA2=HSFF(2)/ALNM**2                                        REVN       82
425               HSFA1=HSFF(1)/ALNM**2                                        REVN       83
                  HTFA2=HTFF(2)/ALNM**2                                        REVN       84
                  HTFA1=HTFF(1)/ALNM**2                                        REVN       85
                  HTLA2=HTLL(2)/ALNM**2                                        REVN       86
                  HTLA1=HTLL(1)/ALNM**2                                        REVN       87
430               HSLA2= HSLL(2)/ALNM**2                                       RM19        8
                  HSLA1= HSLL(1)/ALNM**2                                       RM19        9
            C--                                                                PSSR      303
                     EPS2  = BTA2 / ALNM**2                                    PSSR      304
                     EPS1  = BTA1 / ALNM**2                                    PSSR      305
435         C--                                                                PSSR      306
                     IF (ISET .EQ. 4) GO TO 123                                PSSR      307
            C-- NU/ALN  IS.LE.1 .. WRITE ONLY TWO SETS OF VALUES               PSSR      308
                  WRITE(6,1120) RAT1M(2), BLNK                                 RM15        4
                   WRITE(6, 1121)                                              PSSR      310
440               WRITE(6,1122) DELT2,DELT1                                    RM07        4
                   WRITE(6,1123)                                               PSSR      312
                  WRITE(6,1124) EPS2,EPS1                                      RM07        5
                   WRITE(6,1125)                                               PSSR      314
                         GO TO 124                                             PSSR      315
445          123         CONTINUE                                              PSSR      316
            C-- NU/ALN IS.GT. 1.0. WRITE OUT ALL HOMOLOGOUS RATIOS             PSSR      317
                  WRITE(6,1126) RAT1M(2), BLNK                                 RM15        5
                  WRITE(6,1127) OBRAT1M(2), BLNK                               RM15        6
                  WRITE(6,1128) DELT2,DELT1                                    RM07        6
450               WRITE(6,1129) ZTA2,ZTA1                                      RM07        7
                  WRITE(6,1131) EPS2,EPS1                                      RM07        8
                  WRITE(6,1132) PSI2,PSI1                                      RM07        9
            124      CONTINUE                                                  PSSR      324
            CALCULATE EFFICIENCIES INPERCENT                                   REVN       88
455               EFM= PHYTRQ/PSHTRQ                                           REVN       89
                  EFH2=.84355*NUM(2)/ALNM*(PNH(2)+(1.0/252.0))/BTA2            WK78363    18
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      EFH1=.84355*NUM(1)/ALNM*(PNH(1)+(1.0/252.0))/BTA1                  WK78363   19
      SIGN= PHYTRQ*TRQFM                                                 REVN      92
      IF(SIGN.GT.0.0) GO TO 960                                          REVN      93
460   EFM= 1.0/EFM                                                       REVN      94
      EFH2= 1.0/EFH2                                                     REVN      95
      EFH1= 1.0/ EFH1                                                    REVN      96
 960  CONTINUE                                                           REVN      97
      EFTOT2= EFM* EFH2 *100.0                                           REVN      98
465   EFTOT1=EFM*EFH1 *100.0                                             REVN      99
      EFM= EFM*100.0                                                     REVN     100
      EFH2= EFH2* 100.0                                                  REVN     101
      EFH1= EFH1* 100.0                                                  REVN     102
CWRITE THE TOTAL AND STATIC HEADS....                                    REVN     103
470   WRITE(6,1001)                                                      REVN     104
      WRITE(6,951)HTLL(2), HTLL(1), HTFF(2), HTFF(1)                     REVN     105
 951  FORMAT(1H ,*NORMALIZED TOTAL+STATIC HEADS USING LOCAL DENSITIES*/  RM19      10
     11H , *-------------------------------------------------------*/    RM19      11
     2       1H ,*                        LEG TO LEG         FLNG TO FLNG*/  REVN     108
475  3       1H ,*                      ORIF (OR GD )       ORIF (OR GD )*/  REVN     109
     4       1H ,*HT*,14X, F6.3, *(*, F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)    REVN     110
      WRITE(6,952) HSLL(2),HSLL(1),HSFF(2),HSFF(1)                       RM19      12
 952  FORMAT(1H ,*HS*,14X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)     REVN     112
CWRITE THE HOMOLOGOUS RATIOS BASED ON TOT + STAT HEADS FOR LL + FF       REVN     113
480   IF( ISET. EQ. 4) GO TO 923                                         REVN     114
C--NU/ALN IS LE 1.0, WRITE ONLY TWO SETS                                 REVN     115
      WRITE( 6,953) HTLA2, HTLA1, HTFA2, HTFA1                           REVN     116
 953  FORMAT(1H ,*HOMOLOGOUS RATIOS BASED ON TOT + STAT HEADS*/          REVN     117
     1       1H ,42(*-*),/                                              REVN     118
485  2       1H ,*HT/ALN2*,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)  REVN     119
      WRITE(6,954)HSLA2,HSLA1,HSFA2,HSFA1                                RM19      13
 954  FORMAT(1H ,*HS/ALN2*,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)  REVN     121
      GO TO 924                                                          REVN     122
 923  WRITE(6,953) HTLA2,HTLA1,HTFA2,HTFA1                               REVN     123
490   WRITE(6,956) HTLN2,HTLN1,HTFN2,HTFN1                               REVN     124
      WRITE(6,957)HSLA2,HSLA1,HSFA2,HSFA1                                RM19      14
      WRITE(6,958)HSLN2,HSLN1,HSFN2,HSFN1                                RM19      15
 955  FORMAT(1H ,*HT/ALN2*,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)  REVN     127
 956  FORMAT(1H ,*HT/NU2 *,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)  REVN     128
495  957  FORMAT(1H ,*HS/ALN2*,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,/)  REVN     129
 958  FORMAT(1H ,*HS/NU2 *,9X,F6.3,*(*,F6.3,*)*,5X,F6.3,*(*,F6.3,*)*,//)  REVN     130
CWRITE OUT THE EFFICIENCIES                                              REVN     131
CWRITE OUT THE EFFICIENCIES                                              REVN     132
 924   CONTINUE                                                          REVN     133
500   IF(SIGN.LT.0.0) GO TO 925                                          REVN     134
      SUBPRD= SIGN* EFH2                                                 REVN     135
      IF(SUBPRD. LT. 0.0) GO TO 926                                      REVN     136
      WRITE( 6,980)                                                      REVN     137
 980  FORMAT(1H ,*EFFICIENCIES (PUMPING)*/ 1H ,24(*-*))                  REVN     138
505   GO TO 927                                                          REVN     139
 926  CONTINUE                                                           REVN     140
      WRITE(6,981)                                                       REVN     141
 981  FORMAT(1H ,*EFFICIENCIES (PUMPING DISSIPATION)*/ 1H ,34(*-*))      REVN     142
      GO TO 927                                                          REVN     143
510   925  SUBPRD= SIGN* EFM                                             REVN     144
      IF(SUBPRD.LT.0.0) GO TO 928                                        REVN     145
      WRITE( 6,982)                                                      REVN     146
 982  FORMAT(1H ,*EFFICIENCIES (TURBINING DISSIPATION)*/1H ,34(*-*))     REVN     147
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            GO TO 927                                                        REVN      148
        928 WRITE( 6,983)                                                    REVN      149
        983 FORMAT( 1H ,*EFFICIENCIES (TURBINING)*/ 1H ,24(*-*))             REVN      150
        927 CONTINUE                                                         REVN      151
            WRITE(6,959)EFM,EFH2,EFH1,EFTOT2,EFTOT1                          REVN      152
        959 FORMAT(1H ,*MECHANICAL    HYDRAULIC           TOTAL*,/           REVN      153
           1        1H ,1X,F7.2,3X,F7.2,*(*,F7.2,*)*,2X,F7.2,*(*,F7.2,*)*,/) WK78363    20
      C--                                                                    PSSR      325
            MPRM=PRM                                                         RM28        1
            IF((PRM-MPRM).GE.0.5) MPRM= MPRM+1                               RM28        2
            IF(ABS(RAT1M(2)).LT.1.0) GO TO 7500                              REVN      155
            WRITE(20,7000)NT,DATE,TYPE,MPRM,ALFM(2),DPPMP(6),PMDPIO(6) ,     RM28        3
           1              DPUPTIN(6),NUM(2),ALNM, RAT1M(2),OBRAT1M(2),       REVN      157
           2 PNH(2),BTA2,DELT2,ZTA2,EPS2,PSI2,DENUP                          RM23        8
            GO TO 7501                                                       REVN      159
       7500 WRITE(20,7001)NT,DATE,TYPE,MPRM,ALFM(2),DPPMP(6),PMDPIO(6) ,     RM28        4
           1  DPUPTIN(6), NUM(2),ALNM, RAT1M(2), OBRAT1M(2),                 RM23        9
           2 PNH(2),BTA2,DELT2,BLNK,EPS2,BLNK,DENUP                          RM23       10
       7501 CONTINUE                                                         REVN      163
       7001  FORMAT(1X,I4,3I2,A3,I5  ,F7.3,3(F7.2),7(F7.3),A7,F7.3,A7,F7.3)  RM28        5
       7000  FORMAT(1X,I4,3I2,A3,I5  ,F7.3,3(F7.2),11(F7.3))                 RM28        6
      C                                                                      REVN      166
             DO 125 I=1,6                                                    PSSR      326
             DPPMP(I)=0.0                                                    PSSR      327
             PDWN(I) =0.0                                                    PSSR      328
             PUPS(I) =0.0                                                    PSSR      329
             PMDPIO(I)=0.0                                                   PSSR      330
             DPUPTIN(I)=0.0                                                  PSSR      331
             SVMXUP(I) =0.0                                                  PSSR      332
             SVMXDN(I) =0.0                                                  PSSR      333
             SVGDUPA(I)=0.0                                                  PSSR      334
             SVGDDNA(I)=0.0                                                  PSSR      335
            VMXUP(I)=0.0                                                     PSSR      336
            VMXDN(I)= 0.0                                                    PSSR      337
             SEALOT(I)= 0.0                                                  PSSR      338
             SEALIN(I)= 0.0                                                  PSSR      339
             TOTWTR(I)= 0.0                                                  PSSR      340
             TOTSTM(I) = 0.0                                                 PSSR      341
             AECLDP(I)=0.0                                                   PSSR      342
        125  CONTINUE                                                        PSSR      343
            IF(NT.EQ.NTHI) GO TO 9800                                        RMRV       64
      10000 CONTINUE                                                         RMRV       65
            GO TO 9800                                                       RMRV       66
       9100 FORMAT( 2 I5)                                                    RMRV       67
        110    FORMAT( I5, A10, A5  )                                        PSSR      345
        120    FORMAT(4F10.4)                                                PSSR      346
        130    FORMAT(6F10.4)                                                PSSR      347
      C***                                                                   PSSR      348
        136    FORMAT( I5)                                                   PSSR      349
       1005 FORMAT(2X,*TEST NO.*,2X,I4,*   DATE  *,2(I2,*/*),I2)             RM24        1
      C                                                                      RMP        50
        1   FORMAT(1X,2F10.3)                                                RMRV       68
      6010  FORMAT(1X,4I10  )                                                RMRV       69
      6011  FORMAT(1X,2F10.3)                                                RMRV       70
      6012  FORMAT(1X,F10.3 )                                                RMRV       71
      6016  FORMAT(1X,5F11.3)                                                RMRV       72
      6017  FORMAT(1X,2F8.2 )                                                RMRV       73
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      6018  FORMAT(1X,5F8.5 )                                                  RMRV      74
      9009  FORMAT(1X,I3    )                                                  RMRV      75
       1010  FORMAT( 1H,5X,*OP.PARAMETERS*,3X,*P(PSIA)*, 5X,*ALF*,8X,*NU*,     PSSR     351
          1 7X, *ALN*, 5X,*NU/ALN*, 4X,*ALN/NU*,/1H,83(*-*))                   PSSR     352
575    1015 FORMAT(1H,5X,*   SET POINT*,4X,F6.1,5(4X,F6.3))                   PSSR     353
       1020 FORMAT(1H,5X,*  MEAS.POINT*, /1H,15X,*GD*,4X,                     RM15       7
          1 F6.1, 4X,F6.3,3X,A7,4X,F6.3,3X,A7,3X,A7)                           RM15       8
       1025 FORMAT(1H,5X,*         ORIF*,4X,F6.1,5(4X,F6.3),//)                PSSR     356
       C--                                                                     PSSR     357
580     135     FORMAT(5F10.4)                                                 PSSR     358
        140     FORMAT(5F10.5)                                                 PSSR     359
        145     FORMAT(5F10.2)                                                 PSSR     360
       C--                                                                     PSSR     361
       1030 FORMAT(1H,5X,*   POINT NO.*, 6X,*1*,  9X, *2*,  9X,*3*,  9X, *4*, PSSR     362
585       1   9X, *5*, 8X, *AVE* ,/1H,*PUMP DP LG-LG,PSI*)                     PSSR     363
       1035  FORMAT(1H,4X,*PER DP SENSOR*, 6F10.3)                            PSSR     364
       1040  FORMAT(1H ,  *PER P(DIS)-P(SUC)*,6F10.3)                         REVN     167
       1045  FORMAT(1H,2X ,*PUMP DP(IN-OUT)*, 6F10.3)                         PSSR     366
       1050  FORMAT(1H,*DP(IN-OUT)-DP(LL)*,6F10.3)                            PSSR     367
590    1055  FORMAT(1H ,  *DP MEA(IN-SUC.LG)*,6F10.3,/)                       REVN     168
       1060  FORMAT(1H ,  *CALC.DP(IN-SUC.LG)....=*,F7.3,* FOR K-SUCT=*,F6.3,/ REVN     169
          1       1H ,  *CALC.DP(DIS.LG-OUT)...=*,F7.3,* FOR K-DISCH=*,F6.3,  REVN     170
          2//)                                                                 REVN     171
       1065  FORMAT(1H ,  *K-SUCT FROM MEAS.DP(IN-SUC.LG)....   =*,F7.3,/      REVN     172
595       1       1H ,  *K-DISCH FROM MEAS.DP(LL)-DP(IN-OUT)-DP(IN-SUC.LG)=*, REVN     173
          2       F7.3,//)                                                     REVN     174
       C                                                                       REVN     175
       1070  FORMAT(1H,*SEAL INJ FLOW* ,2X,*OUT GREATER THAN IN--(DESIRABLE)*, PSSR     374
          1 3X,*BY*F8.3,*PRCNT OF LOOP FLOW*,/)                                PMPREV    16
600    1075  FORMAT(1H,*SEAL INJ FLOW* ,2X,*OUT LESS THAN IN--(UNDESIRABLE)*,  PSSR     376
          1 3X,*BY*,F7.3,1X,*PRCNT OF LOOP FLOW*,/)                            REV5       6
       1080  FORMAT(1H,*AECL DP*,20X,F8.3,*MAX  TO  *,F8.3,*MIN*,//  ,         PSSR     378
          1 1H,80(*-*))                                                        PSSR     379
       CALCULATE NORMALIZED HEAD + TORQUE                                      PSSR     380
605     1110  FORMAT(1H,*NORMALIZED*,16X,*TEST*,14X,*B-J MAP*,/                PSSR     381
          1 1H,*PARAMETER*, 14X, *ORIF(OR GD)*,/                               PSSR     382
          2 1H,*----------*, 10X,*--------------*,7X,*-------------*,/)        PSSR     383
        1111 FORMAT(1H,*H(HEAD)*, 14X, F6.3,*(*, F6.3,*)*,//)                  PSSR     384
        1112 FORMAT( 1H,*BTAH(HYD.TRQ)*, 8X, F6.3,*(*, F6.3,*)*,)              PSSR     385
610     1113 FORMAT( 1H,*BTAS(SHAFT TRQ)*, 6X, F6.3,*(*, F6.3,*)*,//)          PSSR     386
        1130 FORMAT(1H ,*HOMOL.*,9X,*TEST*/                                    RM07      12
          1      1H ,*RATIOS*,6X,*ORIF(OR GD)*/                               RM07      13
          2      1H ,*-------*,3X,16(*-*))                                    RM07      14
       C WRITE THIS WHEN NU/ALN IS LE 1.0                                      PSSR     390
615     1120 FORMAT(1H,*NU/ALN*,3X,F7.3,*(*,A7,*)*,/)                          RM15       9
        1121  FORMAT( 1H,*ALN/NU*//)                                          PSSR     392
        1122 FORMAT(1H ,*H/ALN2*3X,F7.3,*(*,F7.3,*)* )                         RM07      15
        1123  FORMAT(1H,*H/NU2*//)                                            PSSR     394
        1124 FORMAT(1H ,*BTAH/ALN2*,F7.3,*(*,F7.3,*)* )                        RM07      16
620     1125   FORMAT( 1H,*BTAH/NU2*//)                                        PSSR     396
       C                                                                       PSSR     397
       C WRITE THIS (ALL) WHEN NU/ ALN IS GT 1.0                               PSSR     398
        1126 FORMAT(1H,*NU/ALN*,3X,F7.3,*(*,A7,*)*,/)                          RM15      10
        1127 FORMAT(1H,*ALN/NU*,3X,F7.3,*(*,A7,*)*,/)                          RM15      11
625     1128 FORMAT(1H0,*H/ALN2*,3X,F7.3,*(*,F7.3,*)* )                        RM07      17
        1129 FORMAT(1H ,*H/NU2*,4X,F7.3,*(*,F7.3,*)*/)                         RM07      18
        1131 FORMAT(1H0,*BTAH/ALN2*,F7.3,*(*,F7.3,*)* )                        RM07      19
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 1132 FORMAT(1H ,*BTAH/NU2*,1X,F7.3,*(*,F7.3,*)*/ )                      RM07     20
C                                                                       PSSR    405
C--                                                                     PSSR    406
150    FORMAT(4F10.3)                                                   PSSR    407
C--                                                                     PSSR    408
 1001  FORMAT( 1H1,20X,*REVIEW OF STEADY STATE DATA FOR*,/               PSSR    409
     1  1H ,28X,*CE/EPRI PUMP TESTS      */                           REV5      7
     2 1H ,30X,*(REVERSE FLOW)*,/)                                      REV5      8
C--                                                                     PSSR    411
C--                                                                     PSSR    412
C--                                                                     PSSR    413
 700   FORMAT(1H ,6F13.5)                                               PSSR    414
 703  FORMAT(1H ,F13.5,6X,A7,4F13.5)                                    RM15     12
 601  FORMAT(1H ,  *INPUT DATA---*/)                                    PSSR    415
 602  FORMAT(1H ,  *SET POINT DATA=*/                                   PSSR    416
     1       1H ,  *   PRS          FLWS          SPDS          ALFS*/ PSSR    417
     2       1H ,  *   PSIA         GPM           RPM * )              PSSR    418
 603  FORMAT(1H ,  *MEAS.POINT DATA=*/                                  PSSR    419
     1       1H ,  *   PRSM         FLWM(1)       FLWM(2)       SPDM   PSSR    420
     2      ALFM(1)      ALFM(2) * )                                    PSSR    421
 604  FORMAT(1H ,  *CONTROL VARIABLE  =*,I5/                            PSSR    422
     1       1H ,  *POINT    1            2            3            4   PSSR    423
     2         5*/)                                                    PSSR    424
 605   FORMAT(1H ,  *DPPMP(I),FROM NORM SUCT TO NORM DISCH*)            REVN    176
 606   FORMAT(1H ,  *NORM SUCT + DISCH LEG PRES(PSIA),PDWN(I),PUPS(I)*) REVN    177
 608   FORMAT(1H ,  *PUMP DP(NORM SUCT-NORM DISCH),PMDPIO(I)*)          REVN    178
 609   FORMAT(1H ,  *FROM SUCTION FLNG TO SUCTION LEG,DPUPTIN(I)*)      RM23     13
 610   FORMAT(1H ,  *SP.VOL MIXING TEE,NORM DISCH(CFT/LBM),SVMXUP(I)*)  REVN    180
 611   FORMAT(1H ,  *SP.VOL MIXING TEE,NORM SUCT,SVMXDN(I)*)            REVN    181
 612   FORMAT(1H ,  *SP.VOL AT NORM DISCH,AVERAGE FROM GD,SVGDUPA(I)*)  REVN    182
 801   FORMAT(1H ,  *SP.VOL AT NORM DISCH,FROM GD1, SVGDUPA(I)*)        REVN    183
 802   FORMAT(1H ,  *SP.VOL AT NORM DISCH,FROM GD2, SVGDUPA(I)*)        REVN    184
 803   FORMAT(1H ,  *SP.VOL AT NORM DISCH,FROM GD3, SVGDUPA(I)*)        REVN    185
 901   FORMAT(1H ,  *SP.VOL AT NORM SUCT,FROM GD1, SVGDDNA(I)*)         REVN    186
 902   FORMAT(1H ,  *SP.VOL AT NORM SUCT,FROM GD2, SVGDDNA(I)*)         REVN    187
 903   FORMAT(1H ,  *SP.VOL AT NORM SUCT,FROM GD3, SVGDDNA(I)*)         REVN    188
 613   FORMAT(1H ,  *SP.VOL AT NORM SUCT,AVERAGE FROM GD,SVGDDNA(I)*)   REVN    189
 614   FORMAT(1H ,  *VELOCITY MIXING TEE,NORM DISCHARE(FT/SEC),VMXUP(I)*) REVN  190
 615   FORMAT(1H ,  *VELOCITY MIXING TEE,NORM SUCT,VMXDN(I)*)           REVN    191
 616    FORMAT(1H ,*SEAL INJ OUT FLOW RATE(PPS),SEALOT(I)*)             RMRV     76
 617    FORMAT(1H ,*SEAL INJ IN  FLOW RATE(PPS),SEALIN(I)*)             RMRV     77
 618    FORMAT(1H ,*TOT WATER FLOW RATE IN LOOP(PPS),TOTWTR(I)*)        RMRV     78
 619   FORMAT(1H ,*TOT STM FLOW RATE IN LOOP(PPS),TOTSTM(I)*)           RMRV     79
 620   FORMAT(1H ,  *AECL DP MEASUREMENTS*)                             PSSR    439
 621   FORMAT(1H ,  *PUMP TORQUE AND HEAD DATA*/                        PSSR    440
     1       1H ,  *    PHYTRQ        PSHTRQ        PH(1)         PH(2)*/ PSSR  441
     2       1H ,  *    (FTLB)        (FTLB)        (FT)          (FT)*)  PSSR  442
 800  FORMAT(1H0,      *NOTE.....FOR THE VARIABLES WITH DEMENSION LENGTH PSSR    443
     1 2, 1-REFERS TO GD MEAS.*/1H ,52X,*2-REFERS TO ORIF.*)            PSSR    444
C--                                                                     PSSR    445
 501     STOP                                                           PMPREV   18
         END                                                            PSSR    446
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CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

37 I 9998 THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.
109 I 9999 THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS DEF LINE REFERENCES
132 PSSR 2

VARIABLES SN TYPE RELOCATION

4763	ABR	REAL	ARRAY	REFS	4	2*404	DEFINED	402	403		
4746	AECLDP	REAL	ARRAY	REFS	4	178	317	318	320	321	
				DEFINED	70	552					
4572	ALFM	REAL	ARRAY	REFS	4	130	210	211	525	529	
				DEFINED	50	51					
4432	ALFS	REAL		REFS	128	209	DEFINED	50			
4454	ALNM	REAL		REFS	198	201	202	210	211	422	423
				424	425	426	427	428	429	430	431
				433	434	456	457	525	529		
				DEFINED	197	198					
4451	ALNS	REAL		REFS	190	191	193	209	DEFINED	189	190
1711	BLNK	REAL		REFS	130	3*210	438	447	448	2*529	
				DEFINED	14						
4523	BTASH1	REAL		REFS	397	DEFINED	393				
4522	BTASH2	REAL		REFS	397	DEFINED	392				
4520	BTA1	REAL		REFS	393	396	419	434	457		
				DEFINED	389						
4521	BTA2	REAL		REFS	392	396	418	433	456	525	529
				DEFINED	390						
1720	C1	REAL		REFS	282	283	DEFINED	16			
4756	DATE	INTEGER	ARRAY	REFS	4	11	126	207	525	529	
				DEFINED	25						
4543	DELT1	REAL		REFS	440	449	DEFINED	423			
4542	DELT2	REAL		REFS	440	449	525	529	DEFINED	422	
4516	DENA1	REAL		REFS	389	DEFINED	387				
4517	DENA2	REAL		REFS	390	DEFINED	388				
4463	DENUP	REAL		REFS	525	529	DEFINED	264			
5033	DGD1	REAL	ARRAY	REFS	4	157	DEFINED	81			
5041	DGD2	REAL	ARRAY	REFS	4	113	158	DEFINED	82		
5047	DGD3	REAL	ARRAY	REFS	4	159	DEFINED	83			
4510	DHPFFGD	REAL		REFS	346	359	DEFINED	344			
4512	DHPFFOR	REAL		REFS	351	362	DEFINED	349			
4502	DHPLLGD	REAL		REFS	334	357	DEFINED	331			
4505	DHPLLOR	REAL		REFS	341	355	DEFINED	338			
4511	DHTFFGD	REAL		REFS	347	DEFINED	346				
4513	DHTFFOR	REAL		REFS	352	DEFINED	351				
4504	DHTLLGD	REAL		REFS	336	DEFINED	334				
4507	DHTLLOR	REAL		REFS	342	DEFINED	341				
4456	DIF	REAL		REFS	226	227	DEFINED	223	226		
4622	DIFPR	REAL	ARRAY	REFS	4	226	239	240	371		
				DEFINED	225	227					
4465	DPDNCAL	REAL		REFS	287	375	DEFINED	283			
4636	DPIOMLL	REAL	ARRAY	REFS	4	373	DEFINED	235	239	240	242

VARIABLES	SN	TYPE	RELOCATION								
4477	DPMAX	REAL		REFS	320	382	DEFINED	317	320		
4500	DPMIN	REAL		REFS	321	382	DEFINED	318	321		
4600	DPPMP	REAL	ARRAY	REFS	4	133	217	235	242	287	331
				338	370	525	529	DEFINED	78	219	368
				537							
4464	DPUPCAL	REAL		REFS	286	375	DEFINED	282			
4644	DPUPTIN	REAL	ARRAY	REFS	4	142	247	286	287	2*344	2*349
				374	525	529	DEFINED	68	248	541	
4445	DUM1	* REAL		DEFINED	108						
4446	DUM2	* REAL		DEFINED	108						
4425	DUM3	* REAL		DEFINED	36						
4426	DUM4	* REAL		DEFINED	36						
4560	EFH1	REAL		REFS	462	465	468	518	DEFINED	457	462
				468							
4557	EFH2	REAL		REFS	461	464	467	501	518		
				DEFINED	456	461	467				
4556	EFM	REAL		REFS	460	464	465	466	510	518	
				DEFINED	455	460	466				
4563	EFTOT1	REAL		REFS	518	DEFINED	465				
4562	EFTOT2	REAL		REFS	518	DEFINED	464				
4555	EPS1	REAL		REFS	442	451	DEFINED	434			
4554	EPS2	REAL		REFS	442	451	525	529	DEFINED	433	
4570	FLWM	REAL	ARRAY	REFS	4	117	130	195	196		
				DEFINED	49	117					
1713	FLWR	REAL		REFS	188	195	196	DEFINED	15		
4431	FLWS	REAL		REFS	128	188	DEFINED	49			
1715	HEADR	REAL		REFS	336	342	347	352	355	357	360
				363	384	385	DEFINED	15			
4545	HSFA1	REAL		REFS	486	491	DEFINED	425			
4544	HSFA2	REAL		REFS	486	491	DEFINED	424			
5005	HSFF	REAL	ARRAY	REFS	4	410	411	424	425	2*477	
				DEFINED	360	363					
4514	HSFFGD	REAL		REFS	360	DEFINED	359				
4515	HSFFOR	REAL		REFS	363	DEFINED	362				
4531	HSFN1	REAL		REFS	492	DEFINED	411				
4530	HSFN2	REAL		REFS	492	DEFINED	410				
4553	HSLA1	REAL		REFS	486	491	DEFINED	431			
4552	HSLA2	REAL		REFS	486	491	DEFINED	430			
5007	HSLL	REAL	ARRAY	REFS	4	416	417	430	431	2*477	
				DEFINED	355	357					
4537	HSLN1	REAL		REFS	492	DEFINED	417				
4536	HSLN2	REAL		REFS	492	DEFINED	416				
4547	HTFA1	REAL		REFS	482	489	DEFINED	427			
4546	HTFA2	REAL		REFS	482	489	DEFINED	426			
5003	HTFF	REAL	ARRAY	REFS	4	412	413	426	427	2*471	
				DEFINED	347	352					
4533	HTFN1	REAL		REFS	490	DEFINED	413				
4532	HTFN2	REAL		REFS	490	DEFINED	412				
4551	HTLA1	REAL		REFS	482	489	DEFINED	429			
4550	HTLA2	REAL		REFS	482	489	DEFINED	428			
5001	HTLL	REAL	ARRAY	REFS	4	414	415	428	429	2*471	
				DEFINED	336	342					
4535	HTLN1	REAL		REFS	490	DEFINED	415				
4534	HTLN2	REAL		REFS	490	DEFINED	414				
4444	I	INTEGER		REFS	64	66	68	70	72	73	74
				75	76	78	79	80	81	82	83
				84	85	86	88	89	90	91	2*112

VARIABLES	SN	TYPE	RELOCATION							
				2*113	217	3*225	226	231	3*235	3*239	247
				255	256	257	258	272	273	274	275
				292	293	304	305	320	321	327	368
				537	538	539	540	541	542	543	544
				545	546	547	548	549	550	551	552
				DEFINED	64	66	68	70	72	73	74
				75	76	78	79	80	81	82	83
				84	85	86	88	89	90	91	111
				216	224	230	234	238	246	254	271
				291	303	319	326	367	536		
4447	IDP	INTEGER		REFS	131	213	233	366	DEFINED	118	
4450	IGD	INTEGER		REFS	151	152	153	154	160	161	162
				163	DEFINED	147	148	149	150	156	157
				158	159						
4424	IMM	INTEGER		REFS	31	DEFINED	28	30			
4525	ISET	INTEGER		REFS	436	480	DEFINED	407	421		
4422	JJ	* INTEGER		DEFINED	24						
4565	MPRM	INTEGER		REFS	2*523	525	529	DEFINED	522	523	
4423	NT	INTEGER		REFS	2*34	126	207	525	529	554	
				DEFINED	25						
4421	NTHI	INTEGER		REFS	21	34	554	DEFINED	19	23	
4420	NTLO	INTEGER		REFS	20	21	34	DEFINED	19	22	
4566	NUM	REAL	ARRAY	REFS	4	12	199	200	201	202	211
				408	409	410	411	412	413	414	415
				416	417	418	419	456	457	525	529
				DEFINED	195	196	199	200			
4417	NUS	REAL		REFS	12	191	192	193	209		
				DEFINED	188	192					
4576	OBRAT1M	REAL	ARRAY	REFS	4	211	448	525	529		
				DEFINED	203	204					
4453	OBRAT1S	REAL		REFS	209	DEFINED	193				
4606	PDWN	REAL	ARRAY	REFS	4	137	225	327	2*331	2*338	2*344
				2*349	DEFINED	64	328	538			
4761	PH	REAL	ARRAY	REFS	4	180	384	385	DEFINED	53	54
4435	PHYTRQ	REAL		REFS	180	389	390	392	393	455	458
				DEFINED	56						
4630	PMDPID	REAL	ARRAY	REFS	4	140	231	235	239	240	242
				287	344	349	372	525	529		
				DEFINED	72	232	540				
4754	PNH	REAL	ARRAY	REFS	4	2*395	408	409	422	423	456
				457	525	529	DEFINED	384	385		
4476	PRCNT	REAL		REFS	377	378	380	DEFINED	311		
4430	PRM	REAL		REFS	130	210	211	522	523		
				DEFINED	48						
4427	PRS	REAL		REFS	128	209	DEFINED	48			
4437	PSHTRQ	REAL		REFS	180	392	393	455	DEFINED	58	
4541	PSI1	REAL		REFS	452	DEFINED	419				
4540	PSI2	REAL		REFS	452	525	DEFINED	418			
4614	PUPS	REAL	ARRAY	REFS	4	138	225	DEFINED	66	539	
4574	RAT1M	REAL	ARRAY	REFS	4	203	204	211	402	403	438
				447	524	525	529	DEFINED	201	202	
4452	RAT1S	REAL		REFS	209	DEFINED	191				
1717	RKDN	REAL		REFS	283	287	375	DEFINED	16		
4467	RKDNMS	REAL		REFS	376	DEFINED	287				
1716	RKUP	REAL		REFS	282	286	375	DEFINED	16		
4466	RKUPMS	REAL		REFS	376	DEFINED	286				
4524	RPM	* REAL		DEFINED	401						

VARIABLES		SN	TYPE	RELOCATION								
4724	SEALIN		REAL	ARRAY	REFS	4	172	293	299	DEFINED	75	297
					549							
4472	SEALNT		REAL		REFS	311	DEFINED	299				
4716	SEALOT		REAL	ARRAY	REFS	4	170	292	299	DEFINED	76	296
					548							
4561	SIGN		REAL		REFS	459	500	501	510	DEFINED	458	
4434	SPDM		REAL		REFS	130	197	401	DEFINED	52		
1712	SPDR		REAL		REFS	189	197	DEFINED	15			
4433	SPDS		REAL		REFS	128	189	DEFINED	52			
4564	SUBPRD		REAL		REFS	502	511	DEFINED	501	510		
4455	SUM		REAL		REFS	217	219	231	232	247	248	
					DEFINED	215	217	229	231	245	247	
4457	SUMA		REAL		REFS	255	260	272	277	DEFINED	250	255
					267	272						
4460	SUMB		REAL		REFS	256	261	273	278	DEFINED	251	256
					268	273						
4461	SUMC		REAL		REFS	257	262	274	279	DEFINED	252	257
					269	274						
4462	SUMD		REAL		REFS	258	263	275	280	DEFINED	253	258
					270	275						
4471	SUMI		REAL		REFS	293	297	DEFINED	290	293		
4470	SUMO		REAL		REFS	292	296	DEFINED	289	292		
4501	SUMP		REAL		REFS	327	328	DEFINED	325	327		
4474	SUMS		REAL		REFS	305	308	DEFINED	302	305		
4473	SUMW		REAL		REFS	304	307	DEFINED	301	304		
4674	SVGDDNA		REAL	ARRAY	REFS	4	157	158	159	164	258	331
					344	387	DEFINED	113	263	545		
4666	SVGDUPA		REAL	ARRAY	REFS	4	148	149	150	155	257	331
					344	387	DEFINED	112	262	544		
4660	SVMXDN		REAL	ARRAY	REFS	4	146	256	283	338	349	388
					DEFINED	79	261	543				
4652	SVMXUP		REAL	ARRAY	REFS	4	144	255	264	282	338	349
					388	DEFINED	80	260	542			
4440	SV1	*	REAL		DEFINED	61						
4441	SV2	*	REAL		DEFINED	61						
4442	SV3	*	REAL		DEFINED	62						
4443	SV4	*	REAL		DEFINED	62						
4475	TOTLPFL		REAL		REFS	311	DEFINED	309				
4740	TOTSTM		REAL	ARRAY	REFS	4	176	305	309	DEFINED	74	308
					551							
4732	TOTWTR		REAL	ARRAY	REFS	4	174	304	309	DEFINED	73	307
					550							
4436	TRQFM		REAL		REFS	458	DEFINED	57				
1714	TRQR		REAL		REFS	389	390	DEFINED	15			
1710	TYPE		REAL		REFS	525	529	DEFINED	13			
5011	UGD1		REAL	ARRAY	REFS	4	148	DEFINED	84			
5017	UGD2		REAL	ARRAY	REFS	4	112	149	DEFINED	85		
5025	UGD3		REAL	ARRAY	REFS	4	150	DEFINED	86			
4503	VELHGD		REAL		REFS	334	346	DEFINED	333			
4506	VELHOR		REAL		REFS	341	351	DEFINED	340			
4765	VLNDISG		REAL	ARRAY	REFS	4	274	333	DEFINED	91	279	
4773	VLNSUCG		REAL	ARRAY	REFS	4	275	333	DEFINED	90	280	
4710	VMXDN		REAL	ARRAY	REFS	4	168	273	283	340		
					DEFINED	88	278	547				
4702	VMXUP		REAL	ARRAY	REFS	4	166	272	282	340		
					DEFINED	89	277	546				
4527	ZTA1		REAL		REFS	450	DEFINED	409				

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VARIABLES      SN  TYPE            RELOCATION
 4526  ZTA2        REAL                          REFS      450      525   DEFINED      408

FILE NAMES          MODE
    0  INPUT
   20  OUTPUT
   40  TAPE10       FMT            READS      25       30       36       48       49       50       51       52
                                      53      54       56       57       58       61       62       64       66
                                      68      70       72       73       74       75       76       78       79
                                      80      81       82       83       84       85       86       88       89
                                      90      91      108   MOTION       18
   60  TAPE20       FMT           WRITES     525      529
  100  TAPE21
    0  TAPE5        FMT            READS      19
   20  TAPE6        FMT           WRITES     124      125      126      127      128      129      130      132
                                     133     136      137      138      139      140      141      142      143
                                     144     145      146      151      152      153      154      155      160
                                     161     162      163      164      165      166      167      168      169
                                     170     171      172      173      174      175      176      177      178
                                     179     180      181      182      206      207      208      209      210
                                     211     365      370      371      372      373      374      375      376
                                     378     380      382      394      395      396      397      398      438
                                     439     440      441      442      443      447      448      449      450
                                     451     452      470      471      477      482      486      489      490
                                     491     492      503      507      512      515      518

EXTERNALS             TYPE   ARGS        REFERENCES
       EOF           REAL      1             26      37      109
       SKIPL                   2             35      41       42       43       44       45       46       47       55
                                             59      60       63       65       67       69       71       77       87
                                             92      93       94       95       96       97       98       99      100
                                            101     102      103      104      105      106      107

INLINE FUNCTIONS      TYPE   ARGS      DEF LINE  REFERENCES
       ABS           REAL      1  INTRIN            190      192      198      199      200      402      403      524
       AMAX1         REAL      0  INTRIN            320
       AMIN1         REAL      0  INTRIN            321

STATEMENT LABELS             DEF LINE   REFERENCES
 3427  1        FMT              565         48       50       52
    0  101                       218        216
    0  102                       226        224
    0  103                       231        230
    0  104                       235        234
  753  105                       237        233
  765  106                       242        236
    0  107                       239        238
  767  108                       243        241
    0  109                       247        246
 3410  110      FMT  NO REFS     558
    0  111                       259        254
    0  112                       276        271
    0  113                       294        291
    0  114                       306        303
    0  115                       322        319
 1240  116                       370        366
    0  117                       369        367
 1262  118                       380        377
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STATEMENT LABELS				DEF LINE	REFERENCES								
1264	119			381	379								
3413	120	FMT	NO REFS	559									
1354	121			421	404								
1355	122			422	420								
1415	123			445	436								
1431	124			453	444								
0	125			553	536								
0	126			327	326								
3415	130	FMT	NO REFS	560									
3506	135	FMT	NO REFS	580									
3417	136	FMT	NO REFS	562									
716	138			220	213								
3510	140	FMT	NO REFS	581									
3512	145	FMT	NO REFS	582									
4010	150	FMT	NO REFS	631									
1570	501			678	20	26							
0	502		INACTIVE	27	26								
4035	601	FMT		641	125								
4041	602	FMT		642	127								
4057	603	FMT		645	129								
4074	604	FMT	NO REFS	648									
4110	605	FMT		651	132								
4116	606	FMT		652	136								
4125	608	FMT		653	139								
4133	609	FMT		654	141								
4142	610	FMT		655	143								
4151	611	FMT		656	145								
4157	612	FMT		657	151								
4232	613	FMT		664	160								
4241	614	FMT		665	165								
4250	615	FMT		666	167								
4256	616	FMT		667	169								
4264	617	FMT		668	171								
4272	618	FMT		669	173								
4301	619	FMT		670	175								
4307	620	FMT		671	177								
4313	621	FMT		672	179								
4026	700	FMT		639	128	133	137	138	140	142	144	146	155
					164	166	168	170	172	174	176	178	180
443	701			135	131								
443	702			136	134								
4031	703	FMT		640	130								
4333	800	FMT		675	181								
4166	801	FMT		658	152								
4174	802	FMT		659	153								
4202	803	FMT		660	154								
4210	901	FMT		661	161								
4216	902	FMT		662	162								
4224	903	FMT		663	163								
1474	923			489	480								
1504	924			499	488								
1515	925			510	500								
1512	926			506	502								
1525	927			517	505	509	514						
1523	928			515	511								
3010	951	FMT		472	471								
3055	952	FMT		478	477								

STATEMENT LABELS				DEF LINE	REFERENCES							
3073	953	FMT		483	482	489						
3120	954	FMT		487	486							
3164	955	FMT	NO REFS	493								
3174	956	FMT		494	490							
3204	957	FMT		495	491							
3214	958	FMT		496	492							
3302	959	FMT		519	518							
1452	960			463	459							
3227	980	FMT		504	503							
3240	981	FMT		508	507							
3252	982	FMT		513	512							
3264	983	FMT		516	515							
4012	1001	FMT		633	124	206	470					
3421	1005	FMT		563	126	207						
3447	1010	FMT		573	208							
3462	1015	FMT		575	209							
3467	1020	FMT		576	210							
3500	1025	FMT		578	211							
3514	1030	FMT		584	365							
3527	1035	FMT		586	370							
3533	1040	FMT		587	371							
3540	1045	FMT		588	372							
3545	1050	FMT		589	373							
3552	1055	FMT		590	374							
3557	1060	FMT		591	375							
3574	1065	FMT		594	376							
3611	1070	FMT		598	378							
3624	1075	FMT		600	380							
3637	1080	FMT		602	382							
3647	1110	FMT		605	394							
3666	1111	FMT		608	395							
3674	1112	FMT		609	396							
3702	1113	FMT		610	397							
3722	1120	FMT		615	438							
3727	1121	FMT		616	439							
3732	1122	FMT		617	440							
3737	1123	FMT		618	441							
3742	1124	FMT		619	442							
3747	1125	FMT		620	443							
3752	1126	FMT		623	447							
3757	1127	FMT		624	448							
3764	1128	FMT		625	449							
3771	1129	FMT		626	450							
3710	1130	FMT		611	398							
3776	1131	FMT		627	451							
4003	1132	FMT		628	452							
2515	1133	FMT		183	182							
160	5001			33	31							
153	5002			29	32							
0	5003			114	111							
3431	6010	FMT		566	25	36	108					
3433	6011	FMT		567	49							
3435	6012	FMT		568	51	53	54	56	57	58		
3437	6016	FMT		569	64	66	68	70	72	73	74	75	76
					78	88	89	90	91			
3441	6017	FMT		570	61	62						
3443	6018	FMT		571	79	80	81	82	83	84	85	86

STATEMENT LABELS			DEF LINE	REFERENCES	
3401	7000	FMT	534	525	
3372	7001	FMT	533	529	
1543	7500		529	524	
1545	7501		532	528	
3445	9009	FMT	572	30	
3406	9100	FMT	557	19	
144	9200		24	21	
173	9300		40	34	
135	9800		19	554	556
0	9998	INACTIVE	38	2*37	
0	9999	INACTIVE	110	2*109	
1565	10000		555	24	39

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES	EXT REFS	EXITS	NOT INNER
145	10000	*	JJ	24 555	1423B				
410	5003		I	111 114	4B	INSTACK			
710	101		I	216 218	3B	INSTACK			
722	102		I	224 226	5B	INSTACK			
735	103		I	230 231	3B	INSTACK			
746	104		I	234 235	3B	INSTACK			
756	107		I	238 239	3B	INSTACK			
773	109		I	246 247	3B	INSTACK			
1006	111		I	254 259	11B	INSTACK			
1033	112		I	271 276	11B	INSTACK			
1072	113		I	291 294	5B	INSTACK			
1110	114		I	303 306	5B	INSTACK			
1131	115		I	319 322	6B	INSTACK			
1143	126		I	326 327	3B	INSTACK			
1234	117		I	367 369	3B	INSTACK			
1550	125		I	536 553	12B	INSTACK			

STATISTICS

PROGRAM LENGTH	4734B	2524
BUFFER LENGTH	1218	81

330120

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      SUBROUTINE SKIPL(NF,NL)                                    RMP      56
      DIMENSION DUM1(80)                                         RMRV     80
      IF(NF.EQ.12)GO TO 12                                       RMP      57
      IF(NF.EQ.14)GO TO 14                                       RMP      58
      IF(NF.EQ.16)GO TO 16                                       RMP      59
      IF(NF.EQ.1) GO TO 101                                      RMRV     81
      IF(NF.EQ.13)GO TO 13                                       RMRV     82
      IF(NF.EQ.15)GO TO 15                                       RMRV     83
      IF(NF.EQ.18)GO TO 18                                       RMRV     84
      IF(NF.EQ.17)GO TO 17                                       RMRV     85
      IF(NF.EQ.534) GO TO 534                                    RMRV     86
      IF(NF.EQ.535) GO TO 535                                    RMRV     87
      IF(NF.EQ.536) GO TO 536                                    RMRV     88
      IF(NF.EQ.537) GO TO 537                                    RMRV     89
   12 DO 2 I=1,NL                                                RMP      60
      READ(10,6012) DUM1                                         RMP      61
    2 CONTINUE                                                   RMP      62
      GO TO 100                                                  RMP      63
   14 DO 4 I=1,NL                                                RMP      64
      READ(10,6014) DUM1                                         RMP      65
    4 CONTINUE                                                   RMP      66
      GO TO 100                                                  RMP      67
   16 DO 6 I=1,NL                                                RMP      68
      READ(10,6016) DUM1                                         RMP      69
    6 CONTINUE                                                   RMP      70
      GO TO 100                                                  RMRV     90
  101 DO 21 I=1,NL                                               RMRV     91
   21 READ(10, 1)DUM1                                            RMRV     92
      GO TO 100                                                  RMRV     93
   13 DO 23 I=1,NL                                               RMRV     94
   23 READ(10,6013)DUM1                                          RMRV     95
      GO TO 100                                                  RMRV     96
   15 DO 25 I=1,NL                                               RMRV     97
   25 READ(10,6015)DUM1                                          RMRV     98
      GO TO 100                                                  RMRV     99
   18 DO 28 I=1,NL                                               RMRV    100
   28 READ(10,6018)DUM1                                          RMRV    101
      GO TO 100                                                  RMRV    102
   17 DO 27 I=1,NL                                               RMRV    103
   27 READ(10,6017)DUM1                                          RMRV    104
      GO TO 100                                                  RMRV    105
  534 DO 1534 I=1,NL                                             RMRV    106
 1534 READ(10,8534) DUM1                                         RMRV    107
      GO TO 100                                                  RMRV    108
  535 DO 1535  I=1,NL                                            RMRV    109
 1535 READ(10, 8535) DUM1                                        RMRV    110
      GO TO 100                                                  RMRV    111
  536 DO 1536 I=1,NL                                             RMRV    112
 1536 READ(10,8536) DUM1                                         RMRV    113
      GO TO 100                                                  RMRV    114
  537 DO 1537 I=1,NL                                             RMRV    115
 1537 READ(10, 8537) DUM1                                        RMRV    116
  100 CONTINUE                                                   RMP      71
    1 FORMAT(1X,80A1)                                            RMRV    117
 6012 FORMAT(1X,80A1)                                            RMRV    118
 6014 FORMAT(1X,80A1)                                            RMRV    119
 6013 FORMAT(1X,80A1)                                            RMRV    120
```

330121

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                6015 FORMAT(1X,80A1)                                    RMRV    121
                6016 FORMAT(1X,80A1)                                    RMRV    122
     60         6017 FORMAT(1X,80A1)                                    RMRV    123
                6018 FORMAT(1X,80A1)                                    RMRV    124
                8534 FORMAT(1X,80A1)                                    RMRV    125
                8535 FORMAT(1X,80A1)                                    RMRV    126
                8536 FORMAT(1X,80A1)                                    RMRV    127
     65         8537 FORMAT(1X,80A1)                                    RMRV    128
                     RETURN                                             RMP      75
                     END                                                RMP      76
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS DEF LINE REFERENCES
3 SKIPL 1 66

VARIABLES SN TYPE RELOCATION

300	DUM1	REAL	ARRAY	REFS	2	DEFINED	16	20	24	28	31	
				34	37	40	43	46	49	52		
277	I	INTEGER		DEFINED	15	19	23	27	30	33	36	
				39	42	45	48	51				
0	NF	INTEGER	F.P.	REFS	3	4	5	6	7	8	9	
				10	11	12	13	14	DEFINED	1		
0	NL	INTEGER	F.P.	REFS	15	19	23	27	30	33	36	
				39	42	45	48	51	DEFINED	1		

FILE NAMES MODE

TAPE10	FMT	READS	16	20	24	28	31	34	37	40
		43	46	49	52					

STATEMENT LABELS

			DEF LINE	REFERENCES							
247	1	FMT	54	28							
0	2		17	15							
0	4		21	19							
0	6		25	23							
41	12		15	3							
71	13		30	7							
47	14		19	4							
77	15		33	8							
55	16		23	5							
113	17		39	10							
105	18		36	9							
0	21		28	27							
0	23		31	30							
0	25		34	33							
0	27		40	39							
0	28		37	36							
151	100		53	18	22	26	29	32	35	38	41	44
				47	50							
63	101		27	6								
121	534		42	11								
127	535		45	12								
135	536		48	13								

STATEMENT LABELS			DEF LINE	REFERENCES
143	537		51	14
0	1534		43	42
0	1535		46	45
0	1536		49	48
0	1537		52	51
251	6012	FMT	55	16
255	6013	FMT	57	31
253	6014	FMT	56	20
257	6015	FMT	58	34
261	6016	FMT	59	24
263	6017	FMT	60	40
265	6018	FMT	61	37
267	8534	FMT	62	43
271	8535	FMT	63	46
273	8536	FMT	64	49
275	8537	FMT	65	52

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
42	2	* I	15 17	58	EXT REFS
50	4	* I	19 21	58	EXT REFS
56	6	* I	23 25	58	EXT REFS
64	21	* I	27 28	58	EXT REFS
72	23	* I	30 31	58	EXT REFS
100	25	* I	33 34	58	EXT REFS
106	28	* I	36 37	58	EXT REFS
114	27	* I	39 40	58	EXT REFS
122	1534	* I	42 43	58	EXT REFS
130	1535	* I	45 46	58	EXT REFS
136	1536	* I	48 49	58	EXT REFS
144	1537	* I	51 52	58	EXT REFS

STATISTICS

PROGRAM LENGTH	437B	287

Appendix 3.3C

REDUCED DATA FILE FROM SSDR CODE FOR A SAMPLE
STEADY-STATE FORWARD FLOW TEST

	856	9	20	77 940.00 0
13	.008188	185.336	.392	
14	.011138	198.130	.755	
21	.000276	151.038	.004	
22	.000231	150.844	.139	
23	.000815	185.154	.374	
24	.000722	181.132	.318	
30	.008517	186.762	.386	
31	.008503	186.702	.387	
49	-.000960	107.969	.062	
50	.008228	185.507	.366	
51	-.000709	118.955	.037	
52	.000448	169.277	1.710	
57	-.001986	62.504	.540	
5	.017737	78.817	1.306	
6	.017670	50.760	2.206	
10	.019480	96.834	1.534	
41	.019342	81.728	.302	
42	.021101	139.655	.919	
47	.015278	15.090	.019	
64	.017541	48.846	.618	
65	.016086	21.569	.038	
48	.019310	106.372	.980	
7	.032383	-23.435	1.385	
8	.007562	-11.394	.008	
9	.017675	.652	.014	
25	.037225	1.622	.007	
43	.015959	-.007	.000	
44	.148898	52.540	.007	
45	.015818	-.005	.002	
46	.015942	-.001	.001	
60	.018516	8.338	.244	
61	.038476	3.626	.265	
66	.035599	-13.470	1.161	
37	.016233	-.002	.000	
38	.148112	7.252	.001	
39	.015968	-.002	.004	
40	.015760	-.004	.005	
62	.008159	-23.512	.007	
33	.050083	-.051	.004	
68	.024600	3.550	.954	
69	.074090	46.782	3.207	
58	.032551	187.303	.363	
59	.018639	113.351	.020	
53	.029180	167.443	.251	
54	.021311	120.933	.017	
55	.032673	187.418	.363	
56	.032752	187.661	.362	
11	-.017087	169.226	4.414	
1	.037752	169770.231	2531.624	
2	.032370	165553.566	2586.533	
26	.024617	147129.342	14518.623	
27	.028482	0.000	0.000	
4	-.000000	-.000	.006	
3	-.000002	-.011	.006	

UNLABELED VERSION

For identification of parameters, see labeled version of SSDR output which follows this numerical unlabeled version.

```
28     -.000010        -.049          .004
29     -.000010        -.047          .004
12      .044228     4422.480         9.515
15      .032110       61.823          .080
16      .025110       62.178          .153
17      .061615       61.963          .218
18      .034550       60.476          .141
19      .025807       60.272          .240
20      .056762       62.124          .145
34      .033221       62.629         1.662
35      .025621       61.041          .857
36      .022535       61.041          .302
32      .021560        8.531          .153
   61.82    60.40
   62.18    60.40
   61.86    60.40
   60.48    60.40
   60.27    60.40
   62.12    60.40
   61.04    60.40
   61.04    60.40
   62.63    60.40
      185.336       187.418       311.006       78.817
      198.130       187.661       281.930       50.760
      185.507       187.418       187.419        8.835
      107.969       113.351       313.521       81.728
      185.154       232.005        21.569
         .488
      -23.435
      -28.057
       -9.844
      150.844
     -680.916
       54.123        54.146
   177099.794    177229.032
        8.445        60.450          .022
        8.835        60.402          .023
      311.012        56.938          .180
       11.088        60.152          .024
        8.682        60.397          .023
      281.968        57.963          .119
    70.000     78.817   1.050   8.817    .788    .630    .450   1.207
  4400.000   4397.778   220.0   2.222  43.978120.391  44.273113.731
     0.000      0.000    .010   0.000   0.000   0.000    .000   0.000
     0.000      0.000        .000        0.000
  4450.000   4422.480  50.000  27.520  44.225   8.720   5.000   6.558
   -54.280       .483        .236        3.284
   -55.870       .507        .243        3.269
   -23.435       .250        .102        1.371
   145.600      3.310       2.125        4.567
```

330202

23.626	.035	1.960	.027
169.226	3.275	.820	3.577
50.760	.402	.090	2.184
4399.588	120.179	57.414	113.775
0.000	0.000	.008	0.000
.003	.001	.000	.003
4422.480	8.720	5.000	6.558
-55.988	.490	.244	3.231
-55.875	.607	.524	3.264
-23.435	.250	.102	1.371
145.600	3.310	2.125	3.567
23.626	.035	1.960	.027
169.226	3.275	.820	3.577
64.789	.114	.229	1.539
4398.683	120.285	47.898	113.753
.000	.000	.004	.000
0.000	0.000	.000	0.000
4422.480	8.720	5.000	6.558
-55.121	.487	.240	3.257
-55.873	.607	.337	3.264
-23.435	.250	.102	1.371
145.600	3.310	2.125	3.567
23.626	.035	1.960	.027
169.226	3.275	.820	3.577

-.215	-.222	-.219
-.222	-.222	-.222
1.257	1.257	1.257
1.257	1.257	1.257
0.000	0.000	.000
0.000	.269	0.000
0.000	0.000	0.000
.983	.983	.983
.989	.989	.989
.474	.489	.481
.488	.488	.488

54.12 54.15

0.00 0.00

21.518	21.541	21.587	21.587	21.611	.939
82.094	81.904	81.761	81.571	81.310	.165
8.748	8.791	8.837	8.879	8.922	.145
79.470	76.806	78.284	80.142	79.378	.571
8.748	8.791	8.837	8.879	8.922	0.000
51.574	50.054	49.493	54.171	44.511	.178
8.793	8.838	8.883	8.927	8.969	0.000
186.957	187.186	187.426	187.646	187.872	0.000
184.833	185.074	185.335	185.574	185.821	1.942
311.581	309.235	310.546	312.163	311.501	.126
187.198	187.433	187.667	187.895	188.112	0.000
197.417	197.499	198.426	196.261	194.046	1.817
282.975	281.084	280.374	286.104	279.115	.039
186.957	187.186	187.426	187.643	187.872	0.000
185.058	185.232	185.534	185.784	185.943	1.941
113.378	113.361	113.355	113.332	113.332	0.000
107.925	108.013	108.014	108.013	107.881	3.334
151.035	151.035	151.044	151.034	151.035	2.384
151.035	150.684	150.831	151.734	150.422	2.387

330203

184.651	184.911	185.214	185.431	185.561	1.564
180.707	180.924	181.184	181.357	181.427	1.588
62.781	62.741	63.095	61.975	61.886	5.760
186.168	186.801	186.662	186.996	187.182	1.928
186.233	186.415	186.723	186.957	187.182	1.928
7.991	8.362	8.262	8.662	8.413	2.052
3.859	3.185	3.735	3.764	3.585	.337
-23.507	-23.522	-23.516	-23.510	-23.504	.612
-.056	-.051	-.049	-.048	-.052	231.093
5.127	2.972	3.068	2.815	3.766	.643
1.611	1.623	1.624	1.631	1.621	2.775
-15.049	-13.087	-13.970	-11.893	-13.351	2.420
579.659	592.636	579.826	580.539	625.945	1.007
0.000	0.000	0.000	0.000	0.000	0.000
1.376	1.350	1.350	1.341	1.342	1.849
1.136	1.158	1.191	1.155	1.174	.586
4408.700	4417.500	4432.300	4429.300	4424.600	.113
171.294	171.264	168.156	173.356	162.059	.484
-23.148	-24.840	-21.586	-22.819	-24.784	.435
.01655	.01655	.01656	.01656	.01656	.01
.01655	.01656	.01656	.01656	.01656	.83
.01615	.01618	.01619	.01620	.01616	.01
.01611	.01613	.01604	.01605	.01608	.01
.01622	.01615	.01608	.01618	.01620	.02
.01658	.01648	.01651	.01654	.01656	.01
.01655	.01666	.01666	.01658	.01652	.01
.01606	.01606	.01611	.01618	.01607	.01
.01608	.01640	.01671	.01645	.01628	.01
.01638	.01642	.01650	.01633	.01629	.01
.01603	.01642	.01546	.01633	.01564	.04
53.011	54.202	53.036	53.105	57.264	.201
53.038	54.225	53.055	53.127	57.284	.261
51.607	52.813	51.381	51.472	55.622	.201
53.013	54.564	53.389	53.180	57.130	.201
-.018	-.018	-.006	-.006	-.006	
-.005	-.005	.005	.005	0.000	
-.051	-.051	-.042	-.047	-.051	
-.050	-.050	-.041	-.046	-.050	
169769.149	177471.114	169897.308	170329.303	198032.096	.402
169925.529	177602.606	170006.071	170454.084	198156.471	.549
165272.183	172920.800	164597.793	165092.104	192356.810	.402
169846.688	178712.733	171075.746	170623.463	197623.758	.402
167589.326	173369.348	167100.287	170299.849	170492.343	
163418.991	168700.358	162031.187	168491.085	165126.211	
181252.036	215054.578	189856.461	189661.791	209821.842	
0.000	0.000	0.000	0.000	0.000	
4.827	5.434	.072	.608	.017	.043	.031	.083
.2776	.2774	.0139	.0001	.0002	.0076	.0028	.0072
0.000	0.000	.010	0.000	0.000	0.000	.000	0.000
0.000	0.000	.000	0.000				
4450.000	4422.480	50.000	27.520	59.960	8.720	5.000	6.558
-16.545	.147	.072	1.001				
-17.029	.185	.074	.996				
-1.616	.017	.007	.095				
197.404	4.498	2.880	4.236				
32.032	.047	2.657	.044				

330204

229.436	4.441	1.111	4.849
3.500	.028	.006	.150
.2775	.0076	.0036	.0072
0.000	0.000	.008	0.000
.003	.001	.000	.003
4422.480	8.720	5.000	6.558
-17.065	.149	.074	.985
-17.031	.185	.160	.996
-1.616	.017	.007	.095
197.404	4.488	2.880	4.836
32.032	.047	2.657	.036
229.436	4.441	1.111	4.849
4.467	.008	.016	.106
.2775	.0076	.0030	.0072
.000	.000	.004	.000
0.000	0.000	.000	0.000
4422.480	8.720	5.000	6.558
-16.801	.148	.073	.993
-17.030	.185	.103	.996
-1.616	.017	.007	.095
197.404	4.488	2.880	4.836
32.032	.047	2.657	.036
229.436	4.441	1.111	4.849

-.215	-.222	-.219
-.222	-.222	-.222
1.257	1.257	1.257
1.257	1.257	1.257
0.000	0.000	.000
0.000	.269	0.000
0.000	0.000	0.000
.983	.983	.983
.989	.989	.989
.474	.489	.481
.488	.488	.488

16.50	16.50
0.00	0.00

1.484	1.485	1.488	1.488	1.490	.939
5.660	5.647	5.637	5.624	5.606	.165
.603	.606	.609	.612	.615	.145
5.479	5.296	5.398	5.526	5.473	.571
.603	.606	.609	.612	.615	0.000
3.556	3.451	3.413	3.735	3.345	.178
.606	.609	.612	.615	.618	0.000
86.087	86.214	86.348	86.472	86.596	0.000
84.907	85.042	85.208	85.319	85.456	1.942
155.323	154.020	154.749	155.646	155.278	.126
86.221	86.351	86.482	86.608	86.729	0.000
91.898	91.944	92.460	92.923	92.248	1.817
139.431	138.380	137.985	141.169	137.286	.039
86.087	86.214	86.348	86.472	86.596	0.000
85.032	85.129	85.297	85.427	85.524	1.941
45.210	45.200	45.197	45.184	45.184	0.000
42.180	42.229	42.229	42.229	42.154	3.334
66.131	66.131	66.135	66.133	66.131	2.384
66.131	65.938	66.017	65.969	66.068	2.387
84.806	84.951	85.119	85.240	85.312	1.944

330205

82.615	82.736	82.886	82.976	83.049	1.988
17.101	17.101	17.275	16.653	16.603	5.760
85.649	86.000	85.923	86.109	86.212	1.928
85.685	85.786	85.957	86.087	86.212	1.928
.551	.577	.576	.597	.580	2.052
.266	.220	.258	.260	.247	.337
-1.621	-1.622	-1.621	-1.621	-1.621	.612
-.004	-.003	-.003	-.003	-.004	231.093
.354	.205	.212	.194	.260	.643
.111	.112	.112	.112	.112	2.775
-1.038	-.902	-.963	-.820	-.921	2.420
262.933	268.820	263.009	263.332	283.928	1.007
0.000	0.000	0.000	0.000	0.000	0.000
.624	.612	.613	.608	.609	1.849
.515	.525	.540	.524	.532	.586
4408.700	4417.500	4432.300	4429.300	4424.600	.113
232.240	232.200	227.986	235.036	219.720	.484
-1.596	-1.713	-1.488	-1.573	-1.709	.435
.00103 .00103 .00103 .00103 .00103 .01					
.00103 .00103 .00103 .00103 .00103 .83					
.00101 .00101 .00101 .00101 .00101 .01					
.00101 .00101 .00100 .00100 .00100 .01					
.00101 .00101 .00100 .00101 .00101 .02					
.00103 .00103 .00103 .00103 .00103 .01					
.00103 .00104 .00104 .00103 .00103 .01					
.00100 .00100 .00101 .00101 .00100 .01					
.00100 .00102 .00104 .00103 .00102 .01					
.00102 .00103 .00103 .00102 .00102 .01					
.00100 .00103 .00097 .00102 .00098 .04					
16.158	16.521	16.165	16.186	17.454	.201
16.166	16.528	16.171	16.193	17.460	.261
15.730	16.097	15.661	15.689	16.954	.201
16.158	16.631	16.273	16.209	17.413	.201
-.005	-.005	-.002	-.002	-.002	
-.002	-.002	.002	.002	0.000	
-.016	-.016	-.013	-.014	-.016	
-.015	-.015	-.012	-.014	-.015	
252616.494	264077.017	252807.194	253450.003	294671.759	.402
252849.188	264272.677	252969.033	253635.676	294857.425	.549
245925.008	257306.151	244921.516	245667.051	286226.934	.402
252731.872	265924.546	254560.710	253887.713	294064.152	.402
249372.917	257973.589	248645.227	253406.176	253692.607	
243167.459	251026.132	241102.406	250714.735	245707.802	
269703.030	320001.213	282506.414	282216.745	312214.901	
0.000	0.000	0.000	0.000	0.000	

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LABELED VERSION

TEST NO 856 DATE 9/20/77 TIME 940.00 PAGE 0

S/N	DEVICE	OUTPUT	VALUE	STD.DEV.
13	THERMOCOUPLE	.008188	185.336	.392
14	THERMOCOUPLE	.011138	198.130	.755
21	THERMOCOUPLE	.000276	151.038	.004
22	THERMOCOUPLE	.000231	150.844	.139
23	THERMOCOUPLE	.000815	185.154	.374
24	THERMOCOUPLE	.000722	181.132	.318
30	THERMOCOUPLE	.008517	186.762	.386
31	THERMOCOUPLE	.008503	186.702	.387
49	THERMOCOUPLE	-.000960	107.969	.062
50	THERMOCOUPLE	.008228	185.507	.366
51	THERMOCOUPLE	-.000709	118.955	.037
52	THERMOCOUPLE	.000448	169.277	1.710
57	THERMOCOUPLE	-.001986	62.504	.540
5	PRESSURE CELL	.017737	78.817	1.306
6	PRESSURE CELL	.017670	50.760	2.206
10	PRESSURE CELL	.019480	96.834	1.534
41	PRESSURE CELL	.019342	81.728	.302
42	PRESSURE CELL	.021101	139.655	.919
47	PRESSURE CELL	.015278	15.090	.019
64	PRESSURE CELL	.017541	48.846	.618
65	PRESSURE CELL	.016086	21.569	.038
48	PRESSURE CELL	.019310	106.372	.980
7	D. P. CELL	.032383	-23.435	1.385
8	D. P. CELL	.007552	-11.394	.008
9	D. P. CELL	.017675	.652	.014
25	D. P. CELL	.037225	1.622	.007
43	D. P. CELL	.015959	-.007	.000
44	D. P. CELL	.148898	52.540	.007
45	D. P. CELL	.015818	-.005	.002
46	D. P. CELL	.015942	-.001	.001
60	D. P. CELL	.018516	8.338	.244
61	D. P. CELL	.038476	3.626	.265
66	D. P. CELL	.035599	-13.470	1.161
37	D. P. CELL	.016233	-.002	.000
38	D. P. CELL	.148112	7.252	.001
39	D. P. CELL	.015968	-.002	.004
40	D. P. CELL	.015760	-.004	.005
62	D. P. CELL	.008159	-23.512	.007
33	D. P. CELL	.050083	-.051	.004
68	D. P. CELL	.024600	3.550	.954
69	D. P. CELL	.074090	46.782	3.207
58	R. T. D.	.032551	187.303	.363
59	R. T. D.	.018639	113.251	.020
53	R. T. D.	.029180	167.443	.251
54	R. T. D.	.021311	120.933	.017
55	R. T. D.	.032673	187.418	.363
56	R. T. D.	.032752	187.661	.362
11	TORQUE METER	-.017087	169.226	4.416
1	DRAG DISC	.037757	169770.231	2531.824
2	DRAG DISC	.032370	165553.566	2986.533
26	DRAG DISC	.024617	197129.342	14518.623
27	DRAG DISC	.028482	0.000	0.000

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4	TURBINE METER	-.000000	-.000	.005
3	TURBINE METER	-.000002	-.011	.006
28	TURBINE METER	-.000010	-.049	.004
29	TURBINE METER	-.000010	-.047	.004
12	SPEED METER	.044228	4422.480	9.515
15	DENSITOMETER	.032110	61.823	.080
16	DENSITOMETER	.025110	62.178	.153
17	DENSITOMETER	.061615	61.863	.218
18	DENSITOMETER	.034550	60.476	.141
19	DENSITOMETER	.025807	60.272	.240
20	DENSITOMETER	.056762	62.124	.195
34	DENSITOMETER	.033221	62.628	1.662
35	DENSITOMETER	.025621	61.041	.857
36	DENSITOMETER	.022535	61.041	.302
32	MAG FLOW METER	.021560	8.531	.153

GAMMA DENSITOMETER DENSITIES		MIX TEE DENSITY
SUCT LEG BEAM 1	61.82	60.40
SUCT LEG BEAM 2	62.18	60.40
SUCT LEG BEAM 3	61.86	60.40
DISCH LEG BEAM 1	60.48	60.40
DISCH LEG BEAM 2	60.27	60.40
DISCH LEG BEAM 3	62.12	60.40
AECL BEAM 1	61.04	60.40
AECL BEAM 2	61.04	60.40
AECL BEAM 3	62.63	60.40

	TC	RTD	TSAT	PRESSURE
SUCT LEG	185.3	187.4	311.0	79.
DISCH LEG	198.1	187.7	281.9	51.
WATER ORIF	185.5	187.4	187.4	9.
STEAM ORIF	108.0	113.4	313.5	82.
H P DRUM	185.2		232.0	22.

SUCT LEG NORMALIZED HYD TORQUE	.488
PUMP DP (LEG-LEG) (PSI)	-23.4
DISCHARGE P - SUCTION P (PSI)	-28.1
LEG-FLANGE + F-F DP (PSI)	-9.8
INJECT OUT TEMP (DEG F)	150.8
INJECT FLOW (OUT-IN) (LB/HR)	-681.

MIXING TEE-	SUCT LEG	DISCH LEG
VELOCITY	54.1	54.1
MOMENTUM FLUX	177099.8	177229.0

THERMODYNAMIC PROPERTIES BASED ON LOOP PARAMETERS

PARAMETER-	T-SAT	P-SAT	SAT-DENSITY LIQ	SAT-DENSITY VAPOR
SUCT -TC	-	8.4	60.45	.02
-RTD	-	8.8	60.40	.02
-P	311.0	-	56.94	.18
DISCH-TC	-	11.1	60.15	.03
-RTD	-	8.9	60.40	.02
-P	282.0	-	57.86	.12

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CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 856 DATE 9/20/77 TIME 940.00 PAGE 1

PUMP PERFORMANCE BASED ON SUCTION LEG CONDITIONS

	SET POINT	ACTUAL POINT (AVG)	SPEC. DIFF.	ACTUAL CONDITIONS ACTUAL DIFF.	SPEC. DRIFT /MIN	ACTUAL DRIFT /MIN	INST. UNCTY	DATA STD. DEV.
PRESSURE(PSIA) L-5	70.	79.	1.	9.	1.	1.	0.	1.
VOL FLOW(GPM)	4400.	4398.	220.	2.	44.	120.	44.	114.
VOID FRACTION								
ORIF	0.000	0.000	.010	0.000	0.000	0.000	.000	0.000
GD		0.000				0.000	.000	0.000
SPEED (RPM) L-12	4450.	4422.	50.	28.	44.	9.	5.	7.
PUMP HEAD								
GD(FT)		-54.3				.5	.2	3.3
ORIF(FT)		-55.9				.6	.2	3.3
DP(PSI) L-7		-23.4				.25	.10	1.37
PUMP TORQUE(FTLB)								
HYDRAULIC		145.6				3.3	2.1	3.6
FRICTION		23.6				.0	2.0	.0
SHAFT L-11		169.2				3.3	.8	3.6

PUMP PERFORMANCE BASED ON DISCHARGE LEG CONDITIONS

PRESSURE(PSIA) L-6	51.			0.	0.	2.
VOL FLOW(GPM)	4400.			120.	57.	114.
VOID FRACTION						
ORIF	0.000			0.000	.008	0.000
GD	.003			.001	.000	.003
SPEED (RPM) L-12	4422.			9.	5.	7.
PUMP HEAD						
GD(FT)	-56.0			.5	.2	3.2
ORIF(FT)	-55.9			.6	.5	3.3
DP(PSI) L-7	-23.4			.25	.10	1.37
PUMP TORQUE(FTLB)						
HYDRAULIC	145.6			3.3	2.1	3.6
FRICTION	23.6			.0	2.0	.0
SHAFT L-11	169.2			3.3	.8	3.6

CONV CONST FILE ZERO 855 09/20/77 0915
DATA REDUCED 15.15.03. 79/06/05.

WATER ORIFICE = MAIN : STEAM ORIFICE = CLOSED

330209

PUMP PERFORMANCE BASED ON SUCTION AND DISCHARGE LEG AVERAGE

	ACTUAL POINT (AVG)	ACTUAL CONDITIONS ACTUAL DRIFT /MIN	INST. STD. DEV.	DATA STD. DEV.
PRESSURE(PSIA) L-5+6	65.	0.	0.	2.
VOL FLOW(GPM)	4399.	120.	48.	114.
VOID FRACTION				
ORIF	.000	.000	.004	.000
GD	0.000	0.000	.000	0.000
SPEED (RPM) L-12	4422.	9.	5.	7.
PUMP HEAD				
GD(FT)	-55.1	.5	.2	3.3
ORIF(FT)	-55.9	.6	.3	3.3
DP(PSI) L-7	-23.4	.25	.10	1.37
PUMP TORQUE(FTLB)				
HYDRAULIC	145.6	3.3	2.1	3.6
FRICTION	23.6	.0	2.0	.0
SHAFT L-11	169.2	3.3	.8	3.6

PUMP PERFORMANCE NORMALIZED VALUES

	SUCTION	DISCHARGE	AVERAGE
PUMP HEAD			
GAMMA DENSITOMETER	-.215	-.222	-.219
ORIFICE	-.222	-.222	-.222
VOLUMETRIC FLOW			
ORIFICE	1.257	1.257	1.257
SET POINT	1.257	1.257	1.257
VOID FRACTION (PERCENT)			
ORIFICE	0.0	0.0	.0
GAMMA DENSITOMETER	0.0	.3	0.0
SET POINT	0.0	0.0	0.0
PUMP SPEED			
ACTUAL	.983	.983	.983
SET POINT	.989	.989	.989
PUMP HYDRAULIC TORQUE			
GAM DEN	.474	.489	.481
ORIFICES	.488	.488	.488

SUPERFICIAL VELOCITIES	SUCT LEG	DISCH LEG (FT/SEC)
WATER	54.12	54.15
STEAM	0.00	0.00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 856 DATE 9/20/77 TIME 940.00 PAGE 3

	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP PRESSURES (PSIA)						
HIGH PRES DRUM L-65	21.5	21.5	21.6	21.6	21.6	.94
STEAM ORIFICE L-41/47	82.1	81.9	81.8	81.6	81.3	.17
WATER ORIFICE L-42/48	8.7	8.8	8.8	8.9	8.9	.15
SUCTION LEG L-5	79.5	76.8	78.3	80.1	79.4	.57
SAT PRES	8.7	8.8	8.8	8.9	8.9	0.00
DISCHARGE LEG L-6	51.6	50.1	49.5	54.2	48.5	.18
SAT PRES	8.8	8.8	8.9	8.9	9.0	0.00
LOOP TEMPERATURE (F)						
SUCTION LEG-RTD L-55	187.0	187.2	187.4	187.6	187.9	0.00
SUCTION LEG-TC L-13	184.8	185.1	185.4	185.6	185.8	1.94
SAT TEMP	311.6	309.2	310.5	312.2	311.5	.13
DISCHARGE LEG-RTD L-56	187.2	187.4	187.7	187.9	188.1	0.00
DISCHARGE LEG-TC L-14	197.4	197.5	198.4	199.3	198.0	1.82
SAT TEMP	283.0	281.1	280.4	286.1	279.1	.04
WATER ORIF.-RTD L-53/58	187.0	187.2	187.4	187.6	187.9	0.00
WATER ORIF.-TC L-50/52	185.1	185.2	185.5	185.8	185.9	1.94
STEAM ORIF.-RTD L-54/59	113.4	113.4	113.4	113.3	113.3	0.00
STEAM ORIF.-TC L-49/51	107.9	108.0	108.0	108.0	107.9	3.33
PUMP INJ IN-TC L-21	151.0	151.0	151.0	151.0	151.0	2.38
PUMP INJ OUT-TC L-22	151.0	150.7	150.8	150.7	150.9	2.39
HP DRUM ID-TC L-23	184.7	184.9	185.2	185.4	185.6	1.94
HP DRUM OD-TC L-24	180.7	180.9	181.2	181.4	181.5	1.99
AMBIENT-TC L-57	62.8	62.8	63.1	62.0	61.9	5.76
SUCTION LEG OD-TC L-30	186.2	186.3	186.7	187.0	187.2	1.93
DISCH. LEG OD-TC L-31	186.2	186.4	186.7	187.0	187.2	1.93
LOOP PRESSURE DROPS (PSI)						
FLOW CNTROL VLV L-50	8.0	8.4	8.3	8.7	8.4	2.05
SUCT LEG-FLANGE L-61	3.9	3.2	3.7	3.8	3.6	.34
PAC16 DP L-62	-23.5	-23.5	-23.5	-23.5	-23.5	.61
ACROSS ELBOW DP L-33	-.1	-.1	-.0	-.0	-.1	231.09
VOLUTE-IMP BACK L-68	5.1	3.0	3.1	2.8	3.8	.64
HP DRUM LEVL DP L-25	1.6	1.6	1.6	1.6	1.6	2.77
PMP FLNGE-FLNGE L-66	-15.0	-13.1	-14.0	-11.9	-13.4	2.42
LOOP FLOWRATES (LBM/SE)						
WATER FLOW	573.65	592.64	579.83	580.54	625.94	1.01
STEAM FLOW	0.00	0.00	0.00	0.00	0.00	0.00
SEAL INJ IN L-9	1.38	1.35	1.35	1.34	1.34	1.85
SEAL INJ OUT L-32	1.14	1.15	1.19	1.16	1.17	.59
PUMP SPEED(RPM) L-12	4409.	4418.	4432.	4429.	4425.	.1
SHAFT TORQUE(FTLB) L-11	171.3	171.3	168.2	173.4	162.1	.5
PUMP DP(PSI) L-7	-23.1	-24.8	-21.6	-22.8	-24.8	.4

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DE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 856 DATE 9/20/77 TIME 940.00 PAGE 4

	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP SPECIFIC VOLUMES (FT3/LBM)						
MIXING TEE						
SUCTION	.01655	.01655	.01656	.01656	.01656	.01
DISCHARGE	.01655	.01656	.01656	.01656	.01656	.83
GAMMA DENSITOMETER						
SUCTION LEG						
BEAM 1 L-15	.01615	.01618	.01619	.01620	.01616	.01
BEAM 2 L-16	.01611	.01613	.01604	.01605	.01608	.01
BEAM 3 L-17	.01622	.01615	.01608	.01618	.01620	.02
DISCHARGE LEG						
BEAM 1 L-18	.01658	.01648	.01651	.01654	.01656	.01
BEAM 2 L-19	.01655	.01665	.01666	.01658	.01652	.01
BEAM 3 L-20	.01606	.01606	.01611	.01618	.01607	.01
AECL						
BEAM 1 L-35	.01608	.01640	.01671	.01645	.01628	.01
BEAM 2 L-36	.01638	.01642	.01650	.01633	.01629	.01
BEAM 3 L-34	.01602	.01642	.01546	.01633	.01554	.04
FLUID VELOCITY						
MIXING TEE(FT/SEC)						
SUCTION	53.0	54.2	53.0	53.1	57.3	.20
DISCHARGE	53.0	54.2	53.1	53.1	57.3	.26
MIX TEE-GAM DEN(FT/SEC)						
SUCTION	51.6	52.8	51.4	51.5	55.6	.20
DISCHARGE	53.0	54.6	53.4	53.2	57.1	.20
CENTER TURBINE METER						
SUCT LEG L-28	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-29	-0.	-0.	-0.	-0.	-0.	
LO TURBINE METER						
SUCT LEG L-3	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-4	-0.	-0.	0.	0.	0.	
MOMENTUM FLUX						
MIXING TEE(LBM/FT-SEC2)						
SUCTION	169759.	177471.	169897.	170329.	198032.	.40
DISCHARGE	169926.	177603.	170006.	170454.	198157.	.55
MIX TEE-GAM DEN(LBM/FT-SEC2)						
SUCTION	165272.	172921.	164598.	165092.	192357.	.40
DISCHARGE	169847.	178713.	171076.	170623.	197624.	.40
HI DRAG DISC						
SUCT LEG L-1	167589.	173369.	167100.	170300.	170492.	
DISCH LEG L-2	163419.	168700.	162031.	168491.	165126.	
LO DRAG DISC						
SUCT LEG L-26	181252.	215055.	189856.	189662.	209822.	
DISCH LEG L-27	0.	0.	0.	0.	0.	

DE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 856 DATE 9/20/77 TIME 940.00 PAGE 5

PUMP PERFORMANCE BASED ON SUCTION LEG CONDITIONS

	SET POINT	ACTUAL POINT (AVG)	SPEC. DIFF.	ACTUAL CONDITIONS ACTUAL DIFF.	SPEC. DRIFT /MIN	ACTUAL DRIFT /MIN	INST. UNCTY	DATA STD. DEV.
PRESSURE(BAR) L-5	5.	5.	0.	1.	0.	0.	0.	0.
VOL FLOW(M3/S)	.2776	.2774	.0139	.0001	.0002	.0076	.0028	.0072
VOID FRACTION								
ORIF	0.000	0.000	.010	0.000	0.000	0.000	.000	0.000
GD		0.000				0.000	.000	0.000
SPEED (RPM) L-12	4450.	4422.	50.	28.	60.	9.	5.	7.
PUMP HEAD								
GD(M)		-16.5				.1	.1	1.0
ORIF(M)		-17.0				.2	.1	1.0
DP(BAR) L-7		-1.6				.02	.01	.09
PUMP TORQUE(NM)								
HYDRAULIC		197.4				4.5	2.9	4.8
FRICTION		32.0				.0	2.7	.0
SHAFT L-11		229.4				4.4	1.1	4.8

PUMP PERFORMANCE BASED ON DISCHARGE LEG CONDITIONS

PRESSURE(BAR) L-6	3.			0.	0.	0.	
VOL FLOW(M3/S)	.2775			.0076	.0036	.0072	
VOID FRACTION							
ORIF	0.000			0.000	.008	0.000	
GD	.003			.001	.000	.003	
SPEED (RPM) L-12	4422.			9.	5.	7.	
PUMP HEAD							
GD(M)	-17.1			.1	.1	1.0	
ORIF(M)	-17.0			.2	.2	1.0	
DP(BAR) L-7	-1.6			.02	.01	.09	
PUMP TORQUE(NM)							
HYDRAULIC	197.4			4.5	2.9	4.8	
FRICTION	32.0			.0	2.7	.0	
SHAFT L-11	229.4			4.4	1.1	4.8	

CONV CONST FILE ZERO 855 09/20/77 0915
DATA REDUCED 15.15.05. 79/06/06.

WATER ORIFICE = MAIN : STEAM ORIFICE = CLOSED

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CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 856 DATE 9/20/77 TIME 940.00 PAGE 6

PUMP PERFORMANCE BASED ON SUCTION AND DISCHARGE LEG AVERAGE

	ACTUAL POINT (AVG)	ACTUAL CONDITIONS ACTUAL DRIFT /MIN	INST. STD. DEV.	DATA STD. DEV.
PRESSURE(BAR) L-5+6	4.	0.	0.	0.
VOL FLOW(M3/S)	.2775	.0076	.0030	.0072
VOID FRACTION				
ORIF	.000	.000	.004	.000
GD	0.000	0.000	.000	0.000
SPEED (RPM) L-12	4422.	9.	5.	7.
PUMP HEAD				
GD(M)	-16.8	.1	.1	1.0
ORIF(M)	-17.0	.2	.1	1.0
DP(BAR) L-7	-1.6	.02	.01	.09
PUMP TORQUE(NM)				
HYDRAULIC	197.4	4.5	2.9	4.8
FRICTION	32.0	.0	2.7	.0
SHAFT L-11	229.4	4.4	1.1	4.8

PUMP PERFORMANCE NORMALIZED VALUES

	SUCTION	DISCHARGE	AVERAGE
PUMP HEAD			
GAMMA DENSITOMETER	-.215	-.222	-.219
ORIFICE	-.222	-.222	-.222
VOLUMETRIC FLOW			
ORIFICE	1.257	1.257	1.257
SET POINT	1.257	1.257	1.257
VOID FRACTION (PERCENT)			
ORIFICE	0.0	0.0	.0
GAMMA DENSITOMETER	0.0	.3	0.0
SET POINT	0.0	0.0	0.0
PUMP SPEED			
ACTUAL	.983	.983	.983
SET POINT	.989	.989	.989
PUMP HYDRAULIC TORQUE			
GAM DEN	.474	.489	.481
ORIFICES	.488	.488	.488

SUPERFICIAL VELOCITIES	SUCT LEG	DISCH LEG (M/SEC)
WATER	16.50	16.50
STEAM	0.00	0.00

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CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 856 DATE 9/20/77 TIME 940.00 PAGE 7

	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP PRESSURES (BAR)						
HIGH PRES DRUM L-65	1.5	1.5	1.5	1.5	1.5	.94
STEAM ORIFICE L-41/47	5.7	5.6	5.6	5.6	5.6	.17
WATER ORIFICE L-42/48	.6	.6	.6	.6	.6	.15
SUCTION LEG L-5	5.5	5.3	5.4	5.5	5.5	.57
SAT PRES	.6	.6	.6	.6	.6	0.00
DISCHARGE LEG L-6	3.6	3.5	3.4	3.7	3.3	.18
SAT PRES	.6	.6	.6	.6	.6	0.00
LOOP TEMPERATURE (C)						
SUCTION LEG-RTD L-55	86.1	86.2	86.3	86.5	86.6	0.00
SUCTION LEG-TC L-13	84.9	85.0	85.2	85.3	85.5	1.94
SAT TEMP	155.3	154.0	154.7	155.6	155.3	.13
DISCHARGE LEG-RTD L-56	86.2	86.4	86.5	86.6	86.7	0.00
DISCHARGE LEG-TC L-14	91.9	91.9	92.5	92.9	92.2	1.82
SAT TEMP	139.4	138.4	138.0	141.2	137.3	.04
WATER ORIF.-RTD L-53/58	86.1	86.2	86.3	86.5	86.6	0.00
WATER ORIF.-TC L-50/52	85.0	85.1	85.3	85.4	85.5	1.94
STEAM ORIF.-RTD L-54/59	45.2	45.2	45.2	45.2	45.2	0.00
STEAM ORIF.-TC L-49/51	42.2	42.2	42.2	42.2	42.2	3.33
PUMP INJ IN-TC L-21	66.1	66.1	66.1	66.1	66.1	2.38
PUMP INJ OUT-TC L-22	66.1	65.9	66.0	66.0	66.1	2.39
HP DRUM ID-TC L-23	84.8	85.0	85.1	85.2	85.3	1.94
HP DRUM OD-TC L-24	82.6	82.7	82.9	83.0	83.0	1.99
AMBIENT-TC L-57	17.1	17.1	17.3	16.7	16.6	5.76
SUCTION LEG OD-TC L-30	85.6	86.0	85.9	86.1	86.2	1.93
DISCH. LEG OD-TC L-31	85.7	85.8	86.0	86.1	86.2	1.93
LOOP PRESSURE DROPS (BAR)						
FLOW CNTROL VLV L-60	.6	.6	.6	.6	.6	2.05
SUCT LEG-FLANGE L-61	.3	.2	.3	.3	.2	.34
PAC16 DP L-62	-1.6	-1.6	-1.6	-1.6	-1.6	.61
ACROSS ELBOW DP L-33	-.0	-.0	-.0	-.0	-.0	231.09
VOLUTE-IMP BACK L-68	.4	.2	.2	.2	.3	.64
HP DRUM LEVL DP L-25	.1	.1	.1	.1	.1	2.77
PMP FLNGE-FLNGE L-66	-1.0	-.9	-1.0	-.8	-.9	2.42
LOOP FLOWRATES (KG/SEC)						
WATER FLOW	262.93	268.82	263.01	263.33	283.93	1.01
STEAM FLOW	0.00	0.00	0.00	0.00	0.00	0.00
SEAL INJ IN L-9	.62	.51	.61	.61	.61	1.85
SEAL INJ OUT L-32	.52	.53	.54	.52	.53	.59
PUMP SPEED(RPM) L-12	4409.	4418.	4432.	4429.	4425.	.1
SHAFT TORQUE(NM) L-11	232.2	232.2	228.0	235.0	219.7	.5
PUMP DP(BAR) L-7	-1.6	-1.7	-1.5	-1.6	-1.7	.4

330215

	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP SPECIFIC VOLUMES (M3/KG)						
MIXING TEE						
SUCTION	.00103	.00103	.00103	.00103	.00103	.01
DISCHARGE	.00103	.00103	.00103	.00103	.00103	.83
GAMMA DENSITOMETER						
SUCTION LEG						
BEAM 1 L-15	.00101	.00101	.00101	.00101	.00101	.01
BEAM 2 L-16	.00101	.00101	.00100	.00100	.00100	.01
BEAM 3 L-17	.00101	.00101	.00100	.00101	.00101	.02
DISCHARGE LEG						
BEAM 1 L-18	.00103	.00103	.00103	.00103	.00103	.01
BEAM 2 L-19	.00103	.00104	.00104	.00103	.00103	.01
BEAM 3 L-20	.00100	.00100	.00101	.00101	.00100	.01
AECL						
BEAM 1 L-35	.00100	.00102	.00104	.00103	.00102	.01
BEAM 2 L-35	.00102	.00103	.00103	.00102	.00102	.01
BEAM 3 L-34	.00100	.00103	.00097	.00102	.00098	.04
FLUID VELOCITY						
MIXING TEE(M/SEC)						
SUCTION	16.2	16.5	16.2	16.2	17.5	.20
DISCHARGE	16.2	16.5	16.2	16.2	17.5	.26
MIX TEE-GAM DEN(M/SEC)						
SUCTION	15.7	16.1	15.7	15.7	17.0	.20
DISCHARGE	16.2	16.6	16.3	16.2	17.4	.20
CENTER TURBINE METER						
SUCT LEG L-28	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-29	-0.	-0.	-0.	-0.	-0.	
LO TURBINE METER						
SUCT LEG L-3	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-4	-0.	-0.	0.	0.	0.	
MOMENTUM FLUX						
MIXING TEE(KG/M-SEC2)						
SUCTION	252616.	264077.	252807.	253450.	294672.	.40
DISCHARGE	252849.	264273.	252969.	253636.	294857.	.55
MIX TEE-GAM DEN(KG/M-SEC2)						
SUCTION	245925.	257306.	244922.	245657.	286227.	.40
DISCHARGE	252732.	265925.	254561.	253888.	294064.	.40
HI DRAG DISC						
SUCT LEG L-1	249373.	257974.	248645.	253406.	253693.	
DISCH LEG L-2	243167.	251026.	241102.	250715.	245708.	
LO DRAG DISC						
SUCT LEG L-26	269703.	320001.	282506.	282217.	312215.	
DISCH LEG L-27	0.	0.	0.	0.	0.	

Appendix 3.3D

REDUCED DATA FILE FROM SSDR CODE FOR A SAMPLE STEADY-STATE REVERSE FLOW TEST

	393	3	2	77 210.00 0
13	.001791	157.614	.026	
14	.001489	156.304	.016	
21	-.000437	147.946	.061	
22	-.001272	144.316	.252	
23	.000165	157.009	.094	
24	.000179	157.599	.099	
30	.001846	157.852	.073	
31	.001737	157.378	.012	
49	.005021	371.556	.421	
50	.000158	156.688	.064	
51	.003379	297.695	.185	
52	.000203	158.640	.405	
57	-.001577	80.761	.081	
5	.016063	27.712	1.039	
6	.016989	41.465	1.405	
10	.023386	227.619	15.493	
41	.023034	176.530	1.017	
42	.019015	101.748	.990	
47	.023104	189.141	.836	
64	.016234	20.676	.108	
65	.015439	14.787	.000	
48	.020017	100.492	.320	
7	.034217	13.840	.081	
8	.007093	10.868	.001	
9	.021697	2.384	.020	
25	.043894	1.353	.018	
43	.016026	-.077	.000	
44	.021051	2.010	.012	
45	.015848	.010	.001	
46	.019801	-.004	.003	
60	.016063	.564	.023	
61	.018431	.446	.051	
66	.035435	13.301	.253	
37	.016528	.020	.001	
38	.052095	1.984	.025	
39	.015944	-.003	.002	
40	.015865	-.004	.003	
62	.015917	.883	.023	
33	.050159	-.014	1.442	
68	.006014	-3.766	.000	
69	.018244	2.074	.353	
58	.027347	156.838	.013	
59	.061827	369.883	.476	
53	.028154	161.454	.144	
54	.050371	292.019	.144	
55	.027451	156.897	.013	
56	.027522	157.149	.013	
11	-.001100	-22.693	1.638	
1	-.000178	-7137.375	1953.577	
2	.000929	9514.355	495.486	
26	.004699	61526.840	985.060	
12	.022441	-2244.100	3.797	

UNLABELED VERSION

For identification of parameters, see labeled version of SSDR output which follows this numerical unlabeled version.

15	.024464	61.310	.099
16	.017387	61.336	.164
17	.046387	61.385	.530
18	.025456	60.879	.295
19	.020081	61.390	.189
20	.028979	60.990	.313
34	.028222	59.625	.617
35	.028088	61.497	.677
36	.023790	60.800	.658
32	.026778	8.421	.125

61.31	61.06
61.34	61.06
61.38	61.06
60.88	61.05
61.39	61.05
60.99	61.05
61.50	61.06
60.80	61.06
59.63	61.06

157.614	156.897	245.801	27.712
156.304	157.149	269.407	41.465
156.688	157.149	157.149	4.428
371.556	369.883	371.485	176.530
157.009	212.312	14.787	

-.031
10.868
13.753
12.855
144.316
-5176.164

11.215	11.086
7679.210	7502.772

4.478	61.041	.012
4.401	61.055	.012
245.827	58.920	.068
4.339	61.067	.012
4.428	61.050	.012
269.430	58.241	.099

27.712	.574	.450	.934
-911.245	3.306	1145.099	4.862
0.000	0.000	1.257	0.000
0.000	0.000	.000	0.000
-2244.100	.520	5.000	3.774
25.514	.031	.034	.064
25.631	.000	32.209	.002
10.868	.000	.014	.001
-9.239	1.082	2.311	1.394
-13.454	.004	1.960	.019
-22.693	1.086	1.225	1.396

30.000	41.465	.450	11.465	.415	.655	.090	1.306
-1050.000	-900.757	52.514	9.243	9.008	3.283*******		4.973
0.000	0.000	.010	0.000	0.000	0.000	5.556	0.000
0.000	0.000	.000		0.000			
-2250.000	-2244.100	45.000	5.900	22.441	.520	5.000	3.774
25.492	.063	.033		.061			
25.633	.000	142.392		.002			

10.868	.000	.014	.001
-9.239	1.082	2.311	1.394
-13.454	.004	1.960	.019
-22.693	1.086	1.225	1.396
34.589	.040	.229	.335
-906.001	3.294	2579.837	4.917
0.000	.000	2.848	.000
0.000	0.000	.000	0.000
-2244.100	.520	5.000	3.774
25.503	.016	.033	.048
25.632	.000	72.989	.002
10.868	.000	.014	.001
-9.239	1.082	2.311	1.394
-13.454	.004	1.960	.019
-22.693	1.086	1.225	1.396

.101	.101	.101
.102	.102	.102
-.260	-.257	-.259
-.300	-.300	-.300
0.000	0.000	0.000
0.000	0.000	0.000
0.000	0.000	0.000
-.499	-.499	-.499
-.500	-.500	-.500
-.030	-.030	-.030
-.031	-.031	-.031

11.21	11.09
0.00	0.00

14.787	14.787	14.787	14.787	14.787	1.369
175.273	175.842	176.506	177.241	177.787	.076
4.430	4.429	4.428	4.427	4.426	.199
26.860	27.554	28.782	26.582	28.782	1.626
4.403	4.402	4.402	4.401	4.399	0.000
43.233	40.731	40.053	42.695	40.614	.217
4.430	4.429	4.428	4.427	4.426	0.000
156.912	156.900	156.900	156.894	156.877	0.000
157.578	157.634	157.638	157.625	157.595	2.284
244.070	245.506	247.971	243.488	247.971	.236
157.166	157.155	157.149	157.143	157.132	0.000
156.289	156.311	156.328	156.294	156.298	2.303
271.979	268.345	267.329	271.212	268.171	.180
157.166	157.155	157.149	157.143	157.132	0.000
156.784	156.697	156.697	156.654	156.610	2.298
369.271	369.583	369.895	370.195	370.471	0.000
371.005	371.321	371.547	371.818	372.088	.969
147.848	147.953	147.935	147.987	148.005	2.433
143.935	144.295	144.539	144.260	144.552	2.495
157.131	157.044	157.001	157.001	156.871	2.293
157.738	157.651	157.565	157.565	157.478	2.284
80.788	80.655	80.743	80.743	80.876	4.458
157.877	157.872	157.907	157.881	157.725	2.281
157.400	157.374	157.369	157.374	157.374	2.287
.564	.570	.524	.589	.570	30.370
.393	.398	.463	.515	.459	2.754
.886	.912	.858	.899	.861	14.310
.056	.916	-.922	1.749	-1.879	42.175

330303

-3.766	-3.766	-3.767	-3.766	-3.766	.578
1.379	1.363	1.344	1.338	1.339	3.328
12.929	13.529	13.361	13.514	13.170	2.437
122.763	122.597	122.501	123.356	121.269	1.006
0.000	0.000	0.000	0.000	0.000	0.000
2.587	2.594	2.569	2.591	2.599	1.113
1.137	1.138	1.166	1.171	1.138	.594
-2244.300	-2245.900	-2237.800	-2247.900	-2244.600	.223
-23.183	-20.079	-22.210	-24.115	-23.880	5.398
10.867	10.869	10.866	10.868	10.868	.131
.01638 .01638	.01638	.01638	.01638	.01638296.72	
.01638 .01638	.01638	.01638	.01638	.01638384.44	
.01632 .01628	.01634	.01633	.01629	.01	
.01628 .01632	.01630	.01625	.01637	.01	
.01636 .01624	.01638	.01641	.01607	.02	
.01646 .01649	.01636	.01650	.01632	.01	
.01628 .01635	.01633	.01625	.01623	.01	
.01633 .01653	.01640	.01632	.01640	.01	
.01637 .01634	.01623	.01641	.01597	.01	
.01657 .01649	.01663	.01618	.01637	.01	
.01669 .01689	.01695	.01652	.01683	.04	
11.240	11.225	11.212	11.291	11.106	24.977
11.110	11.095	11.086	11.163	10.974	112.304
11.175	11.183	11.157	11.202	11.058	.200
11.044	11.076	11.050	11.076	10.876	.200
-.217	-.224	-.221	-.231	-.235	
3.961	4.763	.560	11.704	5.779	
1.500	1.500	1.498	1.495	1.493	
0.000	0.000	0.000	0.000	0.000	
7713.494	7693.615	7675.222	7783.453	7530.267	55.850
7535.156	7514.808	7502.999	7608.084	7352.815	251.123
7669.278	7664.891	7637.903	7722.331	7525.477	.400
7490.356	7502.377	7478.703	7548.258	7287.107	.400
-6719.862	-9037.914	-6392.419	-9076.169	-4460.510	
9491.758	9189.348	8895.868	9910.199	10094.603	
61388.615	60049.469	62416.399	61330.949	62448.769	
0.000	0.000	0.000	0.000	0.000	
1.911	.040	.031	.064		
-.0575	.0002	.0722	.0003		
0.000	0.000	1.257	0.000		
0.000	0.000	.000	0.000		
-2244.100	.520	5.000	3.774		
7.777	.009	.010	.019		
7.812	.000	9.817	.001		
.749	.000	.001	.000		
-12.526	1.467	3.134	1.890		
-18.241	.005	2.657	.026		
-30.768	1.472	1.661	1.892		
2.069	2.859	.031 .791	.029	.045 .006	.040
-.0662	-.0568	.0033 .0094	.0006	.0002 .3156	.0003
0.000	0.000	.010 0.000	0.000	0.000 5.556	0.000
0.000	0.000	.000	0.000		
-2250.000	-2244.100	45.000 5.000	30.426	.520 5.000	3.774
7.770	.019	.010	.019		
7.813	.000	43.401	.001		
.749	.000	.001	.000		

-12.526	1.467	3.134	1.890
-18.241	.005	2.657	.026
-30.768	1.472	1.661	1.892
2.385	.003	.016	.023
-.0572	.0002	.1627	.0003
0.000	.000	2.848	.000
0.000	0.000	.000	0.000
-2244.100	.520	5.000	3.774
7.773	.005	.010	.015
7.813	.000	22.247	.001
.749	.000	.001	.000
-12.526	1.467	3.134	1.890
-18.241	.005	2.657	.026
-30.768	1.472	1.661	1.892

.101	.101	.101
.102	.102	.102
-.260	-.257	-.259
-.300	-.300	-.300
0.000	0.000	0.000
0.000	0.000	0.000
0.000	0.000	0.000
-.499	-.499	-.499
-.500	-.500	-.500
-.030	-.030	-.030
-.031	-.031	-.031
3.42	3.38	
0.00	0.00	

1.020	1.020	1.020	1.020	1.020	1.369
12.085	12.124	12.170	12.221	12.258	.076
.305	.305	.305	.305	.305	.199
1.852	1.900	1.984	1.833	1.984	1.626
.304	.303	.303	.303	.303	0.000
2.981	2.808	2.762	2.944	2.800	.217
.305	.305	.305	.305	.305	0.000
69.395	69.389	69.389	69.386	69.376	0.000
69.765	69.797	69.799	69.792	69.775	2.284
117.817	118.614	119.984	117.493	119.984	.236
69.537	69.530	69.527	69.524	69.518	0.000
69.050	69.062	69.071	69.052	69.054	2.303
133.321	131.303	130.736	132.894	131.206	.180
69.537	69.530	69.527	69.524	69.518	0.000
69.324	69.276	69.276	69.252	69.228	2.298
187.373	187.546	187.720	187.886	188.039	0.000
188.336	188.512	188.637	188.788	188.938	.969
64.360	64.418	64.409	64.437	64.447	2.433
62.186	62.386	62.521	62.367	62.529	2.495
69.517	69.469	69.445	69.445	69.373	2.293
69.854	69.806	69.758	69.758	69.710	2.284
27.104	27.030	27.080	27.080	27.154	4.458
69.932	69.929	69.941	69.934	69.847	2.281
69.667	69.652	69.650	69.652	69.652	2.287
.039	.039	.036	.041	.038	30.370
.027	.027	.032	.036	.032	2.754
.061	.063	.056	.062	.058	16.310
.004	.063	-.064	.121	-.130	42.175
-.260	-.260	-.260	-.260	-.260	.578

330305

.095	.094	.093	.092	.092	3.328
.891	.933	.921	.932	.908	2.437
55.685	55.610	55.567	55.954	55.008	1.006
0.000	0.000	0.000	0.000	0.000	0.000
1.173	1.176	1.166	1.175	1.179	1.113
.516	.516	.525	.531	.516	.594
-2244.300	-2245.900	-2237.800	-2247.900	-2244.600	.223
-31.432	-27.223	-30.112	-32.695	-32.377	5.398
.749	.749	.749	.749	.749	.131

.00102	.00102	.00102	.00102	.00102	296.72	
.00102	.00102	.00102	.00102	.00102	384.44	
.00102	.00102	.00102	.00102	.00102	.01	
.00102	.00102	.00102	.00101	.00102	.01	
.00102	.00101	.00102	.00102	.00100	.02	
.00103	.00103	.00102	.00103	.00102	.01	
.00102	.00102	.00102	.00101	.00101	.01	
.00102	.00103	.00102	.00102	.00102	.01	
.00102	.00102	.00101	.00102	.00100	.01	
.00103	.00103	.00104	.00101	.00102	.01	
.00104	.00105	.00106	.00103	.00105	.04	

3.426	3.421	3.417	3.441	3.385	24.977
3.386	3.382	3.379	3.403	3.345	112.306
3.406	3.409	3.401	3.414	3.383	.200
3.366	3.376	3.368	3.376	3.315	.200
-.066	-.068	-.067	-.070	-.072	
1.207	1.452	.171	3.567	1.761	
.457	.457	.457	.456	.455	
0.000	0.000	0.000	0.000	0.000	
11477.679	11448.100	11420.731	11581.778	11205.037	55.850
11212.313	11182.034	11164.462	11320.829	10940.989	251.123
11411.885	11405.358	11365.199	11490.829	11197.910	.400
11145.650	11163.537	11128.310	11231.808	10843.215	.400
-9999.155	-13448.416	-9511.920	-13505.339	-6637.239	
14123.735	13673.749	13237.052	14746.376	15020.769	
91346.259	89353.609	92875.602	91260.453	92923.768	
0.000	0.000	0.000	0.000	0.000	

LABELED VERSION

TEST NO 393 DATE 3/ 2/77 TIME 210.00 PAGE 0

S/N	DEVICE	OUTPUT	VALUE	STD.DEV.
13	THERMOCOUPLE	.001791	157.614	.026
14	THERMOCOUPLE	.001489	156.304	.016
21	THERMOCOUPLE	-.000437	147.946	.061
22	THERMOCOUPLE	-.001272	144.316	.252
23	THERMOCOUPLE	.000165	157.009	.094
24	THERMOCOUPLE	.000179	157.599	.099
30	THERMOCOUPLE	.001846	157.852	.073
31	THERMOCOUPLE	.001737	157.378	.012
49	THERMOCOUPLE	.005021	371.556	.421
50	THERMOCOUPLE	.000158	156.688	.064
51	THERMOCOUPLE	.003379	297.695	.185
52	THERMOCOUPLE	.000203	158.640	.405
57	THERMOCOUPLE	-.001577	80.761	.081
5	PRESSURE CELL	.016063	27.712	1.039
6	PRESSURE CELL	.016989	41.465	1.405
10	PRESSURE CELL	.023386	227.619	15.493
41	PRESSURE CELL	.023034	176.530	1.017
42	PRESSURE CELL	.019015	101.748	.990
47	PRESSURE CELL	.023104	189.141	.836
64	PRESSURE CELL	.016234	20.676	.108
65	PRESSURE CELL	.015439	14.787	.000
48	PRESSURE CELL	.020017	100.492	.320
7	D. P. CELL	.034217	13.840	.081
8	D. P. CELL	.007093	10.868	.001
9	D. P. CELL	.021637	2.384	.020
25	D. P. CELL	.043894	1.353	.018
43	D. P. CELL	.016026	-.077	.000
44	D. P. CELL	.021051	2.010	.012
45	D. P. CELL	.015848	.010	.001
46	D. P. CELL	.019801	-.004	.003
60	D. P. CELL	.016063	.564	.023
61	D. P. CELL	.018431	.446	.051
66	D. P. CELL	.035435	13.301	.253
37	D. P. CELL	.016528	.020	.001
38	D. P. CELL	.052095	1.984	.025
39	D. P. CELL	.015944	-.003	.002
40	D. P. CELL	.015865	-.004	.003
62	D. P. CELL	.015917	.883	.023
33	D. P. CELL	.050159	-.014	1.442
68	D. P. CELL	.006014	-3.766	.000
69	D. P. CELL	.018244	2.074	.353
58	R. T. D.	.027347	156.838	.013
59	R. T. D.	.061827	369.883	.476
53	R. T. D.	.028154	161.454	.144
54	R. T. D.	.050371	292.019	.144
55	R. T. D.	.027451	156.897	.013
56	R. T. D.	.027522	157.149	.013
11	TORQUE METER	-.001100	-22.693	1.638
1	DRAG DISC	-.000178	-7137.375	1953.577
2	DRAG DISC	.000929	9516.355	495.486
26	DRAG DISC	.004699	61526.840	985.060

330307

12	SPEED METER	.022441	-2244.100	3.797
15	DENSITOMETER	.024469	61.310	.099
16	DENSITOMETER	.017387	61.336	.164
17	DENSITOMETER	.046387	61.385	.530
18	DENSITOMETER	.025456	60.879	.295
19	DENSITOMETER	.020081	61.390	.189
20	DENSITOMETER	.028079	60.990	.313
34	DENSITOMETER	.028222	59.625	.617
35	DENSITOMETER	.028088	61.497	.677
36	DENSITOMETER	.023790	60.800	.658
32	MAG FLOW METER	.026778	8.421	.125

GAMMA DENSITOMETER DENSITIES — MIX TEE DENSITY

SUCT LEG BEAM 1	61.31	61.06
SUCT LEG BEAM 2	61.34	61.06
SUCT LEG BEAM 3	61.38	61.06
DISCH LEG BEAM 1	60.88	61.05
DISCH LEG BEAM 2	61.39	61.05
DISCH LEG BEAM 3	60.99	61.05
AECL BEAM 1	61.50	61.06
AECL BEAM 2	60.80	61.06
AECL BEAM 3	59.63	61.06

	TC	RTD	TSAT	PRESSURE
SUCT LEG	157.6	156.9	245.8	28.
DISCH LEG	156.3	157.1	269.4	41.
WATER ORIF	156.7	157.1	157.1	4.
STEAM ORIF	371.6	369.9	371.5	177.
H P DRUM	157.0		212.3	15.

SUCT LEG NORMALIZED HYD TORQUE	-.031
PUMP DP (LEG-LEG) (PSI)	10.9
DISCHARGE P - SUCTION P (PSI)	13.8
LEG-FLANGE + F-F DP (PSI)	12.9
INJECT OUT TEMP (DEG F)	144.3
INJECT FLOW (OUT-IN) (LB/HR)	-5176.

MIXING TEE-	SUCT LEG	DISCH LEG
VELOCITY	11.2	11.1
MOMENTUM FLUX	7679.2	7502.8

THERMODYNAMIC PROPERTIES BASED ON LOOP PARAMETERS

	T-SAT	P-SAT	SAT-DENSITY LIQ	SAT-DENSITY VAPOR
PARAMETER-				
SUCT -TC	-	4.5	61.04	.01
-RTD	-	4.4	61.06	.01
-P	245.8	-	58.92	.07
DISCH-TC	-	4.3	61.07	.01
-RTD	-	4.4	61.05	.01
-P	269.4	-	58.24	.10

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

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PUMP PERFORMANCE BASED ON SUCTION LEG CONDITIONS

	SET POINT	ACTUAL POINT (AVG)	SPEC. DIFF.	ACTUAL CONDITIONS ACTUAL DIFF.	SPEC. DRIFT /MIN	ACTUAL DRIFT /MIN	INST. UNCTY	DATA STD. DEV.
PRESSURE(PSIA) L-5		28.				1.	0.	1.
VOL FLOW(GPM)		-911.				3.	27.	5.
VOID FRACTION								
DRIF		0.000				0.000	.028	0.000
GD		0.000				0.000	.000	0.000
SPEED (RPM) L-12		-2244.				1.	5.	4.
PUMP HEAD								
GD(FT)		25.5				.0	.0	.1
ORIF(FT)		25.6				.0	.7	.0
DP(PSI) L-7		10.9				.00	.01	.00
PUMP TORQUE(FTLB)								
HYDRAULIC		-9.2				1.1	2.3	1.4
FRICTION		-13.5				.0	2.0	.0
SHAFT L-11		-22.7				1.1	1.2	1.4

PUMP PERFORMANCE BASED ON DISCHARGE LEG CONDITIONS

PRESSURE(PSIA) L-6	30.	41.	0.	11.	0.	1.	0.	1.
VOL FLOW(GPM)	-1050.	-901.	53.	149.	9.	3.	9.	5.
VOID FRACTION								
DRIF	0.000	0.000	.010	0.000	0.000	0.000	.001	0.000
GD		0.000				0.000	.000	0.000
SPEED (RPM) L-12	-2250.	-2244.	45.	6.	22.	1.	5.	4.
PUMP HEAD								
GD(FT)		25.5				.1	.0	.1
ORIF(FT)		25.6				.0	.0	.0
DP(PSI) L-7		10.9				.00	.01	.00
PUMP TORQUE(FTLB)								
HYDRAULIC		-9.2				1.1	2.3	1.4
FRICTION		-13.5				.0	2.0	.0
SHAFT L-11		-22.7				1.1	1.2	1.4

CONV CONST FILE ZERO 391 03/02/77 0055
DATA REDUCED 15.15.13. 79/06/06.

WATER ORIFICE = MAIN : STEAM ORIFICE = CLOSED

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 393 DATE 3/ 2/77 TIME 710.00 PAGE 2

PUMP PERFORMANCE BASED ON SUCTION AND DISCHARGE LEG AVERAGE

	ACTUAL POINT (AVG)	ACTUAL CONDITIONS ACTUAL DRIFT /MIN	INST. STD. DEV.	DATA STD. DEV.
PRESSURE(PSIA) L-5+6	35.	0.	0.	0.
VOL FLOW(GPM)	-906.	3.	15.	5.
VOID FRACTION				
ORIF	0.000	.000	.014	.000
GD	0.000	0.000	.000	0.000
SPEED (RPM) L-12	-2244.	1.	5.	4.
PUMP HEAD				
GD(FT)	25.5	.0	.0	.0
ORIF(FT)	25.6	.0	.4	.0
DP(PSI) L-7	10.9	.00	.01	.00
PUMP TORQUE(FTLB)				
HYDRAULIC	-9.2	1.1	2.3	1.4
FRICTION	-13.5	.0	2.0	.0
SHAFT L-11	-22.7	1.1	1.2	1.4

PUMP PERFORMANCE NORMALIZED VALUES

	SUCTION	DISCHARGE	AVERAGE
PUMP HEAD			
GAMMA DENSITOMETER	.101	.101	.101
ORIFICE	.102	.102	.102
VOLUMETRIC FLOW			
ORIFICE	-.260	-.257	-.259
SET POINT	-.300	-.300	-.300
VOID FRACTION (PERCENT)			
ORIFICE	0.0	0.0	0.0
GAMMA DENSITOMETER	0.0	0.0	0.0
SET POINT	0.0	0.0	0.0
PUMP SPEED			
ACTUAL	-.499	-.499	-.499
SET POINT	-.500	-.500	-.500
PUMP HYDRAULIC TORQUE			
GAM DEN	-.030	-.030	-.030
ORIFICES	-.031	-.031	-.031

SUPERFICIAL VELOCITIES	SUCT LEG	DISCH LEG (FT/SEC)
WATER	11.21	11.09
STEAM	0.00	0.00

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

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	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP PRESSURES (PSIA)						
HIGH PRES DRUM L-65	14.8	14.8	14.8	14.8	14.8	1.37
STEAM ORIFICE L-41/47	175.3	175.8	176.5	177.2	177.8	.08
WATER ORIFICE L-42/48	4.4	4.4	4.4	4.4	4.4	.20
SUCTION LEG L-5	26.9	27.6	28.8	26.6	28.8	1.63
SAT PRES	4.4	4.4	4.4	4.4	4.4	0.00
DISCHARGE LEG L-6	43.2	40.7	40.1	42.7	40.6	.22
SAT PRES	4.4	4.4	4.4	4.4	4.4	0.00
LOOP TEMPERATURE (F)						
SUCTION LEG-RTD L-55	156.9	156.9	156.9	156.9	156.9	0.00
SUCTION LEG-TC L-13	157.6	157.6	157.6	157.6	157.6	2.28
SAT TEMP	244.1	245.5	248.0	243.5	248.0	.24
DISCHARGE LEG-RTD L-56	157.2	157.2	157.1	157.1	157.1	0.00
DISCHARGE LEG-TC L-14	156.3	156.3	156.3	156.3	156.3	2.30
SAT TEMP	272.0	268.3	267.3	271.2	268.2	.18
WATER ORIF.-RTD L-53/58	157.2	157.2	157.1	157.1	157.1	0.00
WATER ORIF.-TC L-50/52	156.8	156.7	156.7	156.7	156.6	2.30
STEAM ORIF.-RTD L-54/59	369.3	369.6	369.9	370.2	370.5	0.00
STEAM ORIF.-TC L-49/51	371.0	371.3	371.5	371.8	372.1	.97
PUMP INJ IN-TC L-21	147.8	148.0	147.9	148.0	148.0	2.43
PUMP INJ OUT-TC L-22	143.9	144.3	144.5	144.3	144.6	2.49
HP DRUM ID-TC L-23	157.1	157.0	157.0	157.0	156.9	2.29
HP DRUM OD-TC L-24	157.7	157.7	157.6	157.6	157.5	2.28
AMBIENT-TC L-57	80.8	80.7	80.7	80.7	80.9	4.46
SUCTION LEG OD-TC L-30	157.9	157.9	157.9	157.9	157.7	2.28
DISCH. LEG OD-TC L-31	157.4	157.4	157.4	157.4	157.4	2.29
LOOP PRESSURE DROPS (PSI)						
FLOW CNTROL VLV L-60	.6	.5	.5	.6	.6	30.37
SUCT LEG-FLANGE L-61	.4	.4	.5	.5	.5	2.75
PAC16 DP L-62	.9	.9	.9	.9	.9	16.31
ACROSS ELBOW DP L-33	.1	.9	-.9	1.8	-1.9	42.18
VOLUTE-IMP BACK L-58	-3.8	-3.8	-3.8	-3.8	-3.8	.58
HP DRUM LEVL DP L-25	1.4	1.4	1.3	1.3	1.3	3.33
PMP FLNGE-FLNGE L-66	12.9	13.5	13.4	13.5	13.2	2.44
LOOP FLOWRATES (LBM/SE)						
WATER FLOW	122.76	122.60	122.50	123.36	121.27	1.01
STEAM FLOW	0.00	0.00	0.00	0.00	0.00	0.00
SEAL INJ IN L-9	2.59	2.59	2.57	2.59	2.60	1.11
SEAL INJ OUT L-32	1.14	1.14	1.17	1.17	1.14	.59
PUMP SPEED(RPM) L-12	-2244.	-2246.	-2238.	-2248.	-2245.	.2
SHAFT TORQUE(FTLB) L-11	-23.2	-20.1	-22.2	-24.1	-23.9	5.4
PUMP DP(PSI) L-7	10.9	10.9	10.9	10.9	10.9	.1

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	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP SPECIFIC VOLUMES (FT3/LBM)						
MIXING TEE						
SUCTION	.01638	.01638	.01638	.01638	.01638	1.70
DISCHARGE	.01638	.01638	.01638	.01638	.01638	1.16
GAMMA DENSITOMETER						
SUCTION LEG						
BEAM 1 L-15	.01632	.01628	.01634	.01633	.01629	.01
BEAM 2 L-16	.01628	.01632	.01630	.01625	.01637	.01
BEAM 3 L-17	.01636	.01624	.01638	.01641	.01607	.02
DISCHARGE LEG						
BEAM 1 L-18	.01646	.01649	.01636	.01650	.01632	.01
BEAM 2 L-19	.01628	.01635	.01633	.01625	.01623	.01
BEAM 3 L-20	.01633	.01653	.01640	.01632	.01640	.01
AECL						
BEAM 1 L-35	.01637	.01634	.01623	.01641	.01597	.01
BEAM 2 L-36	.01657	.01649	.01663	.01618	.01637	.01
BEAM 3 L-34	.01669	.01689	.01695	.01652	.01683	.04
FLUID VELOCITY						
MIXING TEE(FT/SEC)						
SUCTION	11.2	11.2	11.2	11.3	11.1	.59
DISCHARGE	11.1	11.1	11.1	11.2	11.0	.20
MIX TEE-GAM DEN(FT/SEC)						
SUCTION	11.2	11.2	11.2	11.2	11.1	.20
DISCHARGE	11.0	11.1	11.1	11.1	10.9	.20
HI TURBINE METER (MANUF CAL)						
SUCT LEG L-3	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-4	-0.	-0.	0.	0.	0.	
LO TURBINE METER (MANUF CAL)						
SUCT LEG L-28	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-29	-0.	-0.	-0.	-0.	-0.	
MOMENTUM FLUX						
MIXING TEE(LBM/FT-SEC2)						
SUCTION	7713.	7694.	7675.	7783.	7530.	1.31
DISCHARGE	7535.	7515.	7503.	7608.	7353.	.40
MIX TEE-GAM DEN(LBM/FT-SEC2)						
SUCTION	7669.	7665.	7638.	7722.	7525.	.40
DISCHARGE	7490.	7502.	7479.	7548.	7287.	.40
HI DRAG DISC (MANUF CAL)						
SUCT LEG L-1	-6720.	-9038.	-6392.	-9076.	-4461.	
DISCH LEG L-2	9492.	9189.	8896.	9910.	10095.	
LO DRAG DISC (MANUF CAL)						
SUCT LEG L-26	61389.	60049.	62416.	61331.	62449.	
DISCH LEG L-27	0.	0.	0.	0.	0.	

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

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PUMP PERFORMANCE BASED ON SUCTION LEG CONDITIONS

	SET POINT	ACTUAL POINT (AVG)	SPEC. DIFF.	ACTUAL DIFF.	SPEC. DRIFT /MIN	ACTUAL DRIFT /MIN	INST. UNCTY	DATA STD. DEV.
				ACTUAL CONDITIONS				
PRESSURE(BAR) L-5		2.				0.	3.	0.
VOL FLOW(M3/S)		-.0575				.0002	.0017	.0003
VOID FRACTION								
ORIF		0.000				0.000	.028	0.000
GD		0.000				0.000	.000	0.000
SPEED (RPM) L-12		-2244.				1.	5.	4.
PUMP HEAD								
GD(M)		7.8				.0	.0	.0
ORIF(M)		7.8				.0	.2	.0
DP(BAR) L-7		.7				.00	.00	.00
PUMP TORQUE(NM)								
HYDRAULIC		-12.5				1.5	3.1	1.9
FRICTION		-18.2				.0	2.7	.0
SHAFT L-11		-30.8				1.5	1.7	1.9

PUMP PERFORMANCE BASED ON DISCHARGE LEG CONDITIONS

PRESSURE(BAR) L-6	2.	3.	3.	1.	0.	0.	0.	0.
VOL FLOW(M3/S)	-.0662	-.0568	.0033	.0094	.0006	.0002	.0006	.0003
VOID FRACTION								
ORIF	0.000	0.000	.010	0.000	0.000	0.000	.001	0.000
GD		0.000				0.000	.000	0.000
SPEED (RPM) L-12	-2250.	-2244.	45.	6.	30.	1.	5.	4.
PUMP HEAD								
GD(M)		7.8				.0	.0	.0
ORIF(M)		7.8				.0	.0	.0
DP(BAR) L-7		.7				.00	.00	.00
PUMP TORQUE(NM)								
HYDRAULIC		-12.5				1.5	3.1	1.9
FRICTION		-18.2				.0	2.7	.0
SHAFT L-11		-30.8				1.5	1.7	1.9

CONV CONST FILE ZERO 391 03/02/77 0055
DATA REDUCED 15.15.15. 79/06/06.

WATER ORIFICE = MAIN : STEAM ORIFICE = CLOSED

330313

PUMP PERFORMANCE BASED ON SUCTION AND DISCHARGE LEG AVERAGE

	ACTUAL POINT (AVG)	ACTUAL CONDITIONS ACTUAL DRIFT /MIN	INST. STD. DEV.	DATA STD. DEV.
PRESSURE(BAR) L-5+6	2.	0.	0.	0.
VOL FLOW(M3/S)	-.0572	.0002	.0010	.0003
VOID FRACTION				
ORIF	0.000	.000	.014	.000
GD	0.000	0.000	.000	0.000
SPEED (RPM) L-12	-2244.	1.	5.	4.
PUMP HEAD				
GD(M)	7.8	.0	.0	.0
ORIF(M)	7.8	.0	.1	.0
DP(BAR) L-7	.7	.00	.00	.00
PUMP TORQUE(NM)				
HYDRAULIC	-12.5	1.5	3.1	1.9
FRICTION	-18.2	.0	2.7	.0
SHAFT L-11	-30.8	1.5	1.7	1.9

PUMP PERFORMANCE NORMALIZED VALUES

	SUCTION	DISCHARGE	AVERAGE
PUMP HEAD			
GAMMA DENSITOMETER	.101	.101	.101
ORIFICE	.102	.102	.102
VOLUMETRIC FLOW			
ORIFICE	-.260	-.257	-.259
SET POINT	-.300	-.300	-.300
VOID FRACTION (PERCENT)			
ORIFICE	0.0	0.0	0.0
GAMMA DENSITOMETER	0.0	0.0	0.0
SET POINT	0.0	0.0	0.0
PUMP SPEED			
ACTUAL	-.499	-.499	-.499
SET POINT	-.500	-.500	-.500
PUMP HYDRAULIC TORQUE			
GAM DEN	-.030	-.030	-.030
ORIFICES	-.031	-.031	-.031

SUPERFICIAL VELOCITIES	SUCT LEG	DISCH LEG (M/SEC)
WATER	3.42	3.38
STEAM	0.00	0.00

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	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP PRESSURES (BAR)						
HIGH PRES DRUM L-65	1.0	1.0	1.0	1.0	1.0	1.37
STEAM ORIFICE L-41/47	12.1	12.1	12.2	12.2	12.3	.08
WATER ORIFICE L-42/48	.3	.3	.3	.3	.3	.20
SUCTION LEG L-5	1.9	1.9	2.0	1.8	2.0	1.63
SAT PRES	.3	.3	.3	.3	.3	0.00
DISCHARGE LEG L-6	3.0	2.8	2.8	2.9	2.8	.22
SAT PRES	.3	.3	.3	.3	.3	0.00
LOOP TEMPERATURE (C)						
SUCTION LEG-RTD L-55	69.4	69.4	69.4	69.4	69.4	0.00
SUCTION LEG-TC L-13	69.8	69.3	69.8	69.8	69.8	2.28
SAT TEMP	117.8	118.6	120.0	117.5	120.0	.24
DISCHARGE LEG-RTD L-56	69.5	69.5	69.5	69.5	69.5	0.00
DISCHARGE LEG-TC L-14	69.0	69.1	69.1	69.1	69.1	2.30
SAT TEMP	133.3	131.3	130.7	132.9	131.2	.18
WATER ORIF.-RTD L-53/58	69.5	69.5	69.5	69.5	69.5	0.00
WATER ORIF.-TC L-50/52	69.3	69.3	69.3	69.3	69.2	2.30
STEAM ORIF.-RTD L-54/59	187.4	187.5	187.7	187.9	188.0	0.00
STEAM ORIF.-TC L-49/51	188.3	188.5	188.6	188.8	188.9	.97
PUMP INJ IN-TC L-21	64.4	64.4	64.4	64.4	64.4	2.43
PUMP INJ OUT-TC L-22	62.2	62.4	62.5	62.4	62.5	2.49
HP DRUM ID-TC L-23	69.5	69.5	69.4	69.4	69.4	2.29
HP DRUM OD-TC L-24	69.9	69.8	69.8	69.8	69.7	2.28
AMBIENT-TC L-57	27.1	27.0	27.1	27.1	27.2	4.46
SUCTION LEG OD-TC L-30	69.9	69.9	69.9	69.9	69.8	2.28
DISCH. LEG OD-TC L-31	69.7	69.7	69.6	69.7	69.7	2.29
LOOP PRESSURE DROPS (BAR)						
FLOW CNTROL VLV L-50	.0	.0	.0	.0	.0	30.37
SUCT LEG-FLANGE L-61	.0	.0	.0	.0	.0	2.75
PAC16 DP L-62	.1	.1	.1	.1	.1	16.31
ACROSS ELBOW DP L-33	.0	-.1	-.1	.1	-.1	42.18
VOLUTE-IMP BACK L-68	-.3	-.3	-.3	-.3	-.3	.58
HP DRUM LEVL DP L-25	.1	.1	.1	.1	.1	3.33
PMP FLNGE-FLNGE L-66	.9	.9	.9	.9	.9	2.44
LOOP FLOWRATES (KG/SEC)						
WATER FLOW	55.69	55.61	55.57	55.95	55.01	1.01
STEAM FLOW	0.00	0.00	0.00	0.00	0.00	0.00
SEAL INJ IN L-9	1.17	1.18	1.17	1.18	1.18	1.11
SEAL INJ OUT L-32	.52	.52	.53	.53	.52	.59
PUMP SPEED(RPM) L-12	-2244.	-2245.	-2238.	-2248.	-2245.	.2
SHAFT TORQUE(NM) L-11	-31.4	-27.2	-30.1	-32.7	-32.4	5.4
PUMP DP(BAR) L-7	.7	.7	.7	.7	.7	.1

330315

CE-EPRI TWO PHASE PUMP PERFORMANCE PROGRAM -STEADY STATE TESTS

TEST NO 393 DATE 3/ 2/77 TIME 210.00 PAGE 8

	POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	PCT UNCTY
LOOP SPECIFIC VOLUMES (M3/KG)						
MIXING TEE						
SUCTION	.00102	.00102	.00102	.00102	.00102	1.70
DISCHARGE	.00102	.00102	.00102	.00102	.00102	1.16
GAMMA DENSITOMETER						
SUCTION LEG						
BEAM 1 L-15	.00102	.00102	.00102	.00102	.00102	.01
BEAM 2 L-16	.00102	.00102	.00102	.00101	.00102	.01
BEAM 3 L-17	.00102	.00101	.00102	.00102	.00100	.02
DISCHARGE LEG						
BEAM 1 L-18	.00103	.00103	.00102	.00103	.00102	.01
BEAM 2 L-19	.00102	.00102	.00102	.00101	.00101	.01
BEAM 3 L-20	.00102	.00103	.00102	.00102	.00102	.01
AECL						
BEAM 1 L-35	.00102	.00102	.00101	.00102	.00100	.01
BEAM 2 L-36	.00103	.00103	.00104	.00101	.00102	.01
BEAM 3 L-34	.00104	.00105	.00106	.00103	.00105	.04
FLUID VELOCITY						
MIXING TEE(M/SEC)						
SUCTION	3.4	3.4	3.4	3.4	3.4	.59
DISCHARGE	3.4	3.4	3.4	3.4	3.3	.20
MIX TEE-GAM DEN(M/SEC)						
SUCTION	3.4	3.4	3.4	3.4	3.4	.20
DISCHARGE	3.4	3.4	3.4	3.4	3.3	.20
HI TURBINE METER (MANUF CAL)						
SUCT LEG L-3	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-4	-0.	-0.	0.	0.	0.	
LO TURBINE METER (MANUF CAL)						
SUCT LEG L-28	-0.	-0.	-0.	-0.	-0.	
DISCH LEG L-29	-0.	-0.	-0.	-0.	-0.	
MOMENTUM FLUX						
MIXING TEE(KG/M-SEC2)						
SUCTION	11473.	11448.	11421.	11582.	11205.	1.31
DISCHARGE	11212.	11182.	11164.	11321.	10941.	.40
MIX TEE-GAM DEN(KG/M-SEC2)						
SUCTION	11412.	11405.	11365.	11491.	11198.	.40
DISCHARGE	11146.	11164.	11128.	11232.	10843.	.40
HI DRAG DISC (MANUF CAL)						
SUCT LEG L-1	-9999.	-13448.	-9512.	-13505.	-6637.	
DISCH LEG L-2	14124.	13674.	13237.	14746.	15021.	
LO DRAG DISC (MANUF CAL)						
SUCT LEG L-26	91346.	89354.	92876.	91260.	92924.	
DISCH LEG L-27	0.	0.	0.	0.	0.	

Appendix 3.3E

SAMPLE OUTPUT FROM PSSR CODE, FORWARD VERSION

REVIEW OF STEADY STATE DATA FOR
CE/EPRI PUMP TESTS
(FORWARD FLOW)

INPUT DATA---

TEST NO. 856 DATE 9/20/77

SET POINT DATA=

PRS PSIA	FLWS GPM	SPDS RPM	ALFS
70.00000	4400.00000	4450.00000	0.00000

MEAS.POINT DATA=

PRSM	FLWM(1)	FLWM(2)	SPDM	ALFM(1)	ALFM(2)
78.81700		4397.77800	4422.48000	0.00000	0.00000

DPPMP(I),FROM NORM SUCT TO NORM DISCH

-23.14800	-24.84000	-21.58600	-22.81900	-24.78400	0.00000

NORM DISCH + SUCT LEG PRES(PSIA),PDWN(I),PUPS(I)

51.57400	50.05400	49.49300	54.17100	48.51100	0.00000
79.47000	76.80600	78.28900	80.14200	79.37800	0.00000

PUMP DP(NORM SUCT-NORM DISCH),PMDPIO(I)

-15.04900	-13.08700	-13.97000	-11.89300	-13.35100	0.00000

SUCT TEST SECT-NORM INLET DP, DPUPTIN(I)

3.85900	3.18500	3.73500	3.76400	3.58500	0.00000

SP.VOL MIXING TEE,NORM SUCT (CFT/LBM),SVMXUP(I)

.01655	.01655	.01656	.01656	.01656	0.00000

SP.VOL MIXING TEE,NORM DISCH,SVMXDN(I)

.01655	.01656	.01656	.01656	.01656	0.00000

SP.VOL AT NORM SUCT ,FROM GD2, SVGDUPA(I)

.01611	.01613	.01604	.01605	.01608	0.00000

SP.VOL AT NORM DISCH,FROM GD2, SVGDDNA(I)

.01655	.01666	.01666	.01658	.01652	0.00000

VELOCITY MIXING TEE,NORM SUCTION (FT/SEC),VMXUP(I)

53.01100	54.20200	53.03600	53.10500	57.26400	0.00000

VELOCITY MIXING TEE,NORM DISCH,VMXDN(I)

53.03800	54.22500	53.05500	53.12700	57.28400	0.00000

SEAL INJ OUT FLOW RATE(PPS),SEALOT(I)

1.13600	1.15800	1.19100	1.15500	1.17400	0.00000

SEAL INJ IN FLOW RATE(PPS),SEALIN(I)

1.37600	1.35000	1.35000	1.34100	1.34200	0.00000

TOT WATER FLOW RATE IN LOOP(PPS),TOTWTR(I)

579.65900	592.63600	579.82600	580.53900	625.94500	0.00000

TOT STM FLOW RATE IN LOOP(PPS),TOTSTM(I)

0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

AECL DP MEASUREMENTS

-.05600	-.05100	-.04900	-.04600	-.05200	0.00000

PUMP TORQUE AND HEAD DATA

PHYTRQ (FTLB)	PSHTRQ (FTLB)	PH(1) (FT)	PH(2) (FT)
145.60000	169.22600	-54.28000	-55.87000

NOTE.....FOR THE VARIABLES WITH DEMENSION LENGTH 2. 1-REFERS TO GD MEAS.
2-REFERS TO ORIF.

REVIEW OF STEADY STATE DATA FOR
CE/EPRI PUMP TESTS
(FORWARD FLOW)

TEST NO. 856 DATE 9/20/77

OP.PARAMETERS	P(PSIA)	ALF	NU	ALN	NU/ALN	ALN/NU
SET POINT	70.0	0.000	1.257	.989	1.271	.787
MEAS.POINT						
GD	78.8	0.000		.983		
ORIF	78.8	0.000	1.257	.983	1.279	.782

POINT NO.	1	2	3	4	5	AVE
PUMP DP LG-LG,PSI						
PER DP SENSOR	-23.148	-24.840	-21.586	-22.819	-24.784	-23.435
PER P(DIS)-P(SUC)	-27.896	-26.752	-28.796	-25.971	-30.867	-28.056
PUMP DP(IN-OUT)	-15.049	-13.087	-13.970	-11.893	-13.351	-13.470
DP(IN-OUT)-DP(LL)	8.099	11.753	7.616	10.926	11.433	9.965
DP MEA(SUC.LG-IN)	3.859	3.185	3.735	3.764	3.585	3.626

CALC.DP(SUC.LG-IN)....= 13.177 FOR K-SUCT= .690
CALC.DP(OUT-DIS.LG)...= 2.867 FOR K-DISCH= .150

K-SUCT FROM MEAS.DP(SUC.LG-IN).... = .190
K-DISCH FROM MEAS.DP(IN-OUT)-DP(SUC.LG-IN)-DP(LL)= .332

SEAL INJ FLOW OUT LESS THAN IN--(UNDESIRABLE) BY -.032 PERCENT

AECL DP -.046MAX TO -.056MIN

NORMALIZED PARAMETER	TEST ORIF(OR GD)	B-J MAP
H(HEAD)	-.222(-.215)	
BTAH(HYD.TRQ)	.488(.481)	
BTAS(SHAFT TRQ)	.567(.559)	

HOMOL. RATIOS	TEST ORIF(OR GD)	
NU/ALN	1.279( )	
ALN/NU	.782( )	
H/ALN2	-.230(-.223)	
H/NU2	-.140(-.136)	
BTAH/ALN2	.505(.498)	
BTAH/NU2	.309(.305)	

330402

REVIEW OF STEADY STATE DATA FOR
CE/EPRI PUMP TESTS
(FORWARD FLOW)

NORMALIZED TOTAL+STATIC HEADS USING LOCAL DENSITIES

	LEG TO LEG ORIF (OR GD)	FLNG TO FLNG ORIF (OR GD)
HT	-.218(-.184)	-.123(-.091)
HS	-.222(-.199)	-.127(-.106)

HOMOLOGOUS RATIOS BASED ON TOT + STAT HEADS

HT/ALN2	-.225(-.191)	-.128(-.094)
HT/NU2	-.138(-.117)	-.057(-.057)
HS/ALN2	-.229(-.206)	-.132(-.109)
HS/NU2	-.140(-.126)	-.081(-.067)

EFFICIENCIES (PUMPING DISSIPATION)

MECHANICAL	HYDRAULIC	TOTAL
86.04	-48.16(-47.39)	-41.44(-40.77)

Appendix 3.3F

SUMMARY TABLE CODE LISTING

```
      PROGRAM TABLST(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE20)        TABLST      2
      DIMENSION DATE(3)                                                   TABLST      3
      REWIND 20                                                           TABLST      4
      ILINE=0                                                             TABLST      5
      IPAGE=0                                                             TABLST      6
  500 READ(20,7001)NT, DATE, TYPE,MPRM,ALFM,DPPMP, PMDPIO, DPUPTIN,       TABLST      7
     1            NUM, ALNM,RATIM,OBRATIM, PNH, BTA2, DELT2,              TABLST      8
     2            ZTA2,EPS2 , PSI2,DENUP                                  TABLST      9
C--DELT2 = H/ALN2 ,ZTA2= H/NU2 ,EPS2 =B/ALN2 , PSI2 =B/NU2                TABLST     10
      IF(EOF(20))501,502                                                  TABLST     11
  502 CONTINUE                                                            TABLST     12
      IF(ILINE.EQ.54) ILINE=0                                             TABLST     13
      ILINE= ILINE+1                                                      TABLST     14
      IF(ILINE.EQ.1) IPAGE=IPAGE+1                                        TABLST     15
      IF(ILINE.EQ.1) WRITE(6,5001)IPAGE                                   TABLST     16
      IF(ILINE.EQ.1) WRITE(6,5000)                                        TABLST     17
 5000 FORMAT(1H , *TEST*,                                                 TABLST     18
     1          2X,* DATE   TYP  PRES   VOID    DP      DP      DP       N TABLST     19
     2U    ALN   NU/ALN ALN/NU  NORMALIZED   H/ALN2  H/NU2 B/ALN2  B/NU2 TABLST     20
     3*,1X,*DENSITY*,                                                     TABLST     21
     4 /1X,18X,* PSIA   FRAC   (LL)   (FF)  (TS-NS)*,31X,*H   HYTRQ,B*,   TABLST     22
     530X,*UPSTRM*/)                                                      TABLST     23
 5001 FORMAT(1H1,*CE/EPRI TWO PHASE PUMP STEADY STATE TESTS*,10X,         TABLST     24
     1 *SUMMARY TABLE*,55X,*PAGE--*,I3,/)                                 WK78355     1
 7001 FORMAT(1X,I4,3I2,A3,A5,15(A7))                                      TABLST     26
      IF (ILINE.EQ.6)601,602                                              WK78355     2
  601 WRITE(6,7030)                                                       WK78355     3
 7030 FORMAT(/)                                                           WK78355     4
      ILINE = ILINE + 2                                                   WK78355     5
      GO TO 650                                                           WK78355     6
  602 IF(ILINE.EQ.13)601,603                                              WK78355     7
  603 IF(ILINE.EQ.20)601,604                                              WK78355     8
  604 IF(ILINE.EQ.27)601,605                                              WK78355     9
  605 IF(ILINE.EQ.34)601,606                                              WK78355    10
  606 IF(ILINE.EQ.41)601,607                                              WK78355    11
  607 IF(ILINE.EQ.48)601,650                                              WK78355    12
  650 CONTINUE                                                            WK78355    13
      WRITE(6,7002)NT,DATE,TYPE,MPRM,ALFM,DPPMP,PMDPIO,DPUPTIN,           TABLST     27
     1             NUM,ALNM,RATIM,OBRATIM,PNH, BTA2,DELT2,              TABLST     28
     2             ZTA2,EPS2, PSI2,DENUP                                TABLST     29
 7002 FORMAT(1X,I4,1X,2(I2,*/*),I2,1X,A3,1X,A5,A7,1X,3A7,2X,              TABLST     30
     1 11(A7))                                                            TABLST     31
      GO TO 500                                                           TABLST     32
  501 CONTINUE                                                            TABLST     33
      IPAGE= IPAGE+1                                                      TABLST     34
      IF(ILINE.LT.20) GO TO 7006                                          TABLST     35
      WRITE(6,7003)IPAGE                                                  TABLST     36
 7003 FORMAT(1H1,111X,*PAGE--*,I3,/)                                      TABLST     37
 7006 WRITE(6,7005 )                                                      TABLST     38
 7005 FORMAT(60X,*NOTES*/59X,*--------*//                                 TABLST     39
     1       39X,*DP(LL)..... LEG TO LEG PRESSURE RISE,PSI*//             WK78355    14
     2       39X,*DP(FF)..... FLANGE TO FLANGE PRESSURE RISE,PSI*//       WK78355    15
     339X,*DP(TS-NS)..FOR FWD FLOW,PRESSURE DROP IS FROM SUCTION LEG*/    TABLST     42
     439X,*            TO SUCTION FLANGE. FOR REV FLOW, THE PRESSURE*/    WK78355    16
     539X,*            DROP IS FROM SUCTION FLANGE TO SUCTION LEG,PSI*//  WK78355    17
     6       39X,*NU..... NORMALIZED VOLUME FLOW RATE (TEST/RATED)*/      WK78355    18
     6/                                                                   WK78355    19
```

```
                     7       39X,*ALN........ NORMALIZED PUMP SPEED(TEST/RATED)* //      WK78355    20
                     8       39X,*H ......... NORMALIZED LEG TO LEG PUMP HEAD(TEST/RATED WK78355    21
60                   9)*//                                                               TABLST     48
                     1       39X,*B.......... DENSITY CORRECTED NORMALIZED HYDRAULIC*/   TABLST     49
                     2       39X,*            TORQUE((HYD TRQ/RATED),(62.3),(AVE SPEC VO TABLST     50
                     3L))*/)                                                             TABLST     51
                      WRITE(6,7020)                                                      TABLST     52
65                 7020 FORMAT(39X,*DENSITY UPSTRM...FOR FWD FLOW IT IS THE SUCTION LEG VA TABLST     53
                     1LUE*/39X,*                FOR REV FLOW IT IS THE DISCHARGE LEG VA TABLST     54
                     2LUE,LBM/CFT*/)                                                     TABLST     55
                      WRITE(6,7007)                                                      TABLST     56
                   7007  FORMAT(39X,*RATED FLOW RATE, GPM  , 3500*/                     TABLST     57
70                   1       39X,*RATED SPEED ,    RPM  , 4500*/                       TABLST     58
                     2       39X*RATED TORQUE,    FT-LB, 308 */                        TABLST     59
                     3       39X,*RATED HEAD  ,    FT   , 252 */                       TABLST     60
                     4       39X,*AVE SPEC VOL,CFT/LBM  , AVERAGE OF UPSTREAM AND DOWNST TABLST     61
                     5REAM SPEC VOLS*/                                                   TABLST     62
75                   6       39X,*VOID FRAC AND SPEC VOLS ARE BASED ON ORIFICE MEASUREME TABLST     63
                     7NTS*)                                                              TABLST     64
                      WRITE(6,7008)                                                      TABLST     65
                   7008 FORMAT(1X,*...THIS SUMMARY TABLE IS BASED ON ANALYSIS OF REDUCED D WK78355    22
                     1ATA BY PSSR PROGRAMS PSSRFORWARD AND PSSRREVERSE...*)              WK78355    23
80                 503   STOP                                                          TABLST     69
                         END                                                           TABLST     70
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

70	TABLST	1

VARIABLES

560	ALFM	REAL		REFS	38	DEFINED	6					
565	ALNM	REAL		REFS	38	DEFINED	6					
571	BTA2	REAL		REFS	38	DEFINED	6					
577	DATE	REAL	ARRAY	REFS	2	38	DEFINED	6				
572	DELT2	REAL		REFS	38	DEFINED	6					
576	DENUP	REAL		REFS	38	DEFINED	6					
561	DPPMP	REAL		REFS	38	DEFINED	6					
563	DPUPTIN	REAL		REFS	38	DEFINED	6					
574	EPS2	REAL		REFS	38	DEFINED	6					
553	ILINE	INTEGER		REFS	12	13	14	15	16	26	29	
					31	32	33	34	35	36	46	
				DEFINED	4	12	13	29				
554	IPAGE	INTEGER		REFS	14	15	45	47	DEFINED	5	14	
					45							
557	MPRM	INTEGER		REFS	38	DEFINED	6					
555	NT	INTEGER		REFS	38	DEFINED	6					
564	NUM	INTEGER		REFS	38	DEFINED	6					
567	OBRATIM	REAL		REFS	38	DEFINED	6					
562	PMDPIO	REAL		REFS	38	DEFINED	6					
570	PNH	REAL		REFS	38	DEFINED	6					
575	PSI2	REAL		REFS	38	DEFINED	6					
566	RATIM	REAL		REFS	38	DEFINED	6					

VARIABLES	SN	TYPE	RELOCATION										
556	TYPE	REAL		REFS	38	DEFINED	6						
573	ZTA2	REAL		REFS	38	DEFINED	6						

FILE NAMES		MODE											
0	INPUT												
20	OUTPUT												
40	TAPE20	FMT	READS	6	MOTION	3							
0	TAPE5												
20	TAPE6	FMT	WRITES	15	16	27	38	47	49	64	68		
			77										

EXTERNALS	TYPE	ARGS	REFERENCES
EOF	REAL	1	10

STATEMENT LABELS			DEF LINE	REFERENCES						
75	500		6	43						
142	501		44	10						
0	502	INACTIVE	11	10						
0	503	INACTIVE	80							
121	601		27	26	31	32	33	34	35	36
125	602		31	26						
0	603	INACTIVE	32	31						
0	604	INACTIVE	33	32						
0	605	INACTIVE	34	33						
0	606	INACTIVE	35	34						
0	607	INACTIVE	36	35						
137	650		37	30	36					
221	5000	FMT	17	16						
252	5001	FMT	23	15						
264	7001	FMT	25	6						
323	7002	FMT	41	38						
335	7003	FMT	48	47						
344	7005	FMT	50	49						
147	7006		49	46						
473	7007	FMT	69	68						
534	7008	FMT	78	77						
450	7020	FMT	65	64						
273	7030	FMT	28	27						

STATISTICS		
PROGRAM LENGTH	5218	337
BUFFER LENGTH	618	49

Section 4

TRANSIENT DATA REDUCTION METHODS

Section 4

CONTENTS

ILLUSTRATIONS

TABLES

4.1 INTRODUCTION

This section details the processing methods used with the transient test data.

Two types of data acquisition systems were used to record transient test data. The primary system used was a 40 channel FM multiplex recording system. This system recorded data continuously which was necessary for accurately recording the transient events. The data scanner system, which was used to record data during steady-state testing, was used as a backup for transient testing and allowed preliminary analysis of the blowdown to be made while the FM data was being processed. Final analysis of most parameters was based on the FM system data due to the better resolution of parameter values obtainable from this source. It was necessary to digitize the raw FM data for input into the Transient Data Reduction (TDR) program. The digitized raw data plus the appropriate calibration constant files provided the necessary input into the TDR program which converted the raw data into selected parameters in engineering units. The output of the TDR program was then used as input to an experimental plot program to generate machine plots for desired parameters.

Discussion of the various computer codes and outputs mentioned above are included in the following subsections.

4.2 FM SYSTEM TRANSIENT DATA REDUCTION PROCESS

4.2.1 Data Reduction Process Description

The process employed in the reduction of transient data collected by the FM system is shown in Figure 4.2-1 using graphic symbols to represent data storage devices, data processing codes, and data display devices. To maintain the identity of the data as it is transferred into the various forms, the following indexing information is necessary:

a. Instrument Location Number (ILN), and

b. FM Channel Number (FCN).

The instrument location number identifies the physical location of a measuring device, as given in the Piping and Instrumentation Diagram (P&ID) for the test facility (See Figure 4.2-2). The FM channel number indicates the channel of the FM Multiplex Recording System to which a particular instrument was connected, and this can be found in the Instrumentation List. A sample Instru-

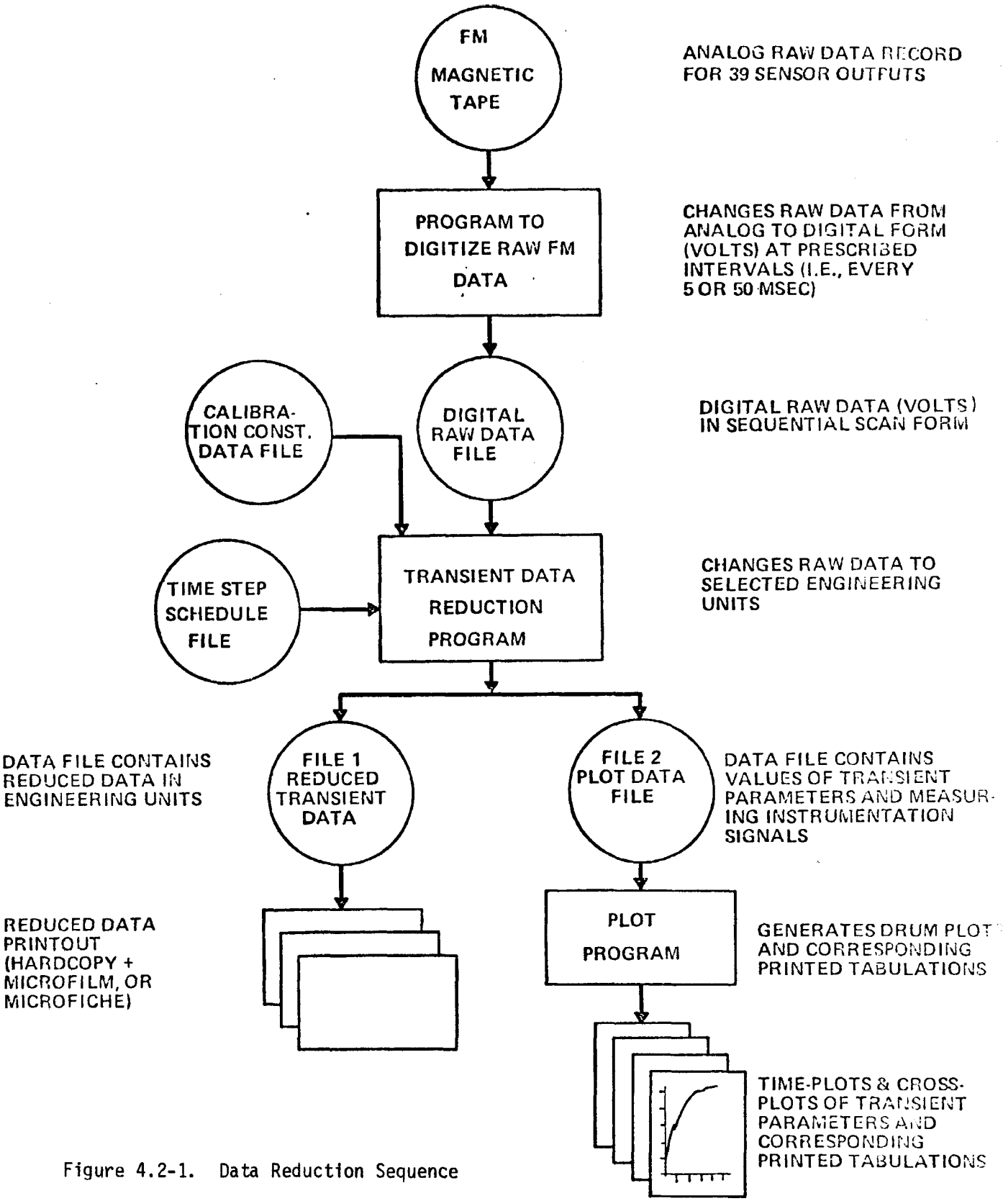


Figure 4.2-1. Data Reduction Sequence

(See Page 3-3).

Figure 4.2-2. Piping and Instrumentation Diagram

mentation List is provided in Table 4.2-1. Instrumentation Lists for all transient tests are provided Appendix 4.2A. The correlation between the ILN and FCN is also contained in the Instrumentation List.

Changes to the instrument location numbers occurred infrequently and were recorded by revising the P&ID. Changes to the FM channel numbers were much more common (from test to test) and occurred when additional blowdown instrumentation was provided and/or when a particular instrument assigned to a FM channel was not operational. These changes are reflected in the Instrumentation List for each blowdown test. The FM channel numbers are used as the master indexes to tie together the Instrumentation List, the Conversion Constant Data File, the FM-Multiplex Recording System, the Transient Data Reduction Program (TDR), and the Output.

The data reduction sequence as shown in Figure 4.2-1 involves the following steps.

1. Digitization of the analog FM data at prescribed sampling frequencies (200 samples/ sec and 20 samples/sec), which results in the creation of the Digitized Raw Data File.

2. Creation of the Time Step Schedule File containing the desired schedule of calculation intervals. A maximum of 5000 time values can be employed to process transient data.

3. Creation of the Conversion Constant Data File which contains the conversion constants for the instruments employed in the blowdown test.

4. Using these files as input, the Transient Data Reduction Program (TDR) converts the raw data into selected parameters in engineering units.

5. The output of the data reduction program can be obtained as hard copy printout, microfilm or microfiche, and/or stored as a data file for later use in plotting.

6. The plot data file can be employed in conjunction with the experimental data plot program described in Appendix 4.2G to generate machine plots of desired parameters.

The above process, made up of the components as shown in Figure 4.2-1, enable the raw transient test data acquired by the FM-Multiplex System during the blowdown tests to be converted into useful operating and performance parameters in an orderly fashion.

TABLE 4.2-1

TWO PHASE PUMP PERFORMANCE PROGRAM
SAMPLE INSTRUMENTATION LIST

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200 psid
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16 psid
9	L-9	F-22	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F

TABLE 4.2-1

TWO PHASE PUMP PERFORMANCE PROGRAM
SAMPLE INSTRUMENTATION LIST

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Lower Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Center Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Upper Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Lower Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer Center Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Upper Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermocouple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F

TABLE 4.2-1 (Cont'd.)

TWO PHASE PUMP PERFORMANCE PROGRAM
SAMPLE INSTRUMENTATION LIST

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-1,000,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-1,000,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet FLow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D.P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ inches H_2O
34	L-34	F-35	AECL Densitometer, Outer Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Inner Beam 1	0-62.4 lb/ft^3
36	L-36	F-37	AECL Densitometer, Center Beam 2	0-62.4 lb/ft^3
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L	F-11	Main Water Orifice DP Cell (Lo)	0-3.5 psid

TABLE 4.2-1 (Cont'd.)

TWO PHASE PUMP PERFORMANCE PROGRAM
SAMPLE INSTRUMENTATION LIST

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
39	L-39L		Bypass Steam Orifice DP Cell (lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Bypass Water Orifice Pressure Cell	0-1500 psi
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F

TABLE 4.2-1 (Cont'd.)

TWO PHASE PUMP PERFORMANCE PROGRAM
SAMPLE INSTRUMENTATION LIST

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62	L-62		Pac-16 Δ Cell	0-200 psid
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65	F-30	H.P. Drum Pressure Cell	0-1500 psi
66	L-66	F-39	Pump Flange to Flange DP Cell	-100 to +200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid

Digitization of the FM analog data involved reproducing the recorded FM signals and demodulating them to recover the associated voltages. The demodulation frequency limits the voltage output with low pass filters to a range of 0-300 HZ. These frequency limited voltages are then converted, using successive approximation techniques, to discrete digital values and written in formatted records to a digital seven track magnetic tape for subsequent calibration. Calibration was accomplished using a FORTRAN Program (Appendix 4.2B) on the Control Data 7600 Computer. The seven track digital tape was read by the program and a three level sort was entered. The output of these sorting routines was a single file which had a complete time history for each channel arranged in sequential order. Calibration was performed based on a slope intercept calculation using the zero and full scale portion of the time history. The full scale deviation voltage was a function of the voltage controlled oscillator (VCO) power supply. Each analog input to the FM system was connected to a separate VCO. Every ten VCO's had their own power supply resulting in four different full scale deviation voltages. These voltages were inputs to the program and applied as full scale voltages to the appropriate channels. Upon completion, a nine track tape was generated for both the 200 and 20 samples/sec rates for input to the Transient Data Reduction (TDR) program.

Details on the FM data acquisition system are provided in Volume VII, Test Facility Description.

The Transient Data Reduction program required a special conversion constant file which differed from the conversion constant file used by the Steady-State Data Reduction program. A separate conversion constant file was created for each transient. Files of all 16 transient tests appear in Appendix 4.2H A line-by-line description of a typical file (Figure 4.2-3) is given in Table 4.2-2. These files refer only to instruments connected to the FM data acquisition system. For example, four thermocouples; L-13 (Suction), L-14 (Discharge), L-30 (Suction drag disc), and L-31 (Discharge drag disc) were included as FM instruments and are listed on line 100. In contrast, among the steady-state instruments were 13 thermocouples, including the four mentioned above.

Each FM instrument is given a file number for use within the transient conversion constant file. File numbers are listed for each instrument type in lines 100 to 180. These file numbers specify the order in which the instrument conversion constants are arranged beginning with 1 on line 250/260, and continuing

```
CAL1156


100=        5 13 14 30 31 33
110=        5  5  6 24 28 29
120=        6  7  8 21 38 37 10
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 20 34 35 36
180=        1 32
190=     1  6  8  9 10 11
200= 14.504 15.966 15.594 15.063 15.468
210=   50.245 49.798 15.961 38.308 16.160 15.829
220=        0.000
230=        0.000  0.000  0.000  0.000
240=        0.000  0.000  0.000  0.000
250=        0.003
260=       16.044
270=         .559088E+04  .609773E+04  .919017E-03  .000000E+00
280=   .000000E+00  .000000E+00  .506167E+04
290=         .138397E+05  .645779E+04 -.259157E-02  .000000E+00
300=   .000000E+00  .000000E+00  .834928E+04
310=         .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=   .000000E+00  .000000E+00  .302208E+01
330=         .000000E+00  .000000E+00  .493782E+01  .000000E+00
340=   .000000E+00  .000000E+00  .552455E+01
350=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360=  0.           0.           .450000E+00
370=         .600000E+01 -.587139E-01  .233839E+02  .136798E-02
380=  0.           0.           .900000E-01
390=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=   .314705E-05  .100000E+01  .307500E+00
410=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=   .151235E-04  .100000E+01  .075000E+00
430=         .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=   .000000E+00  .000000E+00  .587384E+01
450=         .000000E+00 -.255897E-02  .547839E-01 -.468086E-06
460=   .637735E-06  .100000E+01  .404250E-02
470=        0.           .119542E+03  .452000E+00 0.
480=  0.           0.           .819800E+00
490=        0.           .100000E+03 0.           .100000E+01
500=  0.           0.           .500000E+01
510=        0.           0.           0.           0.
520=  0.           0.           .200000E+01
530=        0.           0.           0.           0.
540=  0.           0.           .200000E+01
```

Figure 4.2-3. Typical Transient Conversion Constant File

```
550=        .310772E+03 -.696444E+02 -.108638E+02  .115036E+02
560=  0.          0.          .620000E-02
570=        .226498E+03 -.573851E+02 -.240361E+01  .944093E+01
580=  0.          0.          .600000E-02
590=        .768264E+03 -.162113E+03 -.214654E+02  .227338E+02
600=  0.          0.          .211000E-01
610=        .357793E+03 -.813411E+02 -.122448E+02  .118022E+02
620=  0.          0.          .136000E-01
630=        .250160E+03 -.594545E+02 -.520076E+01  .861198E+01
640=  0.          0.          .530000E-02
650=        .127026E+03 -.368440E+02  .364346E+02  .214572E+02
660=  0.          0.          .144000E-01
670=        .000000E+00 -.276842E-01  .394041E+00  .301402E-05
680=   .327670E-05  .100000E+01  .135000E+00
690=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
700=   .000000E+00  .000000E+00  .436448E+01
710=        0.          0.          0.          0.
720=  0.          0.          .200000E+01
730=        .600000E+01  .151725E+00  .229975E+02  .284105E-02
740=   .000000E+00  .000000E+00  .202500E+00
750=        .682000E+02 -.462861E-03  .394517E-01  .211469E-08
760=   .483871E-06 -.100000E+01  .450000E-01
770=       -.182713E+04  .147514E+05 -.519576E-02  .000000E+00
780=   .000000E+00  .000000E+00  .884631E+04
790=        .247254E+05  .125238E+05 -.628446E-02  .000000E+00
800=   .000000E+00  .000000E+00  .102557E+05
810=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
820=   .000000E+00  .000000E+00  .900000E-01
830=        .000000E+00  .171399E+00  .232378E+02  .380077E-02
840=   .000000E+00  .000000E+00  .202500E+00
850=        0.          0.          0.          0.
860=  0.          0.          .200000E+01
870=        0.          0.          0.          0.
880=  0.          0.          .200000E+01
890=        .154667E+01 0.          0.          0.
900=  0.          0.          0.
910=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
920=   .000000E+00  .000000E+00  .200000E+01
930=        .791130E+02 -.253743E+02  .277750E+02 0.
940=  0.          0.          .374000E-01
950=        .142841E+03 -.367192E+02  .170858E+02 0.
960=  0.          0.          .115000E-01
970=        .319209E+03 -.808198E+02 -.333161E+01 0.
980=  0.          0.          .141000E-01
990=        .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .100000E+01  .076930E+00
1010=      -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
1020=   .491312E-04  .100000E+01  .324000E+00
1030=        .488281E+00  .996800E+00  .814697E+00  .100108E+01
1040=   .000000E+00  .000000E+00  .300000E+00
```

Figure 4.2-3, Typical Transient Conversion Constant File (Cont'd)

in increments of 1 up to 39. A file number of 40 indicates an instrument not in use or out of the order. The FM channel number may be found by adding 1 to the file number (e.g., file number 1 is FM channel 2, file number 2 is FM channel 3, and so on. FM channel 1 is the digital voltmeter short for all transients).

The instrument conversion constants listed in each transient conversion constant file were derived in the same manner as the constants in the steady-state conversion constant files. Calibration methods and updating procedures are discussed in Section 2.

For the processing of raw blowdown test data, five different versions of the TDR program were employed. These versions resulted from the use of different number and choices of primary measuring instruments (the signals from which were recorded on the FM Multiplex System), as well as from the choice of the break location for each blowdown test. A list of blowdown test numbers, corresponding TDR program version names, and associated input data file names is provided in Table 4.2-3.

Fewer flow measuring instruments were employed for the early forward and reverse flow blowdowns in Phase I, and consequently, fewer derived flow parameters (such as, volume flow rates, mass flow rates, etc.) were generated for these tests in comparison to those developed for the other more extensively instrumented blowdown tests in Phase I and Phase II. For example, blowdown tests 246, 252, 475 and 497 employed two drag discs and only one turbine meter in each of the two test pump measuring spools. For all other transient tests, an additional turbine meter was installed in each measuring spool, increasing the number of pump operating parameters to be generated for storage in the plot data file. For early Phase I blowdowns, the test pump seal inlet injection line pressure was recorded on the FM System during the transient. For the later blowdowns in Phase I and all the blowdowns in Phase II, this parameter was not recorded on the FM system so as to make room for the additional flow measuring instruments on the FM recording system (Note that a maximum of 39 instrument channels can be accommodated on the FM system). For Tests 676, 701 and 846 in Phase I and all blowdown tests in Phase II, additional information on test pump seal injection flow, such as, the differential pressure across the water orifice in the inlet seal injection line and the seal injection outlet flow rate as measured by the magnetic flow meter were also recorded on the FM system during the transient.

As indicated before, the location of the break (either suction or discharge side) with reference to the test pump was also employed to differentiate between the various TDR program versions. For a discharge break, the pump flow and speed were in the positive direction (pump flow is defined positive, if the flow is from the suction side to the discharge side, and the pump speed is considered positive, if the pump rotation is in the normal direction) throughout the duration of the test. However, for a suction break, both the flow and speed were in the reverse direction (except for the initial few seconds after rupture during which time the flow and speed remained positive for the "free-wheeling" and "motor power-on" reverse flow blowdown tests) during the transient. Logic changes to the TDR program versions for forward flow blowdown tests were implemented to accommodate flow and speed reversal during a reverse flow blowdown test. This resulted in the creation of two TDR program versions for reducing the reverse flow blowdown data, one each for Phase I and Phase II. Further differences between the TDR program versions resulted from changes in the "Scanner Millivolt to FM Volt" ratio that took place during the middle of Phase I testing. Thus, for Tests 246, 252, 475 and 497, a different set of ratios was employed in comparison to the set used for the reduction of raw data for all other tests. Further discussion on these two sets of ratios are presented in the following sections.

The basic conversion equations described in the following subsection are in general applicable to almost all the TDR program versions. However, for some of the versions, some of these equation are not employed, and it is so indicated in the descriptions that follow.

4.2.2 Transient Data Reduction Program

The Transient Data Reduction (TDR) Program is a computer code employed for the reduction of the digitized raw transient test data. The program is arranged in three major sections, based on the types of data handling steps involved.

The front end of the program reads in the input data and employs conversion equations for transforming raw data into values for primary (i.e. directly measured) parameters in engineering units. The middle section of the program comprises derivation of pertinent pump and loop parameters from the reduced data for the primary parameters. The third section of the program provides output file management for creation of a plot data file and generation of hard copy

printout and/or microfilm or microfiche. It should be indicated that the middle section of the Transient Data Reduction Program parallels that of the Steady-State Data Reduction Program described in Section 3.

TABLE 4.2-2

TRANSIENT CONVERSION CONSTANT FILE KEY

Line 100:	Number of thermocouples and file number of each.
Line 110:	Number of pressure cells and file number of each cell.
Line 120:	Number of differential pressure cells and file number of each cell.
Line 130:	Number of torque meters and file number of each.
Line 140:	Number of drag discs and file number of each.
Line 150:	Number of turbine meters and file number of each.
Line 160:	Number of speed meters and file number of each.
Line 170:	Number of gamma densitometers and file number of each.
Line 180:	Number of magnetic flow meters and file number of each. This line is not included in Phase I calibration files.
Line 190:	Code for printout of pressure drops around loop.
Line 200:	Zeros of pressure cells in same order as line 110.
Line 210:	Zeros of differential pressure cells in same order as line 120.
Line 220:	Torque meter zero (mV).
Line 230:	Drag disc zeros (mV).
Line 240:	Turbine meter zeros (mV).
Line 250:	Speed meter zero (mV).
Line 260:	Magnetic flow meter zero (mV). This line did not appear in Phase I calibration files.
Line 270-1020:	Calibration constants, C(1,K)-C(6,K), and uncertainties, C(7,K), sequentially for file numbers 1 to 39 (FM numbers 2 to 40).
Line 1030:	Thermocouple calibration constants (intercept and slope) for L-13 and L-14.
Line 1040:	Spare.

TABLE 4.2-3

LIST OF BLOWDOWN TESTS AND CORRESPONDING DATA REDUCTION PROGRAM VERSION AND INPUT DATA FILES

Test No.	Transient Data Reduction Program Version File Name	Time Step Schedule File	Calibration Constant Data File	Digitized Raw Data File VSN* 200 samples/sec	20 samples/sec
246	TDRFWD1UPD	TIM246POST	CAL246POST	007700	007730
252	TDRFWD1UPD	TIM252POST	CAL252POST	007697	010264
475	TDRREV1UPD	TIM475POST	CAL475POST	000517	000472
497	TDRREV1UPD	TIM497POST	CAL497POST	000325	009738
676	TDRFWD2UPD	TIM676POST	CAL676POST	000058	001054
701	TDRFWD2UPD	TIM701POST	CAL701POST	000494	004503
846	TDRFWD2UPD	TIM846POST	CAL846POST	008056	010216
1156	TDRFWD3UPD	TIM1156POST	CAL1156POST	009058	009076
1179	TDRFWD3UPD	TIM1179POST	CAL1179POST	009077	009078
1211	TDRFWD3UPD	TIM1211POST	CAL1211POST	009172	009175
1267	TDRFWD3UPD	TIM1267POST	CAL1267POST	009296	009295
1319	TDRFWD3UPD	TIM1319POST	CAL1319POST	009332	009355
1351	TDRFWD3UPD	TIM1351POST	CAL1351POST	009364	009379
1380	TDRFWD3UPD	TIM1380POST	CAL1380POST	007233	007789
1465	TDRREV2UPD	TIM1465POST	CAL1465POST	009530	003824
1511	TDRREV2UPD	TIM1511POST	CAL1511POST	008876	002481

* VSN refers to Volume Serial Number of magnetic tape (See Appendix 4.2D for usage of this number).

Permanently attached to the program are the six subroutines given in Table 4.2-4. In addition, a computerized representation of the ASME steam tables (Reference 2) is required for execution of the program, as indicated in Table 4.2-5. Two of the subroutines in the ASME steam property routine are specifically called for in the Transient Data Reduction Program.

TABLE 4.2-4

List of Subroutines

FLOW	-	Orifice flow measurement using ASME Power Test Code (Reference 4)
VISC	-	Viscosity of steam and water
SRSORT	-	Management of computerized ASME Steam Tables, when fluid is not at saturation conditions
SATUR	-	Management of computerized ASME Steam Tables, when fluid is at saturation conditions
BUFFER1	-	Storage of "double-arrayed" parameters in plot data file
BUFFER2	-	Storage of "single-arrayed" parameters in plot data file
INDATA	-	Reads in raw test data and time values at which data is to be processed
STEPS	-	Computes the record count for data processing at the desired time step schedule

TABLE 4.2-5

Attached Files

NU009485 STEAMPROPERTIES - Computerized ASME Steam Tables

Tape 1	-	Time Step Schedule File
Tape 8	-	Calibration Constant Data File
Tape 7	-	Digitized Raw Data Magnetic Tape
Tape 10	-	Plot Data File

The listing of the data reduction program and the attached subroutines for Phase II forward flow blowdowns are given in Appendix 4.2C as a sample. The descriptions of the job control cards required to execute the program are provided in Appendix 4.2D.

4.2.2.1 Input Data for Execution of the Program. At present the user must input a designator for each plot file parameter by card for execution of the program. These can be unique alphanumeric information referring to the instrument or instruments employed in the measurement of the primary parameters from which the particular plot file parameter is derived. These designators are indicated in Table 4.2-6, and are input in the format 8A10.

All other input information is automatically read in from computerized files. These are: (1) the time step schedule file (Tape 1), (2) the instrument conversion constant data file (Tape 8), and (3) the digitized raw data file (Tape 7). The time step schedule file is created using the program TSTEP described in Appendix 4.2E. A listing of this program and a description of the job control cards required for its execution are also provided in this appendix. See Table 4.2-3 for the list of input files employed for all tests.

TABLE 4.2-6

Standard Plot File Parameters

Plot No.*	Plot Type**	Location No.	Description of Parameter
1	1	L-5	Pump Suction Pressure
2	1	L-6	Pump Discharge Pressure
3	1	L-64	Blowdown Leg Pressure
4	11	L-13	Pump Suction Fluid Temperature
5	11	L-14	Pump Discharge Fluid Temperature
6	5	L-15	Density Beam 1 GD Suction
7	5	L-16	Density Beam 2 GD Suction
8	5	L-17	Density Beam 3 GD Suction
9	5	L-18	Density Beam 1 GD Discharge
10	5	L-19	Density Beam 2 GD Discharge
11	5	L-20	Density Beam 3 GD Discharge
12	5	L-34	Density Beam 1 AECL GD
13	5	L-35	Density Beam 2 AECL GD
14	5	L-36	Density Beam 3 AECL GD
15	7	L-15	Void Fraction Beam 1 GD Suction
16	7	L-16	Void Fraction Beam 2 GD Suction
17	7	L-17	Void Fraction Beam 3 GD Suction
18	7	L-18	Void Fraction Beam 1 GD Discharge
19	7	L-19	Void Fraction Beam 2 GD Discharge
20	7	L-20	Void Fraction Beam 3 GD Discharge
21	7	L-34	Void Fraction Beam 1 AECL GD
22	7	L-35	Void Fraction Beam 2 AECL GD
23	7	L-36	Void Fraction Beam 3 AECL GD
24	2	L-26/L-16	Norm. Vol. Flow Rate LØ-DD/GD2 Suction
25	2	L-1/L-16	Norm. Vol. Flow Rate HI-DD/GD2 Suction
26	2	L-3	Norm. Vol. Flow Rate LØ-TM Suction
27	2	L-28	Norm. Vol. Flow Rate HI-TM Suction
28	2	L-27/L-19	Norm. Vol. Flow Rate LØ-DD/GD2 Discharge
29	2	L-2/L-19	Norm. Vol. Flow Rate HI-DD/GD2 Discharge
30	2	L-4	Norm. Vol. Flow Rate LØ-TM Discharge
31	2	L-29	Norm. Vol. Flow Rate HI-TM Discharge
32	12	L-1/L-16	Mass Flow Rate HI-DD/GD2 Suction
33	12	L-26/L-16	Mass Flow Rate LØ-DD/GD2 Suction
34	12	L-2/L-19	Mass Flow Rate HI-DD/GD2 Discharge
35	12	L-27/L-19	Mass Flow Rate LØ-DD/GD2 Discharge
36	6	L-16/L-3	Momentum Flux GD2/LØ -TM Suction
37	6	L-16/L-28	Momentum Flux GD2/HI-TM Suction
38	6	L-26	Momentum Flux LØ-DD Suction
39	6	L-1	Momentum Flux HI-DD Suction
40	6	L-19/L-4	Momentum Flux GD2/LØ-TM Discharge
41	6	L-19/L-29	Momentum Flux GD2/HI-TM Discharge
42	6	L-27	Momentum Flux LØ-DD Discharge

TABLE 4.2-6 (Cont'd.)

Standard Plot File Parameters

Plot No.*	Plot Type**	Location No.	Description of Parameter
43	6	L-2	Momentum Flux HI-DD Discharge
44	3	L-7	Pump Head in psi
45	4	L-7/L-16/L-19	Norm. Static Pump Head
46	4	L-7/L-16/L-19	Norm. Total Pump Head
47	8	L-12	Norm. Pump Speed
48	9	L-11	Norm. Pump Shaft Torque
49	9	L-11/L-12	Norm. Pump Hydraulic Torque
50	13	L-1/L-16	Integrated Mass HI-DD/GD2 Suction
51	13	L-26/L-16	Integrated Mass LØ-DD/GD2 Suction
52	13	L-2/L-19	Ingetrated Mass HI-DD/GD2 Discharge
53	13	L-27/L-19	Integrated Mass LØ-DD/GD2 Discharge
54	12	L-28/L-16	Mass Flow Rate HI-TM/GD2 Suction
55	12	L-3/L-16	Mass Flow Rate LØ-TM/GD2 Suction
56	12	L-29/L-19	Mass Flow Rate HI-TM/GD2 Discharge
57	12	L-4/L-19	Mass Flow Rate LØ-TM/GD2 Discharge
58	10	L-12	Pump Acceleration in rad/sec^2
59	9	L-11/L-12	Norm. Pump Friction & Windage Torque
60	13	L-28/L-16	Integrated Mass HI-TM/GD2 Suction
61	13	L-3/L-16	Integrated Mass LØ-TM/GD2 Suction
62	13	L-29/L-19	Integrated Mass HI-TM/GD2 Discharge
63	13	L-4/L-19	Integrated Mass LØ-TM/GD2 Discharge
64	12	L-9	Pump Injection Mass Flow Rate In
65	12	L-32	Pump Injection Mass Flow Rate Out
66	12	L-9/L-32	Seal Injection Leakage Mass Flow Rate

* Employed as the designator index number in the BUFFER 1 and BUFFER 2 subroutines
** Employed in the experimental data plot program (See Appendix 4.2 G)

Instrumentation is calibrated using the procedures described in Section 2. For some instruments, this involves check measurements, including steady-state runs with single-phase fluid, before each transient test. The calibration data for each instrument is processed by a curve-fitting computer program to arrive at a set of constants which are the appropriate coefficients for the terms in the equations for converting millivolts to engineering units. Actually, these conversion constants are derived for the conversion equations written in terms of the millivolts sensed by the scanner system digital voltmeter. These conversion constants are stored in the transient conversion constant data file (See Appendix 4.2H). The equivalency of FM measured voltaged will be covered in the next section.

The digitized raw data file for each test is a nine track magnetic tape identified by a unique volume serial number (VSN). All other input data files are disc files stored on CDC7600.

4.2.2.2 Conversion of FM Channel Outputs to Engineering Units. The FM Multiplex Recording System operates on a higher range of voltages than does the data scanner digital voltmeter. Therefore, the signal from a given transducer receives additional amplification before being fed into the FM system. A voltage recorded by the FM system as read out by the analog-to-digital conversion system is next converted to the equivalent scanner millivolt reading by multiplying by the constant, "scanner millivolt to FM volt" ratio, appropriate for the particular transducer and FM channel. This ratio is furnished for each channel (See Table 4.2-7) and is incorporated directly into the code because changes are rare. Also, before this equivalent scanner millivoltage is inserted in the pertinent conversion equation, the "instrument zero" voltage for zero input to the sensor is subtracted out, because the conversion equation was developed on the basis of the zero-adjusted scanner millivoltage.

$$RC = E\left[\frac{\text{Scanner Millivolt}}{\text{FM Volt}}\right] - Z \qquad (4.2\text{-}1)$$

where

RC is the zero-adjusted millivolt input from the transducer to the scanner,

TABLE 4.2-7

Scanner Millivolt to FM Volt Ratios

	Instrument	Conversion Ratio Set 1*	Set 2**
1.	Thermocouples	2	2
2.	Pressure Cells	16	16
3.	Differential Pressure Cells		
	(i) DP Cells across pump	20	20
	(ii) All other DP cells	16	16
4.	Drag Discs		
	(i) HI-Suction	20	38.29
	(ii) HI-Discharge	20	38.41
	(iii) LO-Suction	20	38.48
	(iv) LO-Discharge	20	38.50
5.	Turbine Meters	20	20
6.	Gamma Densitometer	20	20
7.	Speed Meter	20	20
8.	Torque Meter	20	39.216
9.	Magnetic Flow Meter	--	16

* Set 1 was employed for Tests 246, 252, 475 and 497 in Phase I.

** Set 2 was employed for all Phase II tests and all other Phase I tests.

E is the voltage indicated by the FM system, and

Z is the "instrument zero" and is the output in millivolts from the instrument for zero input to the sensor.

The detailed conversions for the various types of devices are given below. In the equations shown below, K is the index number obtained by subtracting 1 from the FM channel number, C(1,K) thru C(6,K) are the calibration constants and C(7,K) is the uncertainty derived from calibration data.

1. Thermocouples

The temperature θ_C in °C is the solution of:

$$\sum_{J=1}^{9} [PAC(J)\ \theta_C^{(J-1)}] + 125\, e^{-0.5\left[\frac{\theta_C - 127}{65}\right]^2} = 1000\,[RC + 2.6621] \qquad (4.2\text{-}2)$$

where PAC(J) is a standard data pack (See Reference 3) contained within the program.

An equation similar to Equation 4.2-2 is developed in Reference 3 for the normal reference point temperature of 32.18°F (Ice Point). Equation 4.2-2 employs a reference point temperature of 150°F.

2. Pressure Cells

$$P = C(1,K)\rho + C(2,K) + C(3,K)RC + C(4,K)(RC)^2 + P_a \qquad (4.2\text{-}3)$$

where P is the absolute pressure in psia,
P_a is the atmospheric pressure in psia, and
ρ is the density of the fluid in lbm/in^3.

The first term on the right hand side of Equation 4.2-3 accounts for the static pressure difference between the location of the pressure tap in the loop and the location of the pressure transducer.

3. Differential Pressure Cells

$$\Delta P = C(1,K)\rho+[C(2,K)+C(4,K)P+(C(3,K)+C(5,K)P)RC]C(6,K) \qquad (4.2\text{-}4)$$

where ΔP is the differential pressure in psi,

P is a system pressure representative of pressure level at the differential pressure cell, psia.

4. Drag Discs

$$(\rho V^2)_{dd} = C(1,K)+C(2,K)\ [RC-C(3,K)\ (T-T_{ref})] \qquad (4.2\text{-}5)$$

where $(\rho V^2)_{dd}$ is the momentum flux in lbm/ft-sec^2,

T is a measured temperature in the drag disc structure in °F, and

T_{ref} is the reference temperature in the term which compensates for temperature effects in the drag disc structure and sensor. For final post-test data reduction T_{ref} is 525°F.

5. Turbine Meters

$$V_{tm} = C(1,K) + C(3,K)\ RC \qquad (4.2\text{-}6)$$

where V_{tm} is the fluid velocity in ft/sec.

6. Gamma Densitometer

$$\rho_{gd} = C(1,K) + C(2,K)\ \log_e\ [RC - C(3,K)] \qquad (4.2\text{-}7)$$

where ρ_{gd} is the density in lbm/ft^3.

7. Speedmeter

$$N_s = C(1,K)+C(2,K)C(4,K)RC \qquad (4.2.8)$$

where N_s is the speed in rpm.

8. Torque Meter

$$\tau_s = \frac{-C(2,K)\ [RC-C(3,K)]}{12} \qquad (4.2\text{-}9)$$

where τ_s is the shaft torque in ft-lbf.

9. Magnetic Flowmeter

$$Q = C(1,K)RC \qquad (4.2\text{-}10)$$

where Q is the volume flow rate in gpm. This equation is not included in the TDR program versions, TDRFWD1UPD, TDRREV1UPD, and TDRFWD2UPD.

4.2.2.3 Derived Parameters.

1. Friction Torque

From the friction and windage torque tests (see Volume II) the following expression was provided for the friction torque in ft-lbf.

$$\tau_f = [-0.018(P_{avg}-P_{atm})+0.0000305(P_{avg}-P_{atm})^2+0.08098\ |N_s| - 4.155\times10^{-6}\ N_s^2]/12 \qquad (4.2\text{-}11)$$

where P_{avg} is the arithmetic average of the pump inlet and exit pressures in psia. This formulation represents a slightly different fit to the friction and windage data than was used for steady-state data reduction (Section 3.2). The small differences are comparable to the friction data uncertainties.

2. Hydraulic Torque

From the equation which describes the change in pump impeller speed, the hydraulic torque in ft-lb can be expressed as:

$$\tau_h = \tau_s - \tau_f - \frac{I_p}{g}\ \frac{d\omega}{dt} \qquad (4.2\text{-}12)$$

where I_p is the moment of inertia of the pump rotor and coupling in lbm-ft^2 equal to 2.33 lbm-ft^{2*},
g_c is the gravitational constant, 32.174 lbm-ft/lbf-sec^2, and
ω is the angular velocity of the pump rotor in rad/sec.

3. Test Pump Injection Flow In

The test pump injection inlet flow is determined from the differential pressure measurement across the orifice in the inlet injection line. The ASME Power Test Codes, Flow Measurement Section (Reference 4) gives this mass flow rate in lbm/hr as:

$$W_i = 359\ C\ D_o^2\ F_a\ Y\ (27.673\ \Delta P/v)^{1/2} \qquad (4.2\text{-}13)$$

where ΔP is the differential pressure across the orifice in psi,
v is the fluid specific volume in ft^3/lbm,
C is the discharge coefficient of the orifice,
D_o is the orifice diameter in inches,
F_a is the orifice thermal expansion factor, and
Y is a fluid expansion factor for compressibility.

Test test pump injection flow in is not calculated in the TDR program versions, TDRFWD1UPD, TDRREV1UPD and TDRFWD2UPD.

4. Test Pump Injection Flow Out

The magnetic flow meter measures this flow rate as Q gallons per minute, and the mass flow rate in lbm/hr can be expressed as:

$$W_o = \frac{60\ \rho Q}{7.4805} \qquad (4.2\text{-}14)$$

*Best estimate for the moment of inertia of the pump rotor and coupling was later revised to 2.87 lbm ft^2. 2.33 lbm ft^2 was used in the initial data reductions. Resulting differences in acceleration torque are of minor importance in relating to homologous performance curves.

The TDR program versions, TDRFWD1UPD, TDRREV1UPD and TDRFWD2UPD does not include this equation for the calculation of injection flow out.

5. Net Injection Flow At the Test Pump

$$W_\ell = W_o - W_i \tag{4.2-15}$$

This equation is not included in the TDR program versions, TDRFWD1UPD, TDRREV1UPD and TDRFWD2UPD.

6. Fluid Void Fraction

The fluid void fractions at various locations are calculated from the fluid densities either directly measured at these locations (gamma densitometer) or determined from other instrument measurements (turbine meter and drag disc). In addition, the vapor and liquid saturation properties are also used.

Combining drag disc and turbine meter measurements, the corresponding density of the two-phase mixture is written as:

$$\rho_{mix} = (\rho V^2)_{dd}/(V_{tm})^2$$

where $(\rho V^2)_{dd}$ is the momentum flux measured by the drag disc in lbm/ft-sec^2, and

V_{tm} is the velocity measured by the turbine meter.

The local void fraction of the mixture is expressed as:

$$\alpha_F = \frac{\rho_\ell - \rho_{mix}}{\rho_\ell - \rho_v} \tag{4.2-16}$$

where ρ_ℓ, ρ_v are the saturation densities of the liquid and vapor, respectively.

The saturation properties are obtained from the ASME steam tables using the local pressure.

7. Volumetric Flow Rate

i) Drag Disc - Gamma Densitometer Combination

$$Q = \left[\frac{(\rho V^2)_{dd}}{\rho_{gd}}\right]^{1/2} A_c \times 60 \times 7.48 \qquad (4.2\text{-}17)$$

where Q is the volumetric flow rate in gpm, and

A_c is the cross-sectional area of the nominal six inch suction and discharge pipe legs, 0.181 ft^2 (6" Sch. 140).

ii) Turbine Meter

$$Q = V_{tm} A_c \times 60 \times 7.48 \qquad (4.2\text{-}18)$$

8. Momentum Flux

The momentum flux in $lbm/ft\text{-}sec^2$ is either directly measured (by the drag disc) or computed from two instrument measurements, namely, from the gamma densitometer measurement and the turbine meter measurement as:

$$\rho V^2 = (\rho_{gd})\ (V_{tm})^2 \qquad (4.2\text{-}19)$$

9. Mass Flow Rate

The mass flow rate in lbm/sec using various instrument measurements is calculated as follows.

i) Drag Disc - Gamma Densitometer Combination

$$\dot{M} = \left[(\rho V^2)_{dd}\ \rho_{gd}\right]^{1/2} A_c \qquad (4.2\text{-}20)$$

ii) Turbine Meter -Gamma Densitometer Combination

$$\dot{M} = \rho_{gd}\ V_{tm}\ A_c \qquad (4.2\text{-}21)$$

10. Integrated Mass

The amount of mass that has flowed through the suction or discharge side of the pump over a given time is computed by using the trapezoidal rule to numerically integrate the mass flow rate function.

Thus, at any time t, the integrated mass in lbm can be expressed as:

$$MI(t) = MI(t-\Delta t) + 1/2\ [|\dot{M}(t)| + |\dot{M}(t-\Delta t)|]\Delta t \qquad (4.2\text{-}22)$$

where Δt is the time step size employed for data processing.

Various normalized pump parameters are also derived in the program from the primary and derived parameters indicated above. These normalizations are based on the rated (normal peak efficiency) values of performance parameters for the model test pump which are as follows:

Head	252 ft
Flow	3500 gpm
Speed	4500 rpm
Torque	308 ft-lbf(at 62.3 lbm/ft^{3}density)

4.2.2.4 Subroutines. The six subroutines attached to the transient data reduction program are indicated in Table 4.2-4. In addition, two subroutines from the ASME steam table routine (Reference 2) are specifically called for in the main program. The complete listing of the ASME Steam Property is provided in Appendix 4.2F. Each of these subroutines is described separately below.

1. Subroutine Flow

This is the subroutine which calculates the volumetric flow measured by an orifice. It requires inputs from the main program of orifice pressure drop, pressure, temperature, pipe diameter, orifice diameter, specific volume of the fluid, and an index defining whether it is a steam or water orifice. It also requires the viscosity subroutine, VISC. Returned to the main program are the mass flow and the orifice coefficients used in calculating that flow. The calculation procedures are derived from the Power Test Code 19.5 published by the American Society of Mechanical Engineers (Reference 4).

2. Subroutine VISC

This subroutine simply accesses the correct portion of the computerized steam tables (Reference 2) for the determination of fluid viscosity. It is used as a subroutine of subroutine FLOW and requires the inputs of pressure, temperature and an index defining whether steam or water is the fluid being considered. It returns to FLOW the required viscosity.

3. Subroutine SRSORT

This subroutine is employed in the management of the computerized version of the 1967 ASME steam tables. It directs the program to the required region of these tables or if saturation values are required, it directs the program to the subroutine SATUR. It requires the inputs of fluid pressure and temperature and returns the values of specific volume and enthalpy. If conditions are saturated, then it accesses the subroutine SATUR and returns to the main program the specific volumes and enthalpies of both saturated liquid and vapor.

4. Subroutine SATUR

This manages the computerized steam tables when conditions are on the saturation line. It requires the inputs of pressure and/or temperature and an index defining whether pressure, temperature or both are given. Returned are the specific volumes and enthalpies for saturated liquid and vapors.

5. Subroutine BUFFER 1

This subroutine is employed to facilitate storage of double-arrayed test facility parameters (i.e., parameters with two variable indexes, such as X_{ij}) in the plot data file, and requires inputs from the main program of indexes for the parameter designator parameter calibration constants, the parameter, and the total number of data points for each parameter.

6. Subroutine BUFFER 2

This subroutine facilitates storage of single-arrayed parameters (i.e., for parameters with one variable index, such as Y_i) in the plot data file, and requires inputs from the main program of what kinds of indexed items are being handled (namely, parameter designator and parameter calibration constants), parameter values, indexes for the parameter designator and calibration constants, and the total number of data points for each parameter.

7. Subroutine INDATA

The reading in of the digitized raw test data and the desired time step schedule intervals is facilitated by means of the INDATA subroutine. This raw data is read from a magnetic tape (Tape 7) which must be attached to the transient data reduction program. The digitized raw test data in FM volts for successive time steps are stored on this magnetic tape, first for one instrument and then for another in ascending order of the FM channel numbers. At the beginning of the magnetic tape, the following information is provided: test date, test number, digitization frequency (samples/sec), and the number of data records divided by 100 for each FM channel. Note that the first channel of the FM tape contains signals from the digital

voltmeter under shorted conditions. This information is used in comparing the FM System records to Data Scanner records.

The INDATA subroutine also reads from a disc file, namely Tape 1, which contains the information defining the desired time step schedule for data evaluation. INDATA returns to the main program the following information: the raw FM data in volts for all instruments at specified time step schedule intervals, total number of data points to be processed for each instrument, desired edit frequency for hard copy printout, the date the test was run, test number, and the desired time step schedule for data evaluation. To bring the desired record count for data processing, this subroutine also employs another subroutine called STEPS.

8. Subroutine STEPS

This subroutine computes the record count for processing the data (such as the 1st, 21st, 41st, etc., serially numbered digitized raw data values) at the desired time intervals. The inputs to this subroutine are: the total number of data points to be processed, digitization time step, time values for data processing, and an index for indicating whether the computer run should actually proceed with the data processing or stop after listing all the preparations.

4.2.3 Output Description Of Reduced Transient Data

The final output of the transient data reduction program can be in the form of hard copy (paper) printout and/or microfiche of the information on the hard copy printout, and/or a disc file (plot data file) containing an assortment of extracted and further derived parameters of special interest (See Table 4.2-6).

The printed copy consists of two separate sections. The first section contains certain information on the pump related parameters, while the other section gives information for additional pump-related as well as test loop-related parameters. All information is provided in English units first, and then in Metric units.

At the top of each page of the hardcopy output, the program title, the test number and the date the test was run are printed along with the page number. Then for the first section of the output (Figure 4.2-4), values for the pump performance parameters based on suction leg, discharge leg, and average of suction and discharge leg conditions are tabulated as a function of time. These parameters include: pressure, volumetric flow rates based on gamma densitometer-drag disc measurements as well as on turbine meter measurements, void fractions based on drag disc-turbine meter measurements and on gamma densitometer measurements, pump speed, pump head in feet based on drag disc-turbine meter combination density as well as gamma densitometer density, and pump hydraulic torque.

The second section of the output (Figure 4.2-5) contains, as a function of time, values for other parameters, such as, blowdown line pressure, fluid temperatures at suction and discharge legs, suction and discharge leg fluid densities determined from drag disc-turbine meter measurements and from gamma densitometer measurements, and suction and discharge leg momentum flux values determined from turbine meter-gamma densitometer measurements and from drag disc measurements. Additionally, pump shaft, and friction and windage torques as well as various loop pressure drop data including pump head in psi are tabulated in this section.

The plot data file contains values for the time step schedule employed in the processing of the digitized raw data as well as reduced data values for up to 66 parameters listed in Table 4.2-6. The array structure of this output file is indicated in Figure 4.2-6. The first record of the plot data file contains the time step information starting with the eighth word. The experiment designator, number of words in the record, and total number of parameters for which values are stored in the file make up words 1 through 3, respectively, of the same record. Words 4 through 7 are as yet unused. All other records of the file contain reduced data values for pump-related parameters. The first seven values in the array written for each parameter are the alphanumeric plot parameter designator and the six conversion constants for the parameter.

The plot data file is identified in the program as tape 10. It is used in conjunction with a plot program to generate machine plots of the transient data.

CE-EPRI TWO-PHASE PUMP PERFORMANCE TEST - TRANSIENT RUN
TEST NO.1319 DATE 11/09/77 TIME BLOWDOWN AREA PAGE 16

PUMP PERFORMANCE BASED ON SUCTION CONDITIONS

ELAPSED TIME (SEC)	19.750		19.800		19.850		19.900		19.950		20.000		20.050	
	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY
PRESSURE (PSIA)	783.2	.5	778.6	.5	781.4	.5	781.4	.5	788.8	.5	779.6	.5	783.2	.5
VOL FLOW (GPM)														
DD(HI)-GAM DEN	7684.3	127.5	9351.0	120.1	9259.7	116.9	9511.3	127.6	7846.0	122.3	7985.2	120.3	7759.1	117.8
DD(LO)-GAM DEN	10661.9	63.1	11414.7	67.4	11681.2	64.6	10943.4	73.8	10236.5	63.4	10003.5	64.4	10045.8	61.6
TURBINE METER(HI)	6543.6	477.1	6580.2	477.1	6561.9	477.1	6708.4	477.1	7019.9	477.1	7001.5	477.1	7642.7	477.1
TURBINE METER(LO)	6184.1	245.5	6023.0	245.5	5628.3	245.5	5257.7	245.5	5489.3	245.5	5883.0	245.5	5575.7	245.5
VOID FRACTION														
DD(HI)-TUR MTR(HI)	.523	.077	.374	.098	.357	.100	.426	.088	.560	.067	.541	.069	.624	.053
DD(LO)-TUR MTR(LO)	0.000	.000	0.000	.000	0.000	.000	0.000	.000	0.000	.000	0.000	.000	0.000	.000
GAMMA DEN	.664	.002	.708	.002	.696	.002	.733	.002	.655	.002	.656	.002	.636	.002
PUMP SPEED (RPM)	5379.9	5.0	5389.9	5.0	5404.8	5.0	5394.8	5.0	5394.8	5.0	5399.8	5.0	5409.7	5.0
PUMP HEAD (FT)														
DD(HI)-TUR MTR(HI)	-596.	-89.	-457.	-67.	-497.	-73.	-538.	-78.	-618.	-86.	-648.	-90.	-704.	-90.
DD(LO)-TUR MTR(LO)	-295.	-0.	-292.	-0.	-326.	-0.	-317.	-0.	-284.	-0.	-310.	-0.	-280.	-0.
GAMMA DEN	-821.	-5.	-922.	-5.	-990.	-6.	-1082.	-6.	-772.	-4.	-843.	-5.	-726.	-4.
PUMP TORQUE(FT.LB)														
HYDRAULIC TORQUE	-18.3	2.4	-32.2	2.4	-27.4	2.4	-22.6	2.4	-24.1	2.4	-25.9	2.4	-21.9	2.4

PUMP PERFORMANCE BASED ON DISCHARGE CONDITIONS

PRESSURE (PSIA)	678.0	.1	668.6	.1	673.3	.1	677.0	.1	669.5	.1	681.7	.1	679.8	.1
VOL FLOW (GPM)														
DD(HI)-GAM DEN	13554.0	179.1	13183.1	176.7	12382.4	173.2	12595.2	171.5	11929.3	162.0	12634.1	172.1	12667.6	184.4
DD(LO)-GAM DEN	13340.1	221.4	12840.3	220.7	12028.2	217.0	12375.6	212.6	12133.6	194.4	12738.7	208.1	13065.0	218.5
TURBINE METER(HI)	9832.9	354.5	9419.1	354.5	8897.4	354.5	8303.8	354.5	7638.2	354.5	9365.1	354.5	9167.3	354.5
TURBINE METER(LO)	10549.8	448.8	9789.3	448.8	10939.8	448.8	10491.3	448.8	10900.8	448.8	9438.3	448.8	10569.3	448.8
VOID FRACTION														
DD(HI)-TUR MTR(HI)	.565	.036	.532	.040	.496	.045	.399	.057	.283	.072	.534	.040	.547	.040
DD(LO)-TUR MTR(LO)	.039	.036	.592	.043	.697	.030	.649	.035	.651	.033	.533	.050	.644	.035
GAMMA DEN	.786	.001	.776	.002	.755	.002	.756	.002	.724	.002	.758	.002	.777	.001
PUMP SPEED (RPM)	5379.9	5.0	5389.9	5.0	5404.8	5.0	5394.8	5.0	5394.8	5.0	5399.8	5.0	5409.7	5.0
PUMP HEAD (FT)														
DD(HI)-TUR MTR(HI)	-641.	-49.	-592.	-47.	-616.	-52.	-507.	-45.	-384.	-37.	-632.	-51.	-586.	-48.
DD(LO)-TUR MTR(LO)	-762.	-69.	-674.	-66.	-987.	-88.	-839.	-77.	-756.	-67.	-631.	-63.	-732.	-67.
GAMMA DEN	-1219.	-7.	-1159.	-7.	-1193.	-7.	-1167.	-7.	-937.	-5.	-1150.	-7.	-1119.	-7.
PUMP TORQUE(FT.LB)														
HYDRAULIC TORQUE	-18.3	2.4	-32.2	2.4	-27.4	2.4	-22.6	2.4	-24.1	2.4	-25.9	2.4	-21.9	2.4

PUMP PERFORMANCE BASED ON SUCTION AND DISCHARGE AVERAGE

PRESSURE (PSIA)	730.6	.2	723.6	.2	727.3	.2	729.2	.2	729.1	.2	730.6	.2	731.5	.2
VOL FLOW (GPM)														
DD(HI)-GAM DEN	9173.1	110.0	10382.8	106.8	10470.4	104.5	10237.3	108.9	9041.3	101.5	8894.4	105.0	8902.4	109.4
DD(LO)-GAM DEN	13447.1	115.1	13011.7	115.4	12205.3	113.2	12485.4	112.5	12031.4	102.2	12686.4	108.9	12866.3	113.5
TURBINE METER(HI)	10191.3	297.2	9604.2	297.2	9918.6	297.2	9397.5	297.2	9269.5	297.2	9401.7	297.2	9868.3	297.2
TURBINE METER(LO)	6363.8	255.8	6301.1	255.8	6095.1	255.8	5983.0	255.8	6254.6	255.8	6442.3	255.8	6809.2	255.8
VOID FRACTION														
DD(HI)-TUR MTR(HI)	.544	.042	.454	.052	.427	.055	.412	.052	.420	.049	.537	.040	.585	.033
DD(LO)-TUR MTR(LO)	.323	.018	.300	.022	.353	.015	.328	.018	.330	.017	.270	.025	.326	.018
GAMMA DEN	.726	.001	.742	.001	.725	.001	.745	.001	.690	.001	.707	.001	.708	.001
PUMP SPEED (RPM)	5379.9	5.0	5389.9	5.0	5404.8	5.0	5394.8	5.0	5394.8	5.0	5399.8	5.0	5409.7	5.0
PUMP HEAD (FT)														
DD(HI)-TUR MTR(HI)	-618.	-53.	-515.	-46.	-550.	-49.	-522.	-44.	-474.	-38.	-640.	-51.	-640.	-47.
DD(LO)-TUR MTR(LO)	-426.	-11.	-407.	-12.	-490.	-11.	-460.	-12.	-413.	-10.	-416.	-14.	-405.	-10.
GAMMA DEN	-981.	-4.	-1027.	-4.	-1082.	-4.	-1123.	-5.	-847.	-3.	-973.	-4.	-880.	-4.
PUMP TORQUE(FT.LB)														
HYDRAULIC TORQUE	-18.3	2.4	-32.2	2.4	-27.4	2.4	-22.6	2.4	-24.1	2.4	-25.9	2.4	-21.9	2.4

Figure 4.2-4. Typical Page of First Section of Hard Copy Output

CE-EPRI TWO-PHASE PUMP PERFORMANCE TEST - TRANSIENT RUN
TEST NO.1319 DATE 11/09/77 TIME BLOWDOWN AREA PAGE 58

ELAPSED TIME (SEC)	19.750		19.800		19.850		19.900		19.950		20.000		20.050	
	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY	VALUE	UNCTY
LOOP PRESSURE (PSIA)														
BLOW DOWN ORIF	345.7	.1	352.3	.1	358.8	.1	351.3	.1	334.4	.1	328.7	.1	352.3	.1
LOOP TEMPERATURES (F)														
SUCTION	512.8	2.0	511.5	2.0	511.7	2.0	512.1	2.0	512.1	2.0	512.3	2.0	511.9	2.0
DISCHARGE	509.3	2.0	508.9	2.0	509.1	2.0	508.4	2.0	508.9	2.0	508.9	2.0	509.9	2.0
LOOP DENSITIES														
DD(HI)-TUR MTR(HI)														
SUCTION	23.8275	3.5614	30.7652	4.5279	31.5034	4.6468	28.3010	4.0938	22.0891	3.0784	22.9996	3.2080	19.1362	2.4569
DISCHARGE	22.1257	1.6943	23.7475	1.8925	25.4350	2.1432	30.0266	2.6857	35.5562	3.4332	23.6045	1.8944	22.9952	1.8956
AVERAGE	22.9766	1.9720	27.2563	2.4538	28.4692	2.5586	29.1638	2.4480	28.8226	2.3056	23.3021	1.8628	21.0657	1.5516
DD(LO)-TUR MTR(LO)														
SUCTION	48.0572	.0038	48.0958	.0038	48.0726	.0038	48.0726	.0038	48.0110	.0038	48.0881	.0038	48.0572	.0038
DISCHARGE	18.6188	1.6967	20.8571	2.0386	15.8757	1.4200	18.1602	1.6709	18.0604	1.5924	23.6266	2.3718	18.4015	1.6766
AVERAGE	33.3380	.8484	34.4764	1.0193	31.9742	.7100	33.1164	.8354	33.0357	.7962	35.8573	1.1859	33.2294	.8380
GAMMA DENSITOMETER														
SUCTION														
BEAM1	17.6621	.0966	21.2105	.1128	22.3999	.1182	23.1534	.1216	19.4144	.1046	22.3499	.1180	20.7695	.1109
BEAM2	17.2783	.0949	15.2344	.0856	15.8206	.0883	14.0788	.0804	17.6821	.0967	17.6821	.0967	18.5665	.1008
BEAM3	16.7672	.0926	14.2386	.0811	13.7018	.0786	12.9886	.0754	15.4078	.0864	16.7672	.0926	20.2613	.1085
AVERAGE	17.2783	.0949	15.2344	.0856	15.8206	.0883	14.0788	.0804	17.6821	.0967	17.6821	.0967	18.5665	.1008
DISCHARGE														
BEAM1	9.6574	.0603	10.6016	.0646	12.5235	.0733	12.0388	.0711	13.4122	.0773	11.6881	.0695	12.1707	.0717
BEAM2	11.6445	.0693	12.1229	.0715	13.1326	.0761	13.0511	.0757	14.5770	.0826	12.9698	.0753	12.0428	.0711
BEAM3	45.8363	.2247	42.8970	.2113	43.1126	.2123	44.7404	.2197	44.3045	.2177	44.6313	.2192	43.8699	.2158
AVERAGE	11.6445	.0693	12.1229	.0715	13.1326	.0761	13.0511	.0757	14.5770	.0826	12.9698	.0753	12.0428	.0711
SUCTION (AECL)														
BEAM1	37.0175	.1846	40.5569	.2007	35.0074	.1755	32.6025	.1646	36.8469	.1838	37.8793	.1885	38.0535	.1893
BEAM2	2.0878	.0259	4.1422	.0352	2.6828	.0286	4.5284	.0369	1.9519	.0252	3.1940	.0309	3.7599	.0335
BEAM3	4.5413	.0370	6.7969	.0473	15.5823	.0872	6.4325	.0456	21.6677	.1149	4.9882	.0390	18.7319	.1015
AVERAGE	2.0878	.0259	4.1422	.0352	2.6828	.0286	4.5284	.0369	1.9519	.0252	3.1940	.0309	3.7599	.0335
MOMENTUM FLUX (LBM/FT-SEC2)														
TUR MTR(LO)-GAM DEN														
SUCTION	100137.	7969.	83722.	6842.	75946.	6639.	58978.	5518.	80742.	7235.	92741.	7757.	100470.	8273.
DISCHARGE	196401.	16750.	176052.	16175.	238179.	19590.	217691.	18667.	262494.	21664.	175086.	16681.	203871.	17355.
AVERAGE	153420.	9380.	129554.	6383.	150551.	9296.	127467.	8280.	164157.	10247.	136299.	9101.	158720.	9815.
TUR MTR(HI)-GAM DEN														
SUCTION	112115.	16362.	99962.	14508.	103232.	15024.	96016.	13670.	132046.	17965.	131358.	17918.	164346.	20540.
DISCHARGE	170614.	12345.	162990.	12308.	157548.	12589.	136375.	11672.	128879.	11987.	122384.	13090.	153371.	11898.
AVERAGE	146934.	5360.	132654.	5360.	131075.	5360.	115820.	5360.	131295.	5360.	155533.	5360.	163845.	5360.
DRAG DISK (HI)														
SUCTION	154612.	5062.	201870.	5062.	205565.	5062.	193010.	5062.	164956.	5062.	170861.	5062.	169389.	5062.
DISCHARGE	324105.	8349.	319280.	8349.	305138.	8349.	313757.	8349.	314363.	8349.	313731.	8349.	292854.	8349.
AVERAGE	239398.	4882.	260575.	4882.	255351.	4882.	253383.	4882.	239659.	4882.	242296.	4882.	231122.	4882.
DRAG DISK (LO)														
SUCTION	297650.	3123.	300808.	3123.	327142.	3123.	255508.	3123.	280786.	3123.	268147.	3123.	283943.	3123.
DISCHARGE	314033.	10256.	302894.	10256.	287930.	10256.	302910.	10256.	325222.	10256.	318948.	10256.	311517.	10256.
AVERAGE	305842.	5360.	301851.	5360.	307536.	5360.	279209.	5360.	303004.	5360.	293548.	5360.	297730.	5360.
LOOP PRESSURE DROP DATA, (PSI)														
PUMP IN-FLANGE, SUCT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WATER ORIF PRES DROP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PUMP INLET-OUTLET DP	212.3	.3	212.7	.3	212.7	.3	169.8	.3	211.4	.3	213.1	.3	212.7	.3
PUMP IMP FRONT-BACK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LEG TO LEGDP,HEAD	-98.6	.1	-97.6	.1	-108.8	.1	-105.8	.1	-94.8	.1	-103.6	.1	-93.6	.1
AECL DP,ACROSS PIPE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PUMP TORQUE (FT.LB)														
SHAFT	5.2	.8	-4.2	.8	1.5	.8	2.4	.8	2.4	.8	1.5	.8	6.2	.8
FRICTION	26.5	2.0	26.5	2.0	26.6	2.0	26.6	2.0	26.6	2.0	26.6	2.0	26.6	2.0

Figure 4.2-5. Typical Page of Second Section of Hard Copy Output

WORD INDEX \ i =	RECORD 1 TIME, SECONDS	RECORD 2 PLOT PARAMETER 1	RECORD 3 PLOT PARAMETER 2	• • • • • •	RECORD 67 PLOT PARAMETER 66
j = 1	EXPERIMENT DESIGNATOR (TEST No.)	PLOT PARAMETER DESIGNATOR	ANALOGOUS TO RECORD 2 →	→	
2	NTOT (NUMBER OF TIME PTS. +7)	INSTRUMENT CONVERSION CONSTANT 1	↓		
3	NWORD (TOTAL NUMBER OF PLOT PARAMETERS)	INSTRUMENT CONVERSION CONSTANT 2			
4	----	INSTRUMENT CONVERSION CONSTANT 3			
5	----	INSTRUMENT CONVERSION CONSTANT 4			
6	----	INSTRUMENT CONVERSION CONSTANT 5			
7	----	INSTRUMENT CONVERSION CONSTANT 6			
8	FIRST TIME IN SEC	DATA AT 1ST TIME PT.			
•	• •	• •	• •	•	• •
N	NTH TIME IN SEC	DATA AT NTH TIME PT.			
•	• •	• •	• •	•	• •
NTOT	(NTOT)TH TIME IN SEC	DATA AT (NTOT)TH TIME PT.			

Figure 4.2-6. Array Structure of Plot Data File

4.2.4 References

1. W.G. Kennedy, M.C. Jacob, and J.R. Shuckerow, Two Phase Pump Performance Program Preliminary Test Plan. EPRI NP-128, September 1975.

2. Meyer, C.A. et al., Thermodynamic and Transport Properties of Steam, ASME, 1967.

3. Powell, R. L., et al., "Thermocouple Reference Tables based on the IPTS-68", National Bureau of Standards Monograph 125, March, 1974.

4. "Power Test Codes, Flow Measurement Part 5 - Measurement of Quantity of Materials", ASME, 1959 (p. 56-58).

4.3 DATA SCANNER SYSTEM TRANSIENT DATA REDUCTION PROCESS

4.3.1 Introduction

The data scanner system utilized for steady-state test data acquisition was used as a backup system for all transient tests. During the course of the transient it scanned all instrument channels once every 5 seconds.

Upon the conclusion of a transient test, the data acquired by the scanner was stored as a transient test data file on C-E's Cyber 172 computer. The data scanner system transient data reduction and plot program (TP4TPT) was then used to reduce and plot the output from selected instruments. This program used a conversion constant file identical to the files described in the steady-state data reduction section of this volume (see Section 3) The program TP4TPT is described in the next section.

4.3.2 TP4TPT - Plot Porgram Using Data From The Steady State Data Scanner

TP4TPT is a data reduction program that used the data scanner data obtained during blowdown tests. It is primarily a plotting package and is used on a General Electric Terminet 300 terminal to which a model 7202A Hewett Packard digital plotter is connected. The primary use of the program was for obtaining an initial review of blowdown test data immediately subsequent to the actual test. This approach was necessary because the turnaround time on plots obtained from data acquired by the FM system was in excess of forty-eight (48) hours. The reason the program is described here is that it was not possible to acquire all of the loop measurement data on the FM system because of the limitation on the number of channels available. As a result, certain plots, given in Volume VI were obtained using the data from the steady state data scanner and this program.

The data files needed prior to execution are TAPE 4, the conversion constant file, and TAPE 3, the scanner transient test data file. These two files are similar in format to the combined calibration and data file described in the section on the steady-state data reduction program.

The program is executed in an interactive manner and a sample output is given in Figure 4.3-1. The program first tells the operator which test is being analyzed and then asks for the total time required, in seconds (T) on the X axis. The

data points were taken at five (5) second intervals and therefore the number of data points used (N) is given by:

$$N = \frac{T}{5} + 1$$

The program then lists the ID of each parameter and the upper and lower limits, of measured millivolts and derived engineering units, determined for each parameter, over the required plotting period. The parameters and their identification are given in Table 4.3-1.

After this listing is completed, the upper and lower limits and the spacing of the grid lines, for the Y axis, are requested. A series of questions is then asked and the program responds in various ways as shown in Figure 4.3-2. If axes are required to be plotted then the outside boundary is drawn defining the limits of the X and Y axes. Horizontal grid lines are then drawn at the requested spacing on the Y axis. The next step is to draw short vertical lines at five (5) second intervals along the X axis and finally vertical grid lines are drawn at one-minute intervals along the X axis.

As can be seen from Figure 4.3-2, it is possible to superimpose plots, to plot either engineering units or millivolts, to change the Y axis and/or produce multiple plots during a single run of the program. The only restriction is that the X axis may not change. If a different X axis is required then the program must be rerun.

TABLE 4.3-1

DATA SCANNER SYSTEM PARAMETER
IDENTIFICATION NUMBERS

("L" Numbers refer to P&ID, Figure 4.2-2)

Parameter	Identification	Parameter	Identification
1	L-1	41	L-41
2	L-2	42	L-42
3	L-3	43	L-37H
4	L-4	44	L-38M
5	L-5	45	L-39H
6	L-6	46	L-40H
7	L-7H	47	L-47
8	L-7L	48	L-48
9	L-9	49	L-49
10	L-10	50	L-50
11	L-11	51	L-51
12	L-12	52	L-52
13	L-13	53	L-53
14	L-14	54	L-54
15	L-15	55	L-55
16	L-16	56	L-56
17	L-17	57	L-57
18	L-18	58	L-58
19	L-19	59	L-59
20	L-20	60	L-60
21	L-21	61	L-61
22	L-22	62	L-62
23	L-23	63	Unassigned
24	L-24	64	L-64
25	L-25	65	L-65
26	L-26	66	L-66
27	L-27	67	Sequence timer
28	L-28	68	L-68
29	L-29	69	L-38H
30	L-30	70	Unassigned
31	L-31	71	Suction leg saturation temperature
32	L-32		
33	L-33		
34	L-34	72	Discharge leg saturation temperature
35	L-35		
36	L-36L		
37	L-37L	73	Drum saturation temperature
38	L-38L		
39	L-39L	74	Drum Water level (in. above center-line)
40	L-40L		
		75	Unassigned

```
TP4TPT
          BLOWDOWN TEST 1351    11/11/77        705

          INPUT TOTAL TIME ON X AXIS
? 420
```

ID	MILLIVOLTS MINIMUM	MILLIVOLTS MAXIMUM	ENG. UNITS MINIMUM	ENG. UNITS MAXIMUM
1	-.4	22.5	2435.5	159250.7
2	-1.4	48.9	-14503.2	319189.1
3	3.5	52.6	20.3	307.3
4	-.0	100.4	-.0	495.6
5	14.6	58.4	14.4	1031.6
6	16.1	63.3	14.6	1118.4
7	38.0	56.2	-153.4	73.2
8	19.5	61.2	-152.1	57.1
9	15.9	45.9	-.0	11.9
10	15.9	76.2	14.7	1428.8
11	-15.0	20.4	-201.8	151.3
12	33.7	37.1	3373.7	3704.7
13	28.8	90.1	275.5	548.7
14	15.2	90.4	215.7	550.1
15	37.7	83.8	4.6	4.6
16	20.7	50.4	4.0	4.0
17	50.8	73.8	4.7	4.8
18	44.9	90.5	4.7	4.8
19	31.3	77.8	4.4	4.5
20	54.8	76.0	5.8	5.8
21	-.4	2.7	148.1	161.7
22	1.4	19.9	156.0	236.4
23	3.3	9.0	295.5	546.5
24	8.4	9.0	521.6	547.4
25	41.3	80.0	-.0	1.5
26	5.5	30.3	20987.4	312218.9
27	-2.5	25.4	-6238.2	359619.6
28	-.0	57.1	-.0	266.9
29	3.9	104.5	17.6	475.8
30	47.5	90.0	359.3	548.3
31	18.2	90.1	228.7	548.7
32	6.9	98.8	-14.2	127.9
33	47.1	56.7	-1.3	2.7
34	32.1	55.7	3.3	3.4
35	29.9	59.5	3.8	3.8

Figure 4.3-1 TP4TPT Typical Output

BLOWDOWN TEST 1351 11/11/77 705

ID	MILLIVOLTS MINIMUM	MILLIVOLTS MAXIMUM	ENG. UNITS MINIMUM	ENG. UNITS MAXIMUM
36	24.0	44.6	5.1	5.1
37	142.3	160.0	7.0	8.0
38	15.7	145.7	-.0	7.2
39	7.1	16.2	-.5	.0
40	15.5	16.0	-.0	.0
41	51.0	64.3	831.9	1141.8
42	15.5	59.4	14.8	1026.3
43	131.6	160.0	46.0	57.3
44	16.0	73.6	-.0	22.9
45	14.8	15.9	-.4	.0
46	15.8	15.9	-.0	.0
47	15.3	58.5	20.2	1029.6
48	14.7	58.4	15.6	1030.9
49	8.6	9.4	532.1	564.4
50	37.3	90.1	0.0	0.0
51	2.4	8.0	253.0	504.1
52	3.0	8.9	281.7	543.9
53	79.4	90.5	470.9	541.1
54	57.5	83.3	334.8	494.4
55	-98.0	135.7	0.0	0.0
56	40.6	92.5	233.9	551.6
57	-1.7	-1.7	73.9	77.1
58	59.9	91.8	351.1	549.7
59	65.6	75.7	393.2	455.6
60	6.1	23.9	-31.4	25.1
61	10.8	93.0	-.8	12.2
62	-.0	0.0	.0	.1
63	-.0	0.0	0.0	0.0
64	16.0	60.4	.2	1040.1
65	15.7	59.2	4.6	1023.4
66	15.6	48.3	-110.3	47.9
67	11.4	64.4	0.0	0.0
68	6.0	80.1	-3.9	25.3
69	16.0	31.7	-.0	24.9
70	0.0	0.0	0.0	0.0
71	0.0	0.0	210.8	548.4
72	0.0	0.0	211.6	558.3
73	0.0	0.0	159.0	547.4
74	0.0	0.0	-35.7	20.8
75	0.0	0.0	0.0	0.0

Figure 4.3-1 (Cont.) TP4TPT Typical Output

```
            INPUT LOWER AND UPPER LIMITS AND STEP SIZE-Y AXIS
? 0,25,5
            DO YOU WANT NEW AXES PLOTTED (1-YES, 2-NO)?
? 1
 PLTP
            WHICH PLOT NUMBER DO YOU WANT?
? 44
            IS THIS MILLIVOLTS (1) OR ENG. UNITS (2) ?
? 2
 PLTL
            DO YOU WANT ANOTHER PLOT (1 FOR YES OR 2 FOR NO)?
? 1
            DO YOU WANT NEW AXES (1 FOR YES, 2 FOR NO)?
? 1
            INPUT LOWER AND UPPER LIMITS AND STEP SIZE-Y AXIS
? 0,1100,100
            DO YOU WANT NEW AXES PLOTTED (1-YES, 2-NO)?
? 1
 PLTP
            WHICH PLOT NUMBER DO YOU WANT?
? 64
            IS THIS MILLIVOLTS (1) OR ENG. UNITS (2) ?
? 2
 PLTL
            DO YOU WANT ANOTHER PLOT (1 FOR YES OR 2 FOR NO)?
? 1
            DO YOU WANT NEW AXES (1 FOR YES, 2 FOR NO)?
? 2
            WHICH PLOT NUMBER DO YOU WANT?
? 65
            IS THIS MILLIVOLTS (1) OR ENG. UNITS (2) ?
? 2
 PLTL
            DO YOU WANT ANOTHER PLOT (1 FOR YES OR 2 FOR NO)?
? 2
     8.106 CP SECONDS EXECUTION TIME
/
```

Figure 4.3-1 (Cont.) TP4TPT Typical Output

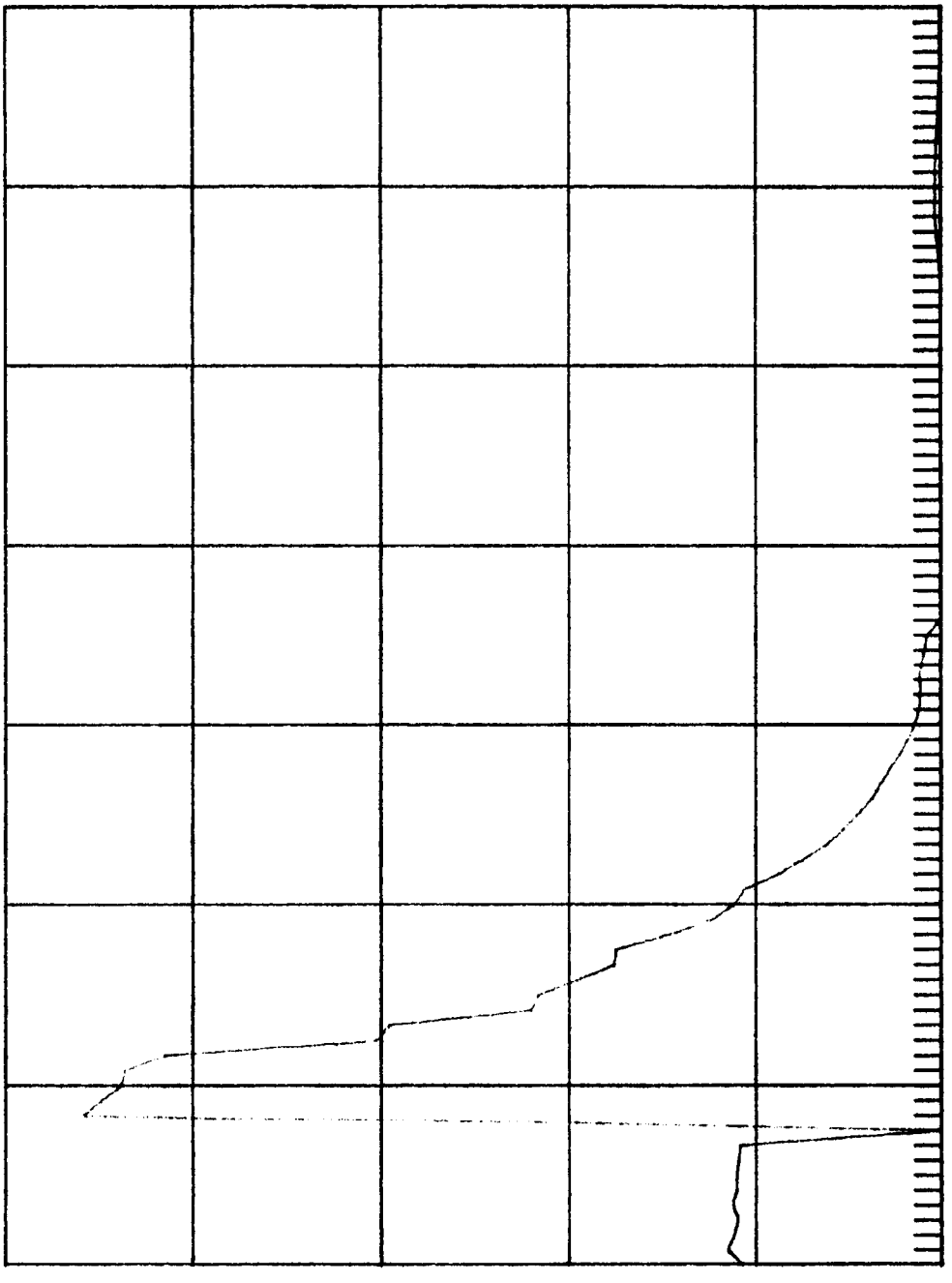


Figure 4.3-1 (Cont.) TP4TPT Typical Output

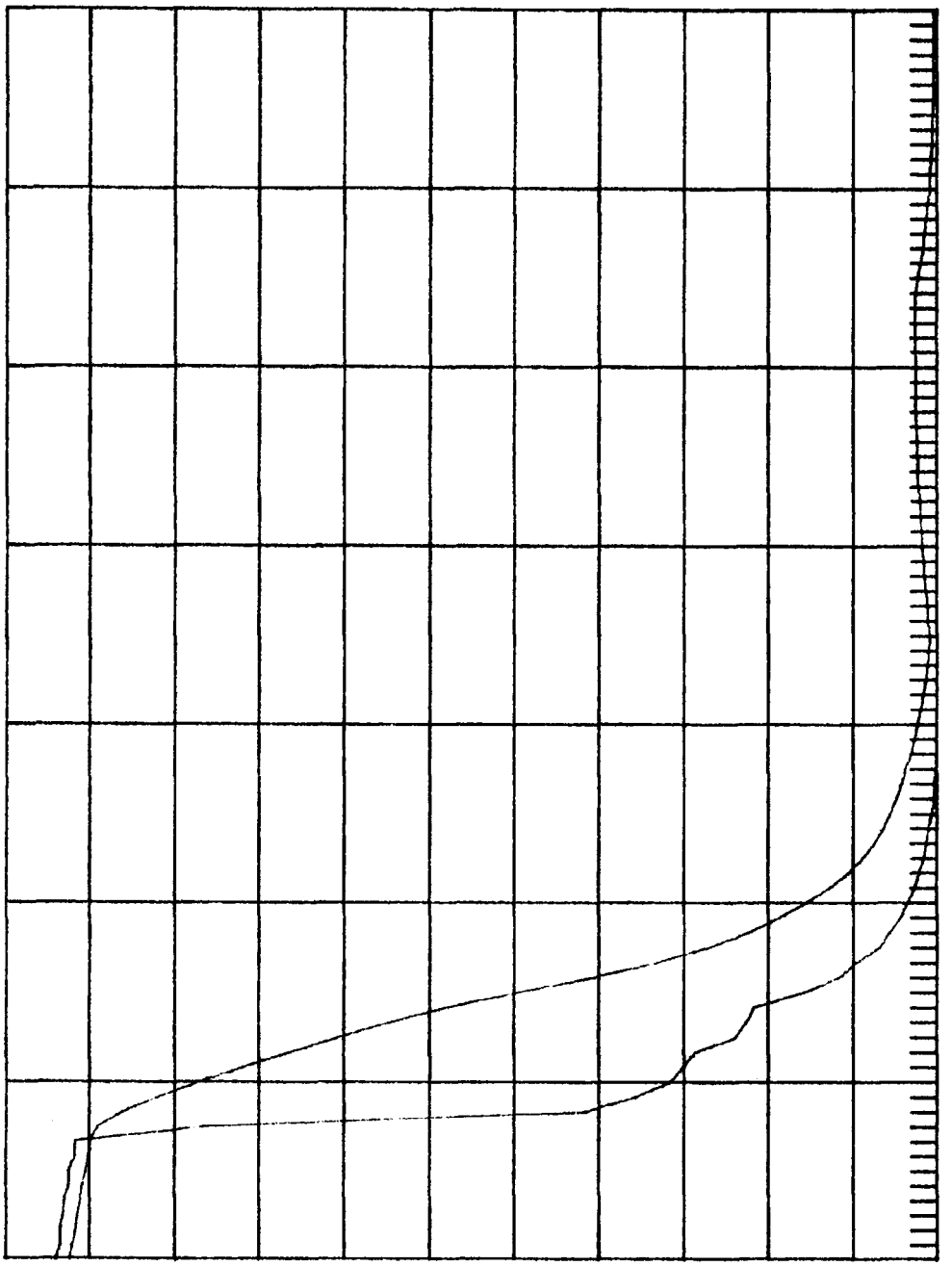


Figure 4.3-1 (Cont.) TP4TPT Typical Output

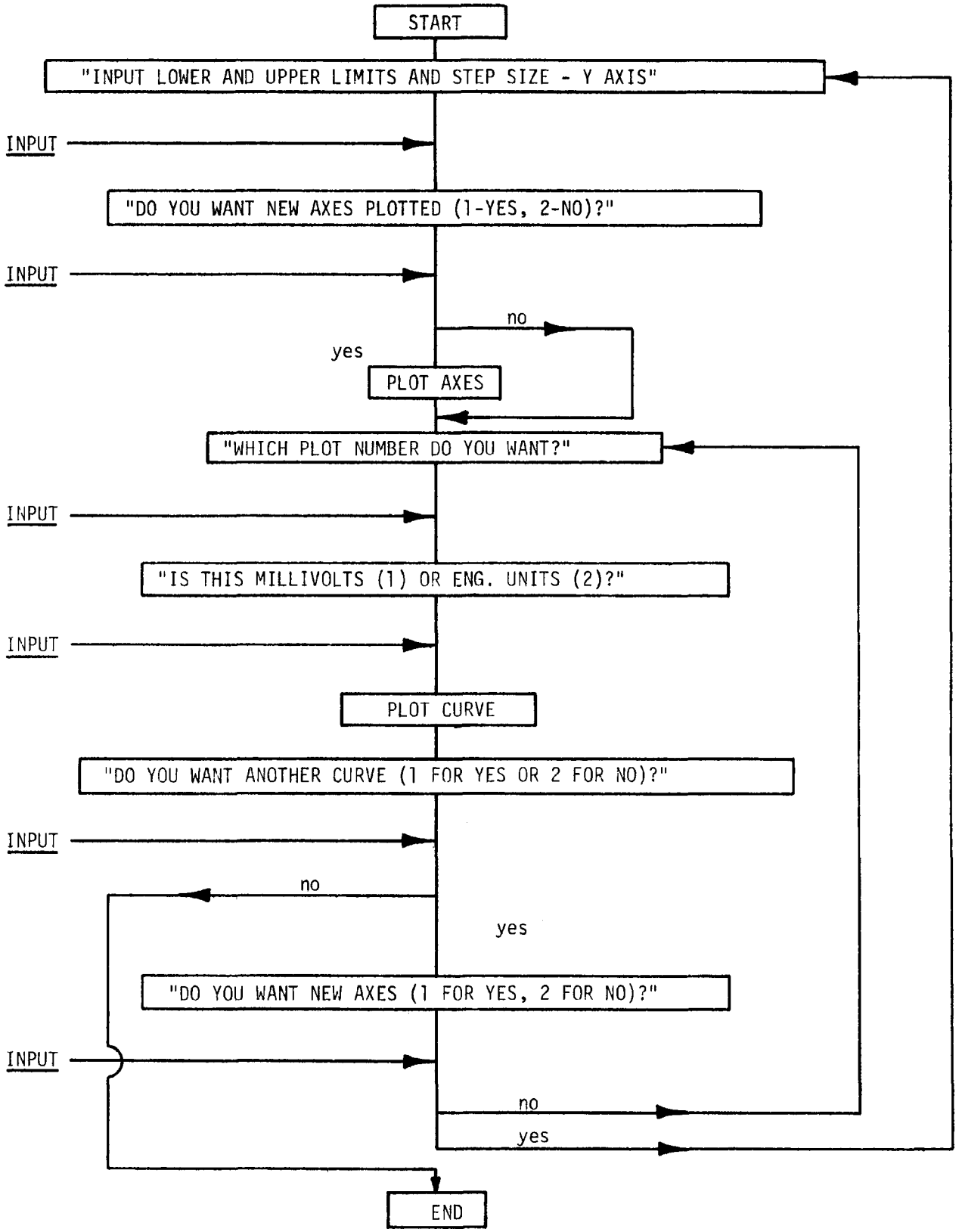
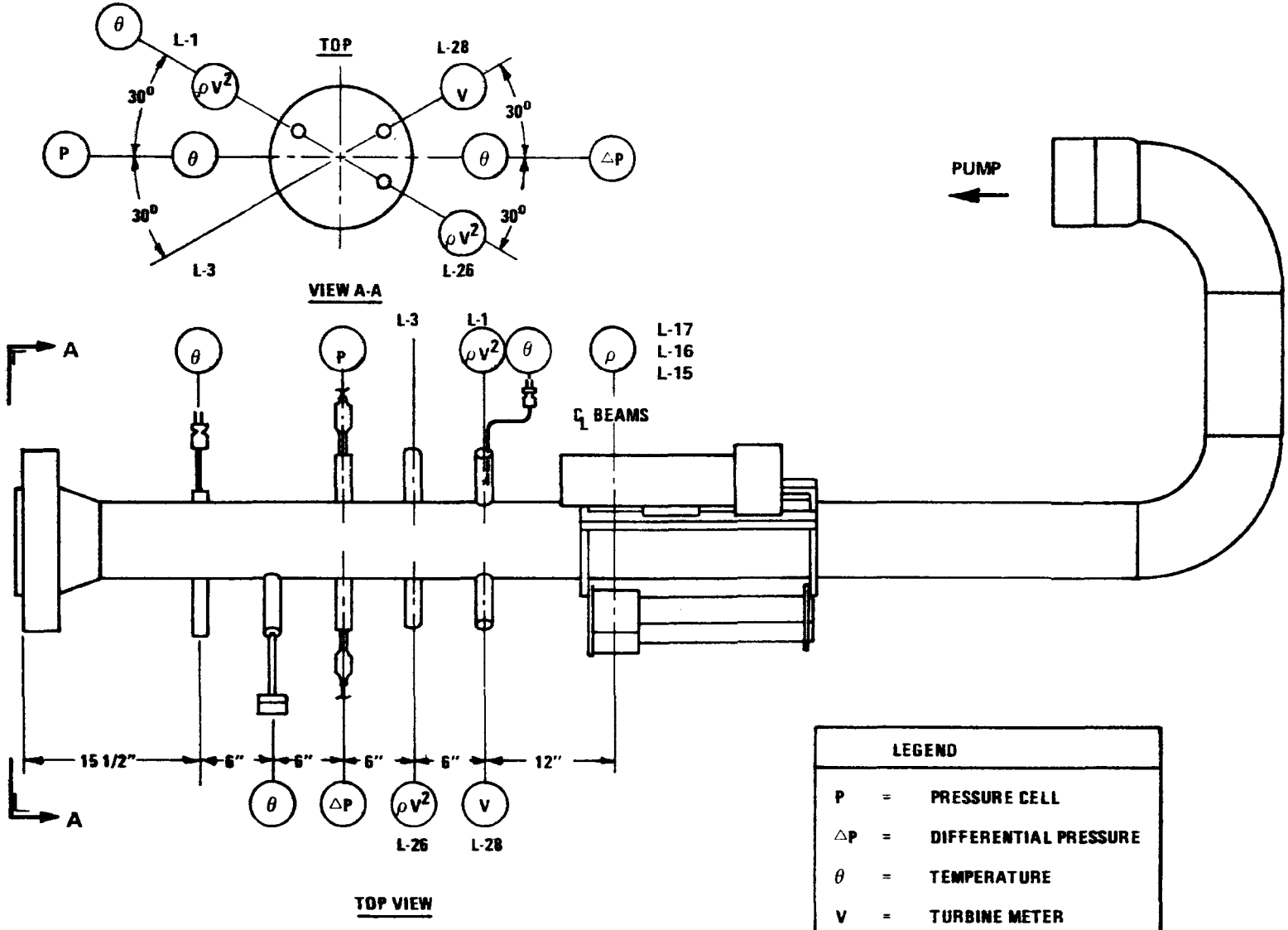


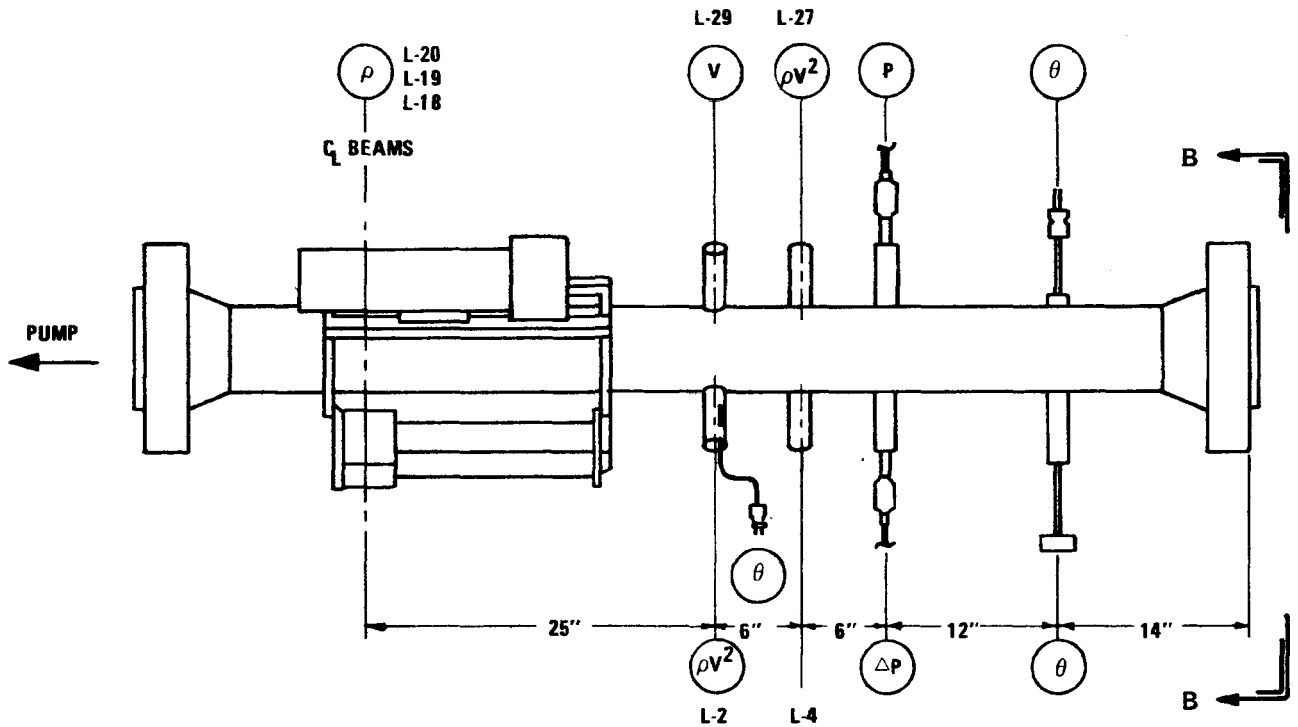
Figure 4.3-2. TP4TPT - INTERACTIVE LOGIC

Appendix 4.2A

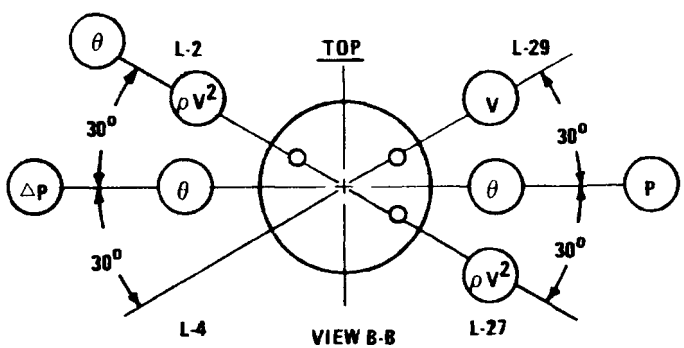
TRANSIENT TESTS INSTRUMENTATION LISTS



TEST 246 SUCTION INSTRUMENT SECTION



TOP VIEW



TEST 246 DISCHARGE INSTRUMENT SECTION

LEGEND		
P	=	PRESSURE CELL
△P	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

INSTRUMENTATION LIST

TEST 246

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3			Not Used	
4	L-29	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	0-200 psid
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	0-25 psid
9	L-9	F-10	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10	F-11	Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Continued)

TEST 246

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21	F-22	Pump Inlet Injection Flow Thermocouple	0-300°F
22	L-22	F-23	Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 246

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25	F-24	High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-30	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
28	L-28	F-4	Pump Suction Turbine Meter	0-90 ft/sec
29			Not Used	
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-50 GPM
33	L-33	F-34	Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-37	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd)

TEST 246

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42		Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50		Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

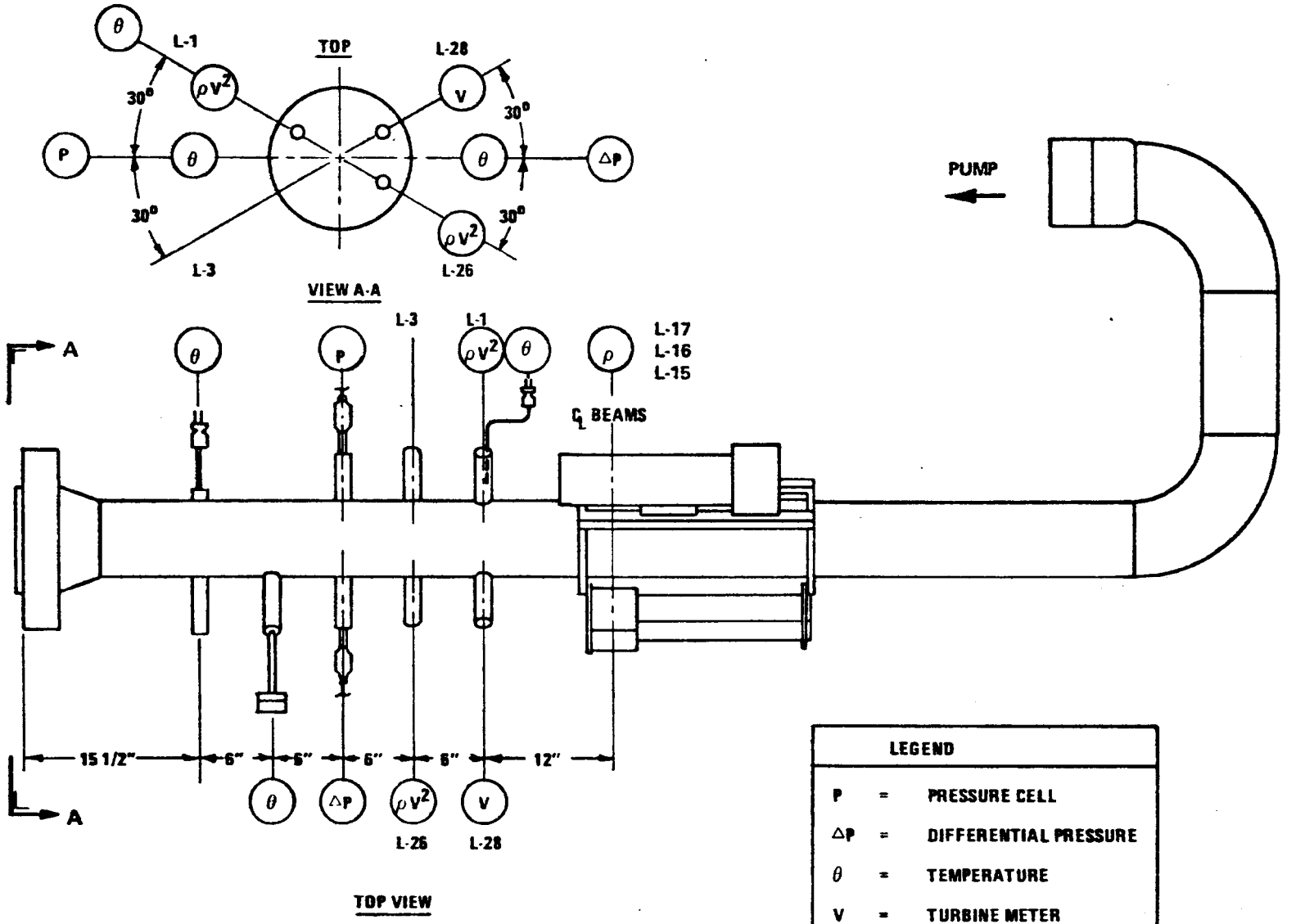
TEST 246

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61	F-25	Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62	L-62		Pac-16 ΔP Cell	0-200 psid
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

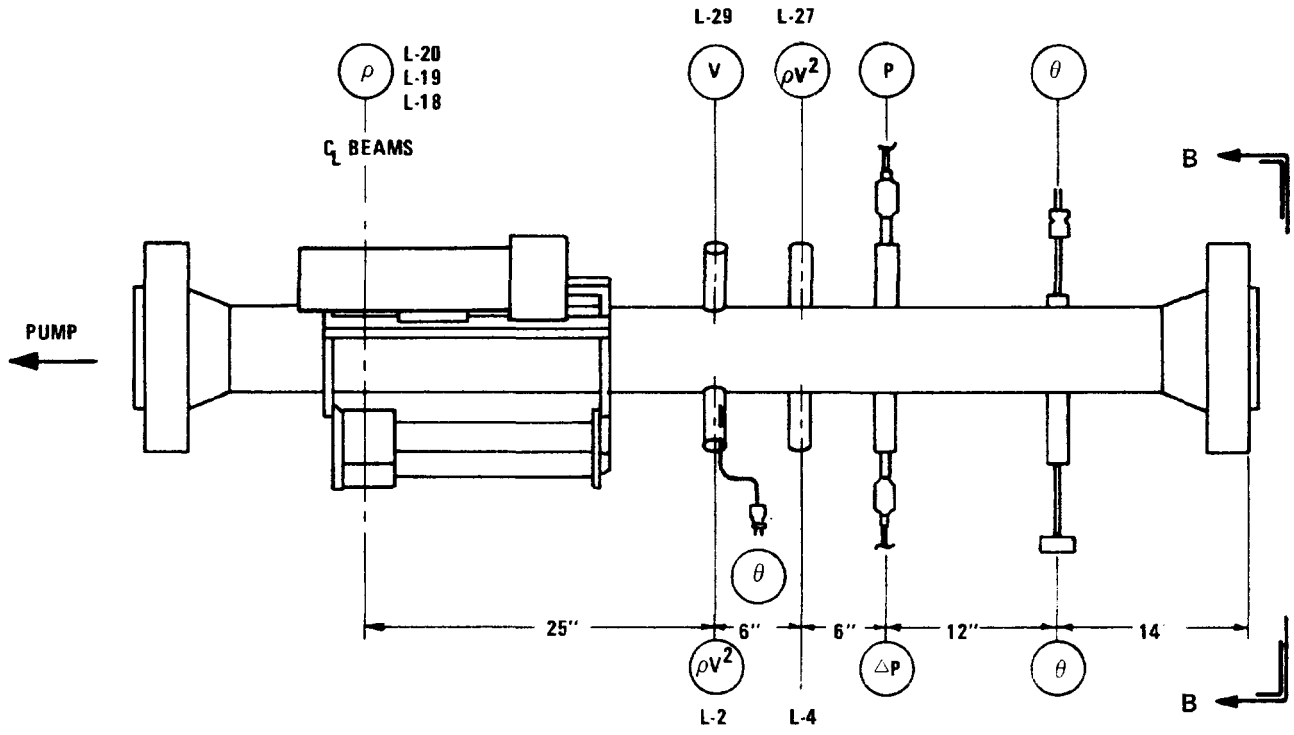
INSTRUMENTATION LIST (Cont'd.)

TEST 246

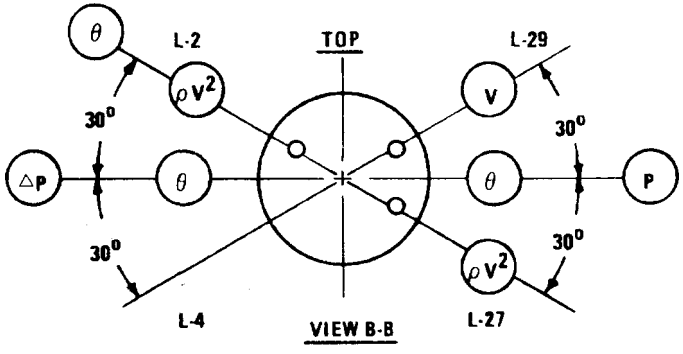
Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-28	Pump Flange to Flange DP Cell	0-200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68	F-39	Pump Impeller (Front-to-Back) D/P	0-25 psid
69			Not Used	



TEST 252 SUCTION INSTRUMENT SECTION



TOP VIEW



TEST 252 DISCHARGE INSTRUMENT SECTION

LEGEND		
P	=	PRESSURE CELL
△P	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

INSTRUMENTATION LIST

TEST 252

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3			Not Used	
4	L-29	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	0-200 psid
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	0-25 psid
9	L-9	F-10	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10	F-11	Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Continued)

TEST 252

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21	F-22	Pump Inlet Injection Flow Thermocouple	0-300°F
22	L-22	F-23	Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 252

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25	F-24	High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-30	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
28	L-28	F-4	Pump Suction Turbine Meter	0-90 ft/sec
29			Not Used	
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-50 GPM
33	L-33	F-34	Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-37	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 252

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42		Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50		Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

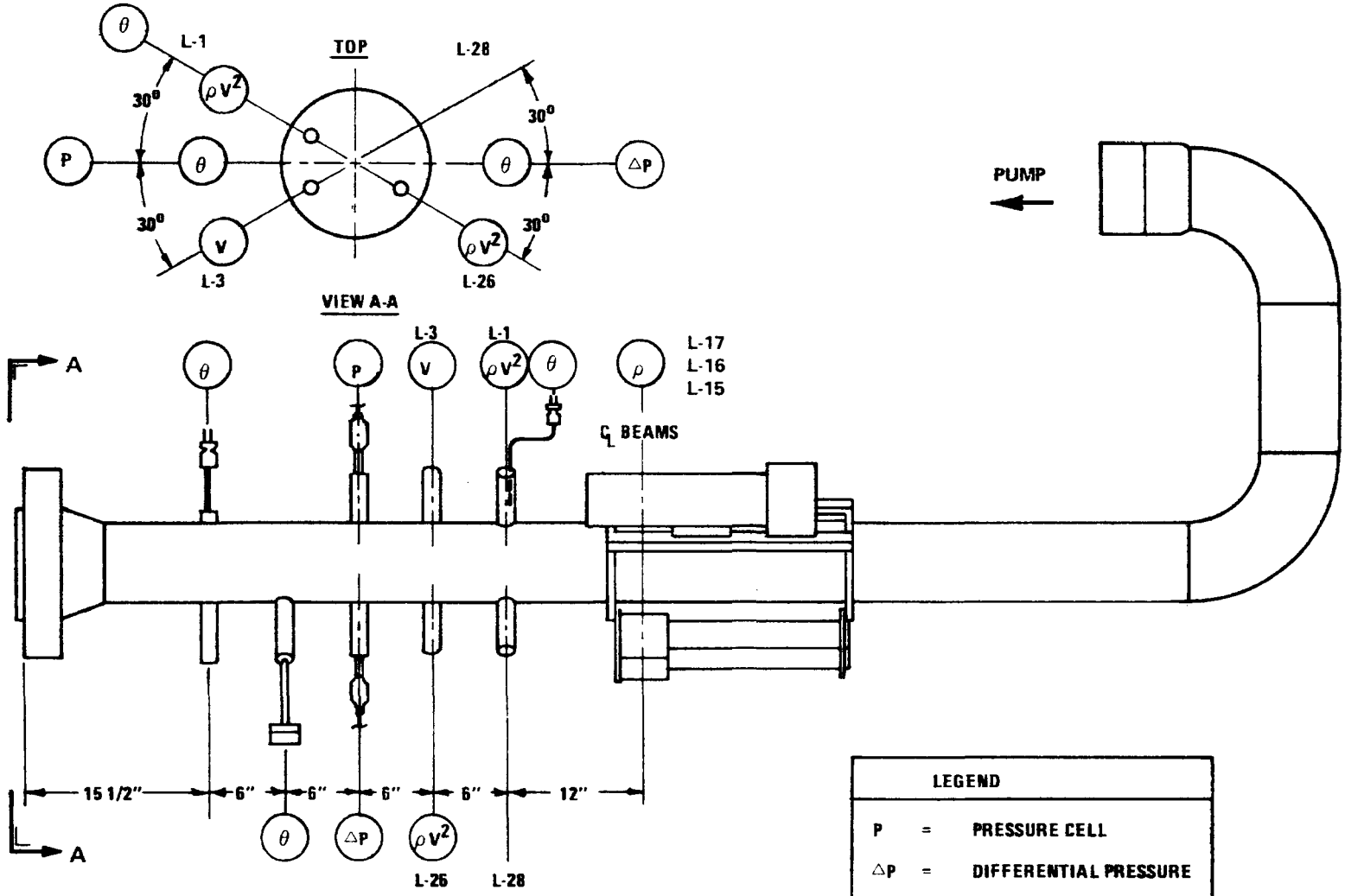
TEST 252

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61	F-25	Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62	L-62		Pac-16 ΔP Cell	0-200 psid
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

INSTRUMENTATION LIST (Cont'd.)

TEST 252

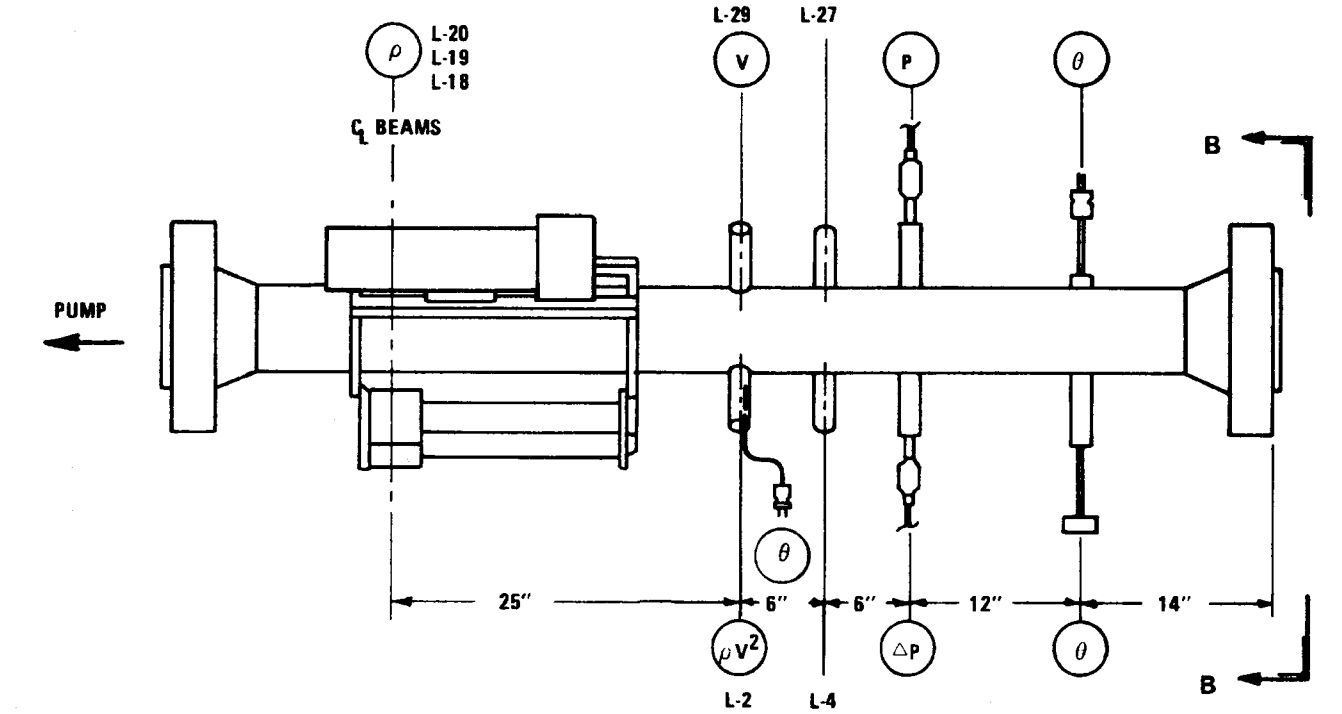
Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-28	Pump Flange to Flange DP Cell	0-200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68	F-39	Pump Impeller (Front-to-Back) D/P	0-25 psid
69			Not Used	

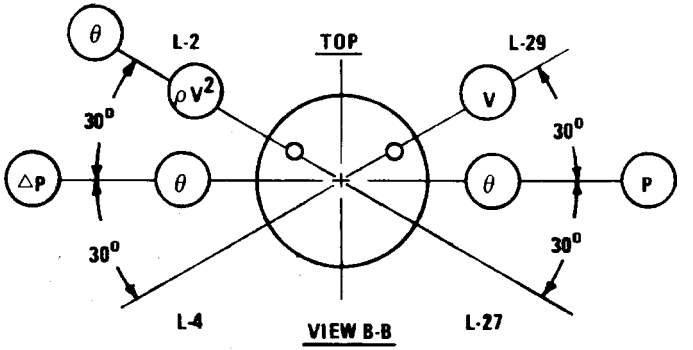


LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 475 SUCTION INSTRUMENT SECTION

400018





LEGEND		
P	=	PRESSURE CELL
△P	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 475 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 475

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-29	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200 psid
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16 psid
9	L-9	F-10	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10	F-11	Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Continued)

TEST 475

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21	F-22	Pump Inlet Injection Flow Thermocouple	0-300°F
22	L-22	F-23	Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 475

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25	F-24	High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27			Not Used	
28			Not Used	
29			Not Used	
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-50 GPM
33	L-33	F-34	Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-37	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 475

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42		Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50		Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

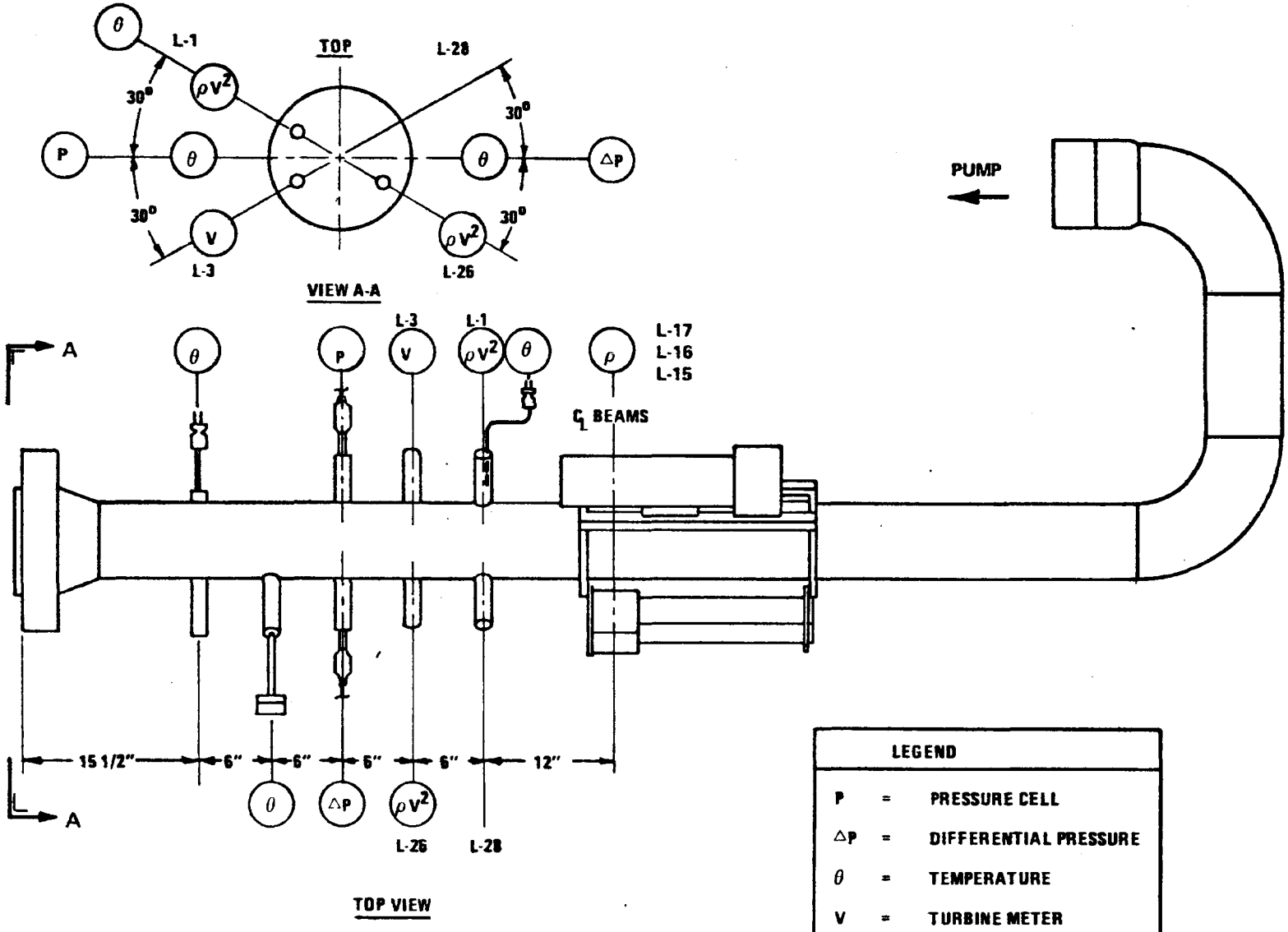
TEST 475

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61	F-25	Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62	L-62		Pac-16 ΔP Cell	0-200 psid
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65	F-30	H.P. Drum Pressure Cell	0-1500 psi

INSTRUMENTATION LIST (Cont'd.)

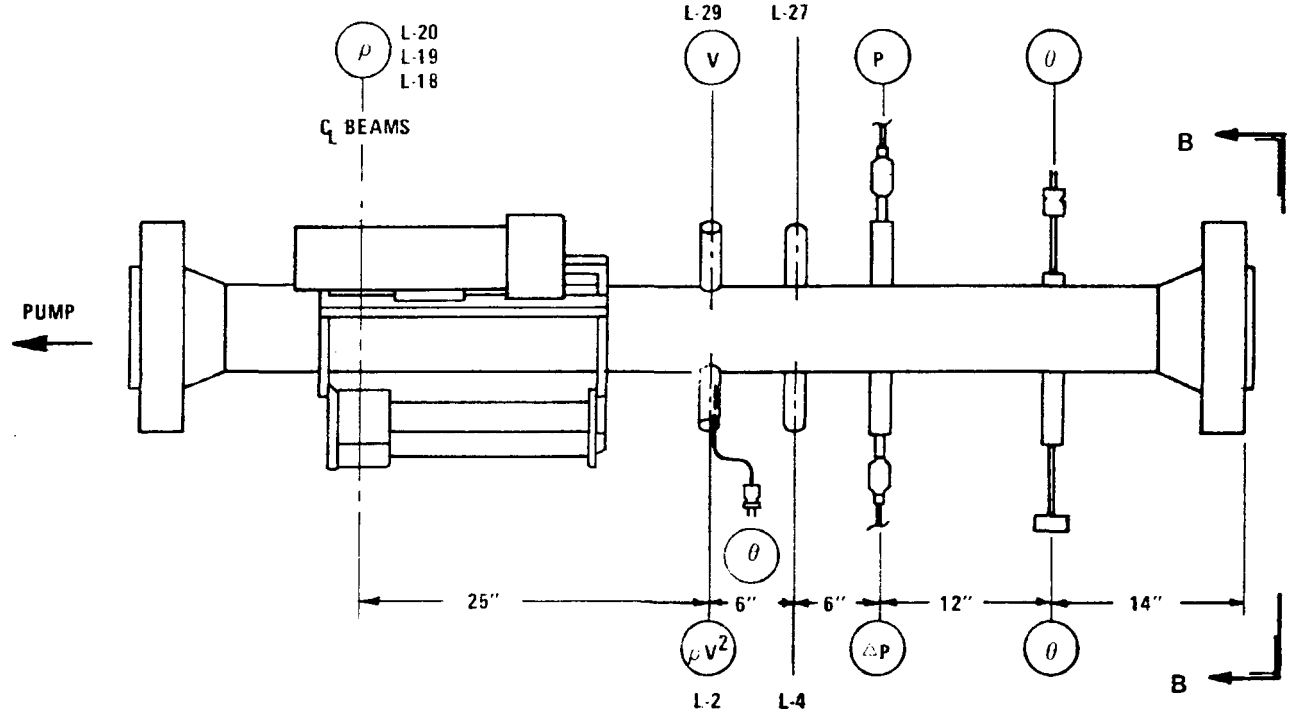
TEST 475

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-28	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68	F-39	Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H		Main Water Orifice D/P	0-50 psid

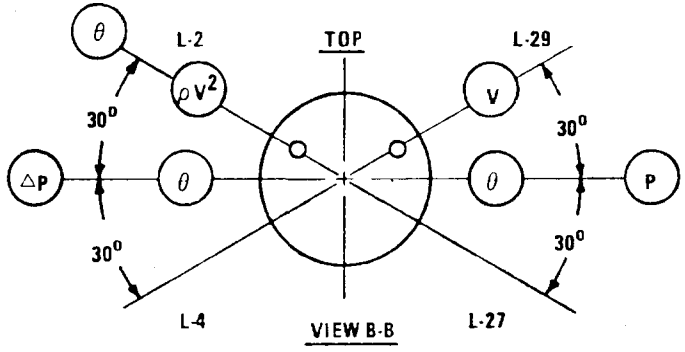


LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 497 SUCTION INSTRUMENT SECTION



TOP VIEW



TEST 497 DISCHARGE INSTRUMENT SECTION

LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

INSTRUMENTATION LIST

TEST 497

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-29	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200 psid
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16 psid
9	L-9	F-10	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Continued)

TEST 497

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21	F-22	Pump Inlet Injection Flow Thermocouple	0-300°F
22	L-22	F-23	Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 497

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25	F-24	High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27			Not Used	
28			Not Used	
29			Not Used	
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-50 GPM
33	L-33	F-34	Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-11	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-22	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 497

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42		Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50		Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

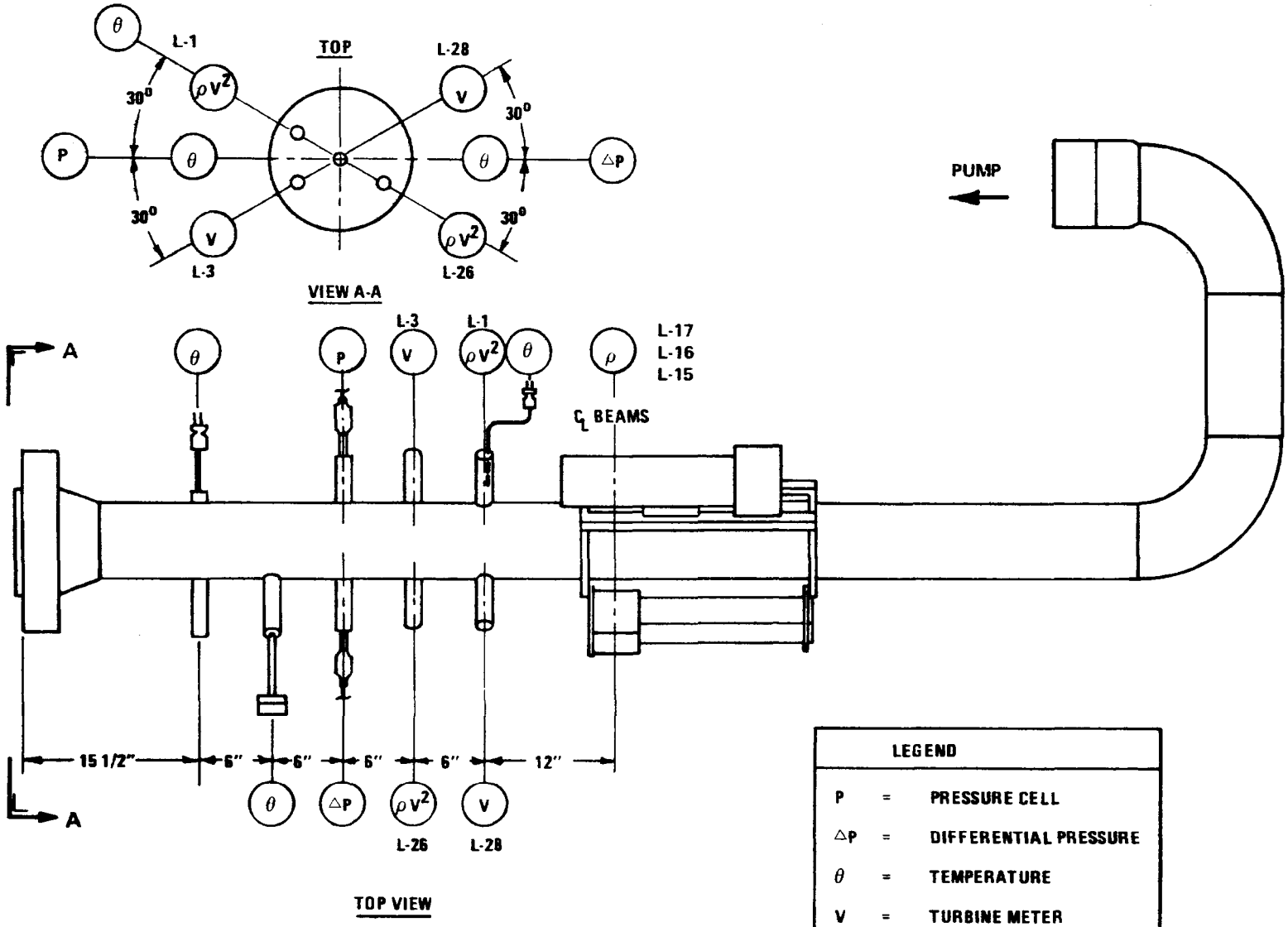
TEST 497

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61	F-25	Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62	L-62		Pac-16 ΔP Cell	0-200 psid
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65	F-30	H.P. Drum Pressure Cell	0-1500 psi

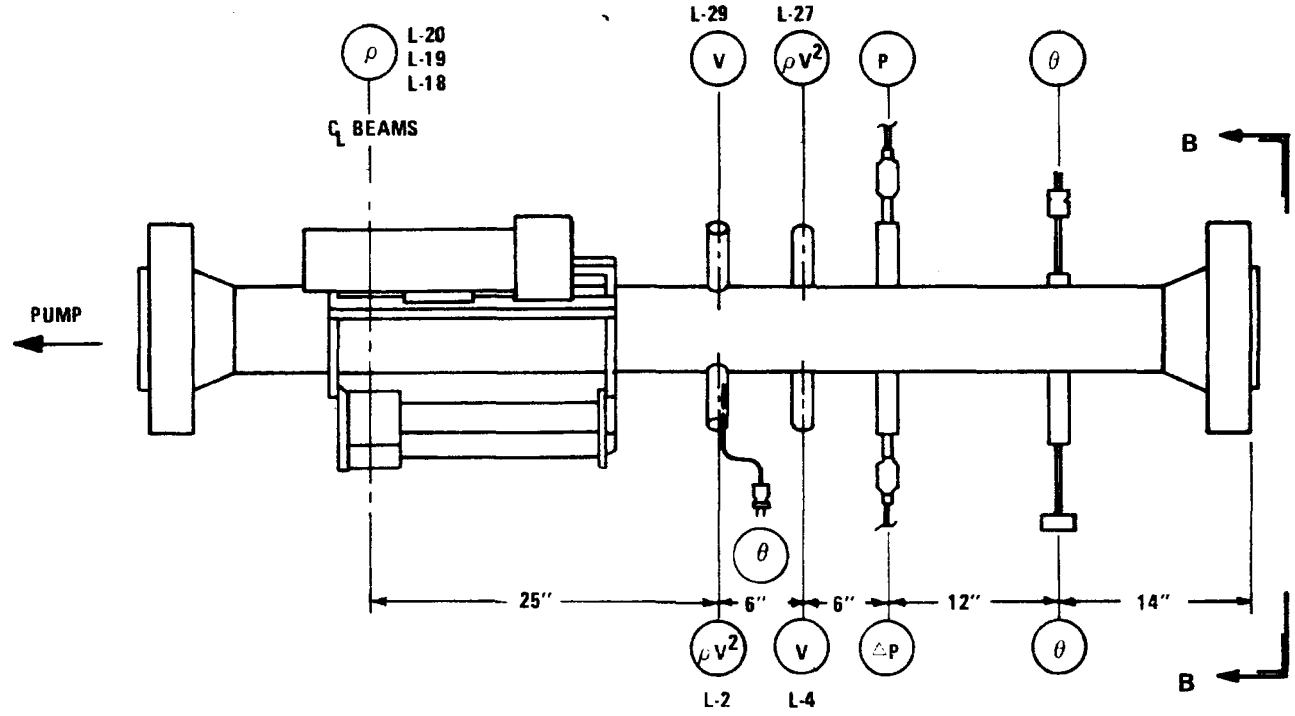
INSTRUMENTATION LIST (Cont'd.)

TEST 497

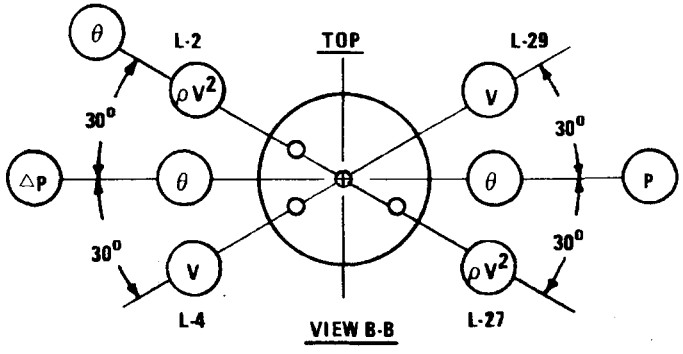
Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-28	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68	F-39	Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H		Main Water Orifice D/P	0-50 psid



TEST 676 SUCTION INSTRUMENT SECTION



TOP VIEW



LEGEND		
P	=	PRESSURE CELL
△P	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV²	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 676 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 676

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200 psid
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16 psid
9	L-9		Pump Inlet Injection D/P Cell	0-25 psid
10	L-10	F-11	Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Continued)

TEST 676

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21	F-22	Pump Inlet Injection Flow Thermocouple	0-300°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 676

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25	F-24	High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33	F-34	Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-37	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 676

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42		Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50		Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

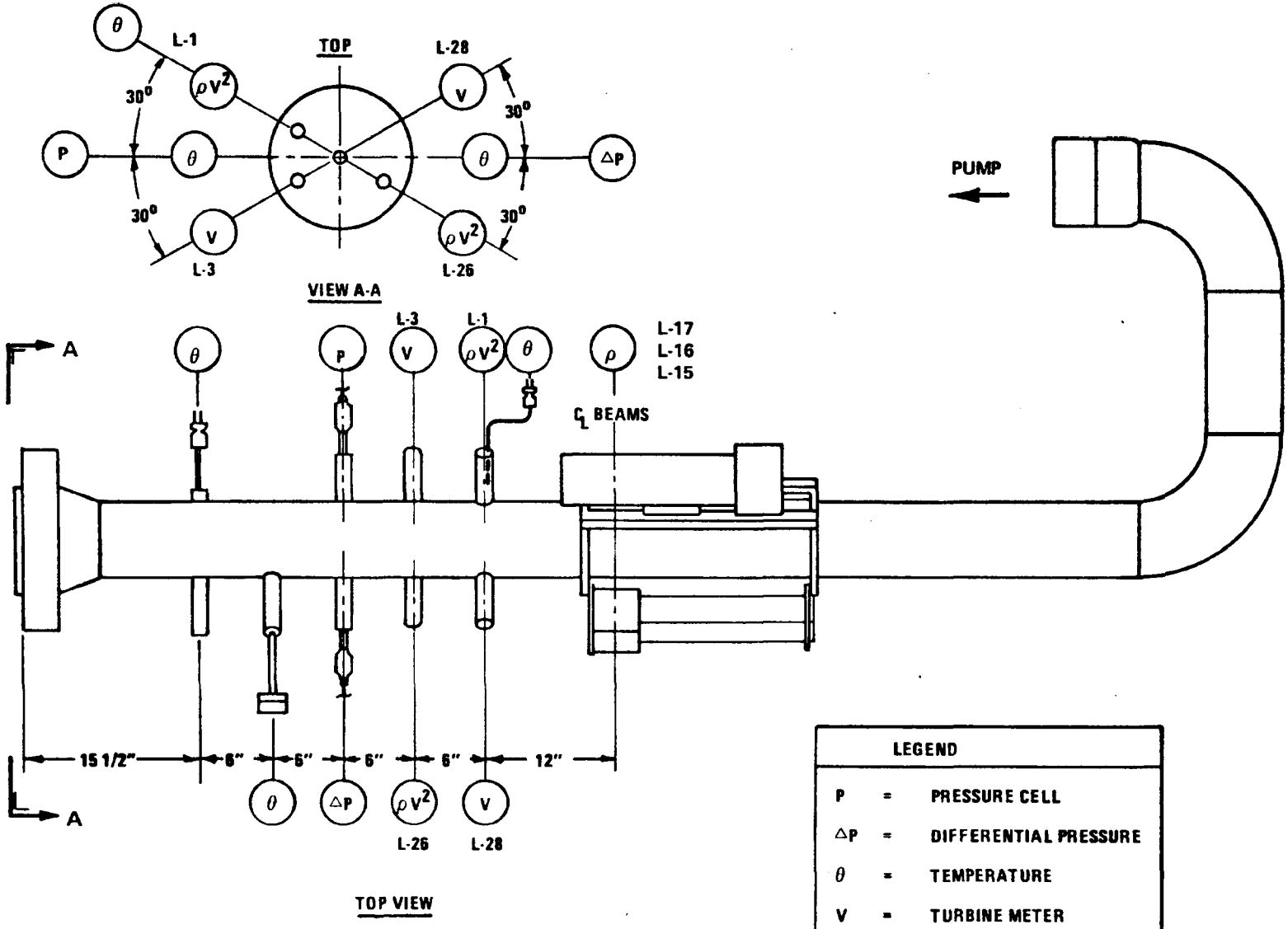
TEST 676

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61	F-25	Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62	L-62		Pac-16 ΔP Cell	0-200 psid
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65	F-30	H.P. Drum Pressure Cell	0-1500 psi

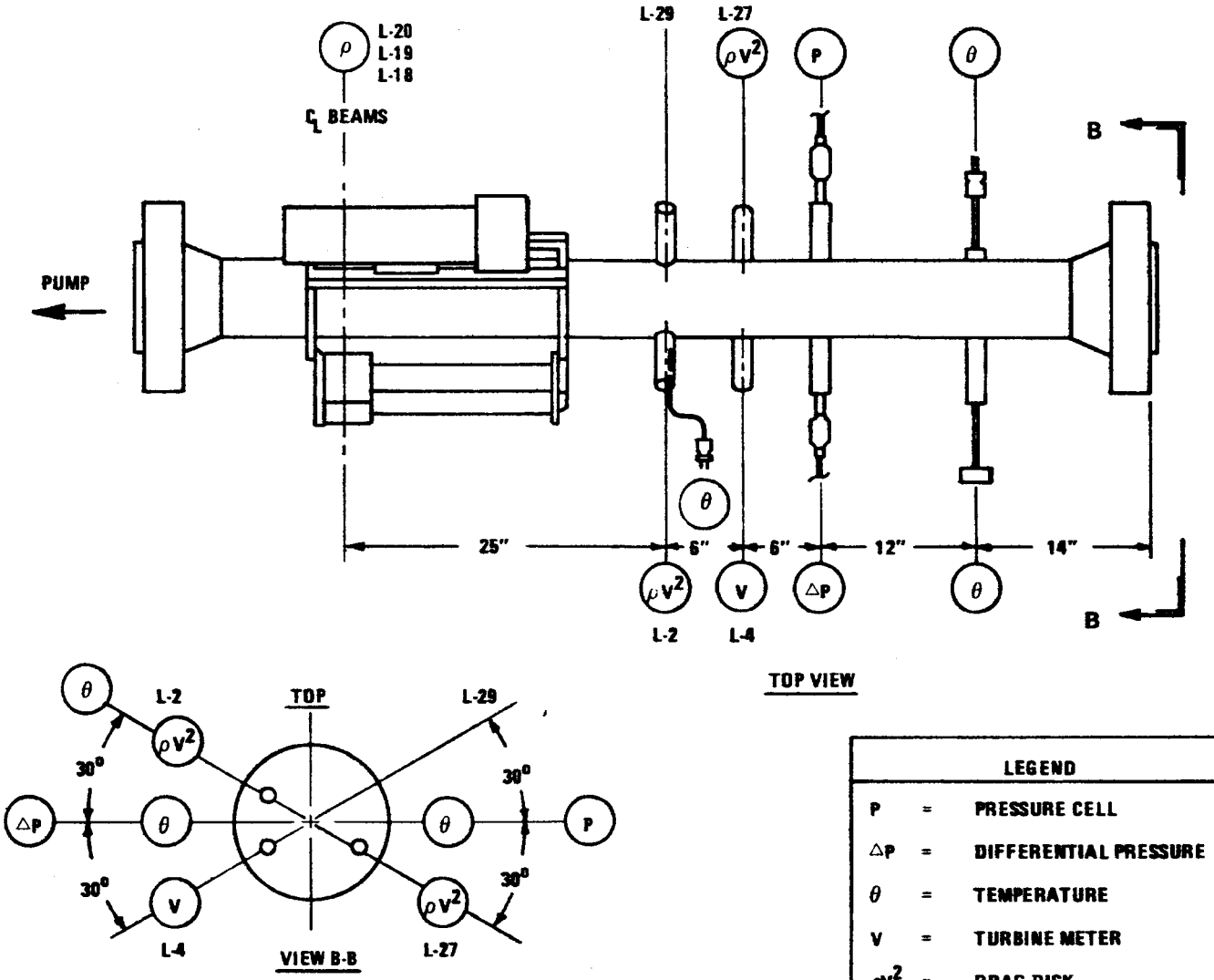
INSTRUMENTATION LIST (Cont'd.)

TEST 676

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-28	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68	F-39	Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H		Main Water Orifice D/P	0-50 psid



TEST 701 SUCTION INSTRUMENT SECTION



TEST 701 DISCHARGE INSTRUMENT SECTION

LEGEND		
P	=	PRESSURE CELL
$\triangle P$	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

INSTRUMENTATION LIST

TEST 701

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200 psid
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16 psid
9	L-9		Pump Inlet Injection D/P Cell	0-25 psid
10	L-10	F-11	Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Continued)

TEST 701

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21	F-22	Pump Inlet Injection Flow Thermocouple	0-300°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 701

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25	F-24	High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29			Not Used	
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33	F-34	Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-37	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 701

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42		Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50		Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

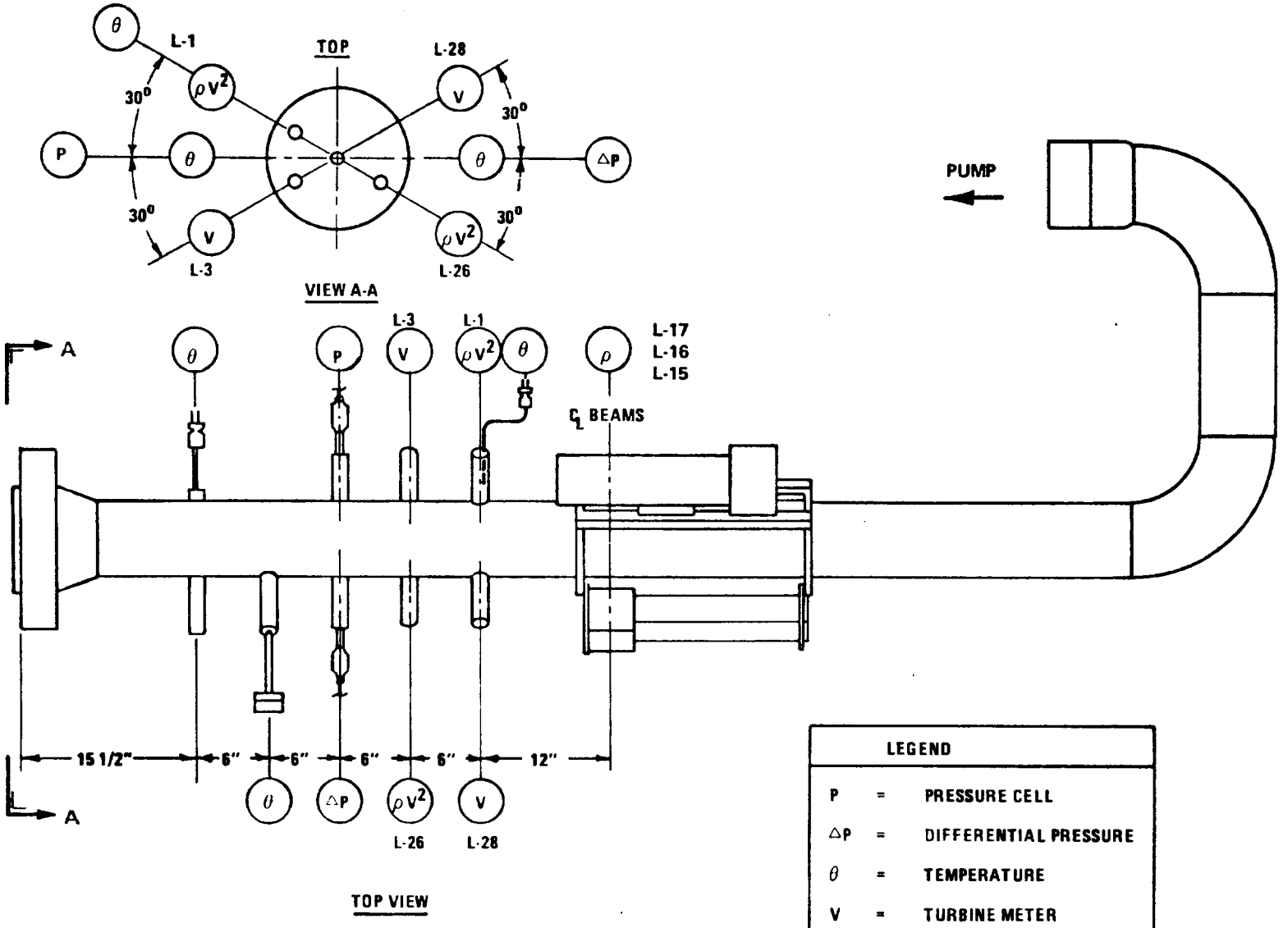
TEST 701

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61	F-25	Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62	L-62		Pac-16 ΔP Cell	0-200 psid
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65	F-30	H.P. Drum Pressure Cell	0-1500 psi

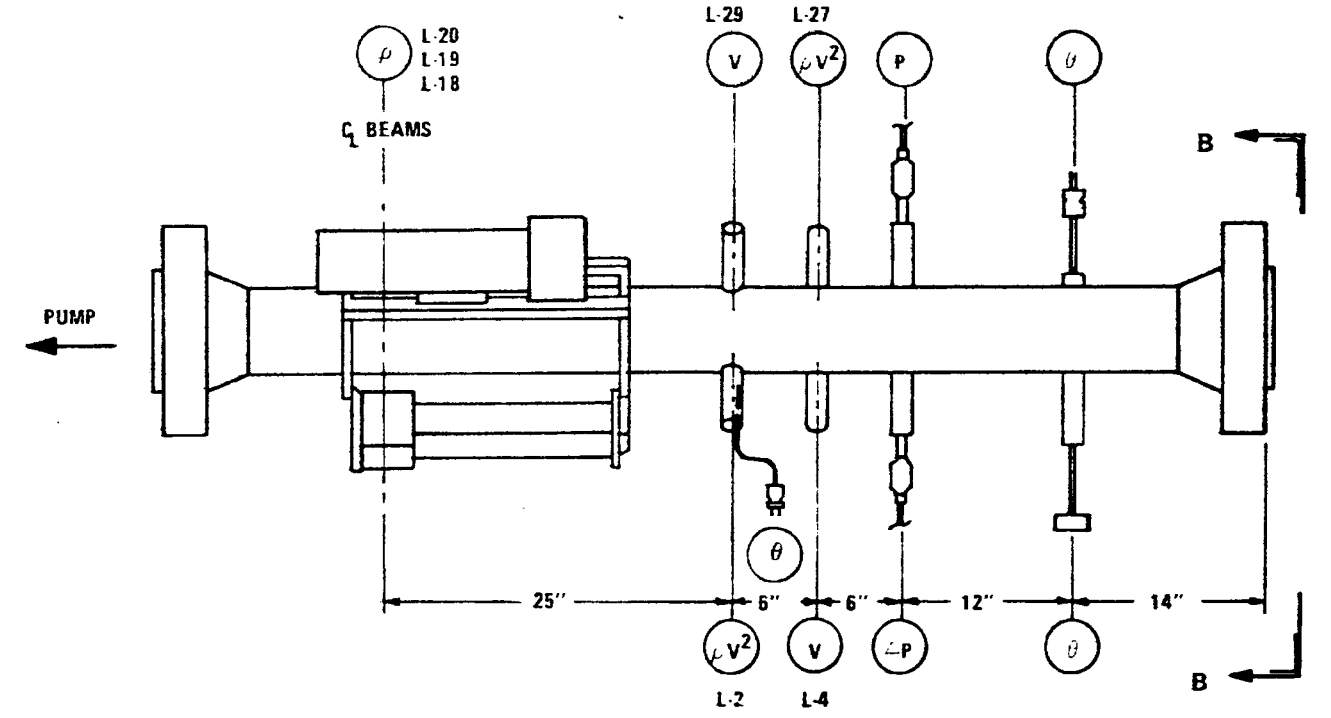
INSTRUMENTATION LIST (Cont'd.)

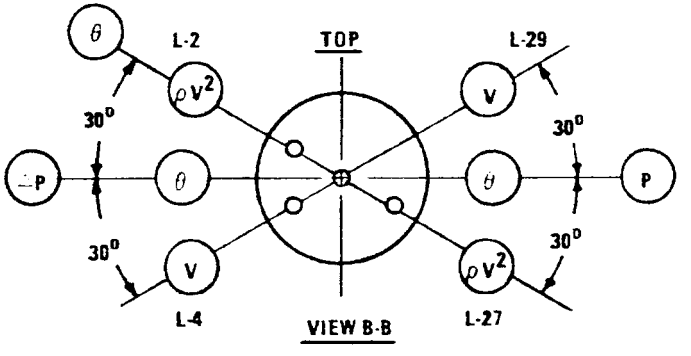
TEST 701

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-28	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68	F-39	Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H		Main Water Orifice D/P	0-50 psid



TEST 846 SUCTION INSTRUMENT SECTION





LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 846 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 846

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200 psid
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16 psid
9	L-9		Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Continued)

TEST 846

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21	F-22	Pump Inlet Injection Flow Thermocouple	0-300°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 846

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25	F-24	High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33	F-34	Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-37	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 846

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42		Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50		Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

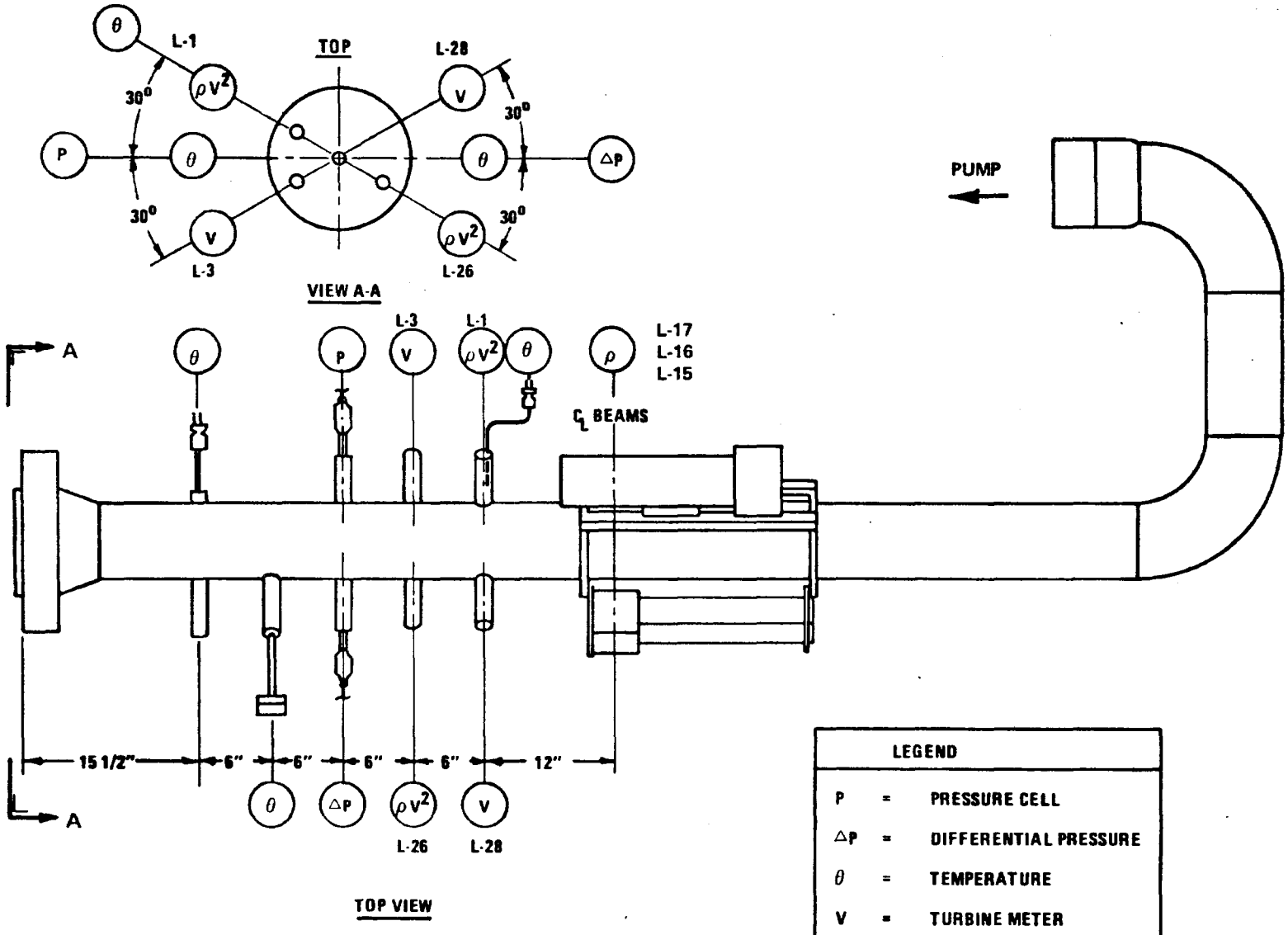
TEST 846

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61	F-25	Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62	L-62		Pac-16 ΔP Cell	0-200 psid
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65	F-30	H.P. Drum Pressure Cell	0-1500 psi

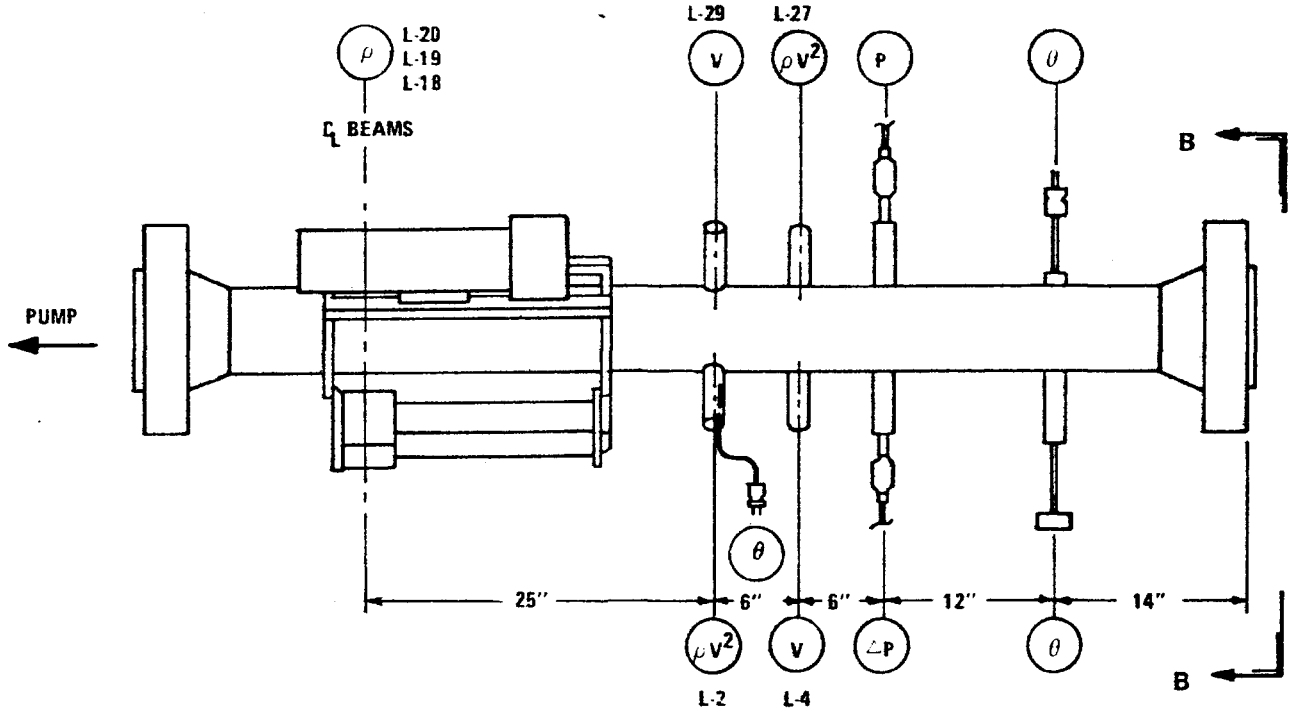
INSTRUMENTATION LIST (Cont'd.)

TEST 846

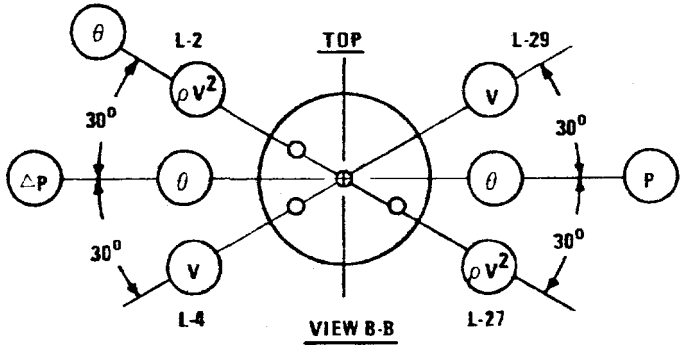
Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-39	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68	F-38	Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H		Main Water Orifice D/P	0-50 psid



TEST 1156 SUCTION INSTRUMENT SECTION



TOP VIEW



LEGEND		
P	=	PRESSURE CELL
△P	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 1156 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 1156

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16
9	L-9	F-22	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Cont'd).

TEST 1156

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermocouple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 1156

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-1,000,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-1,000,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-37	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 1156

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L	F-11	Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

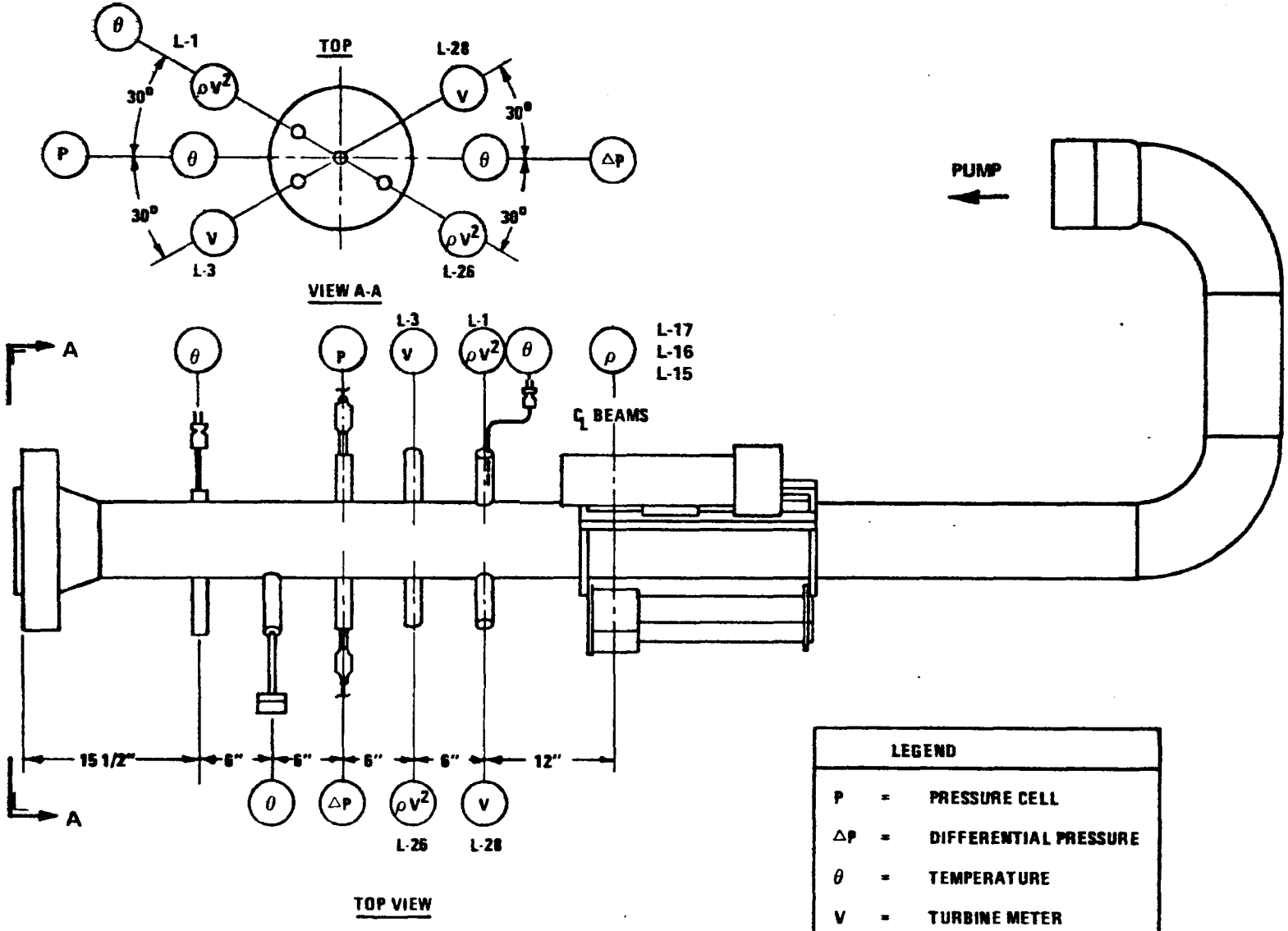
TEST 1156

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62			Not Used	
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65	F-30	H.P. Drum Pressure Cell	0-1500 psi

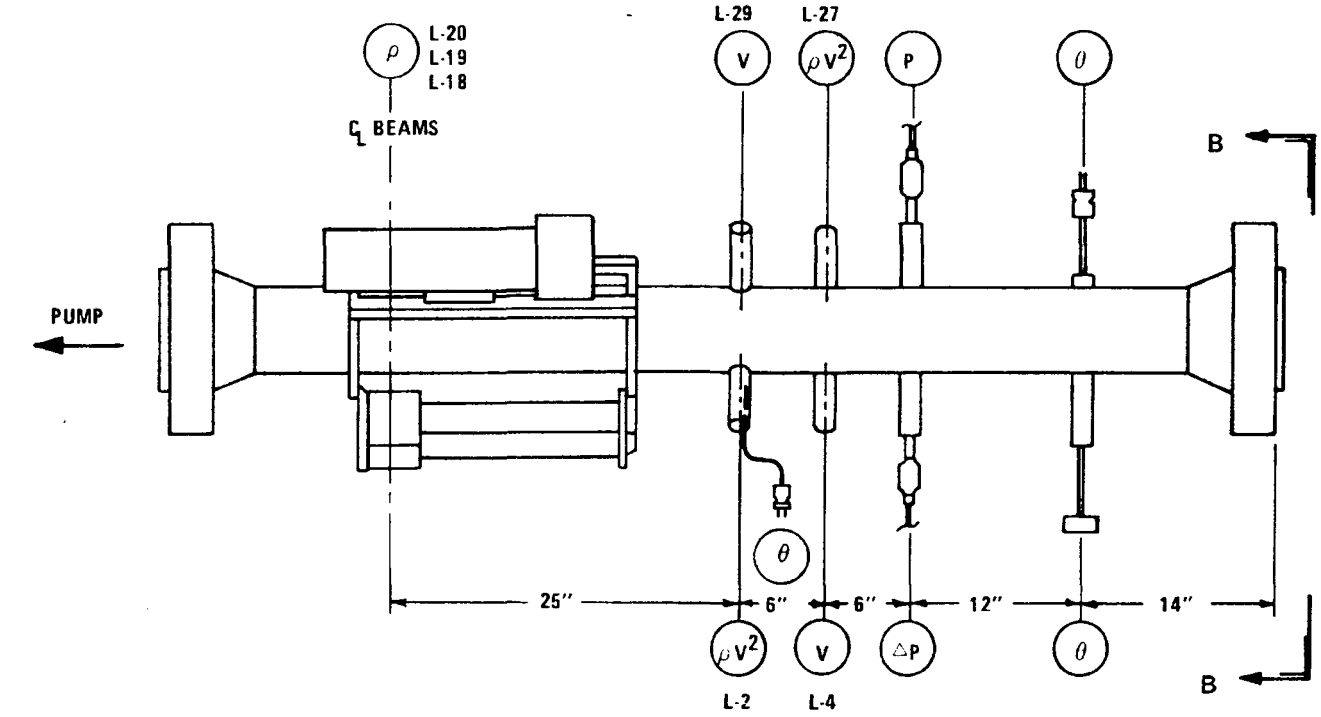
INSTRUMENTATION LIST (Cont'd.)

TEST 1156

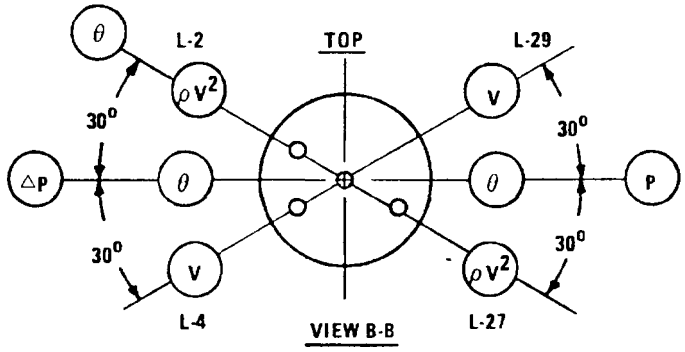
Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-39	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid



TEST 1179 SUCTION INSTRUMENT SECTION



TOP VIEW



LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 1179 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 1179

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16
9	L-9	F-22	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Cont'd).

TEST 1179

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermo-couple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermo-couple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 1179

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-1,000,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-1,000,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-37	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-30	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 1179

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L	F-11	Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

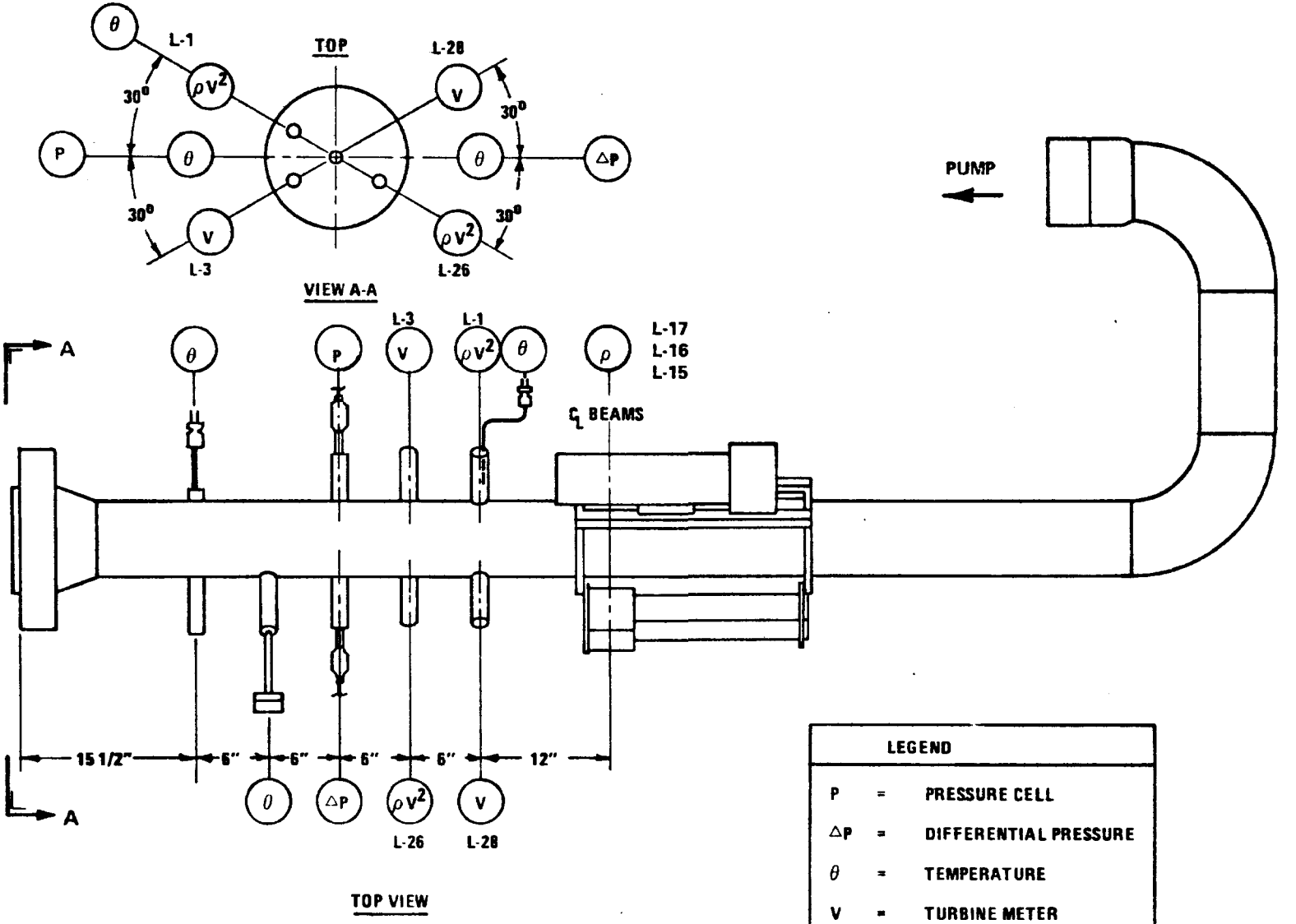
TEST 1179

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62			Not Used	
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

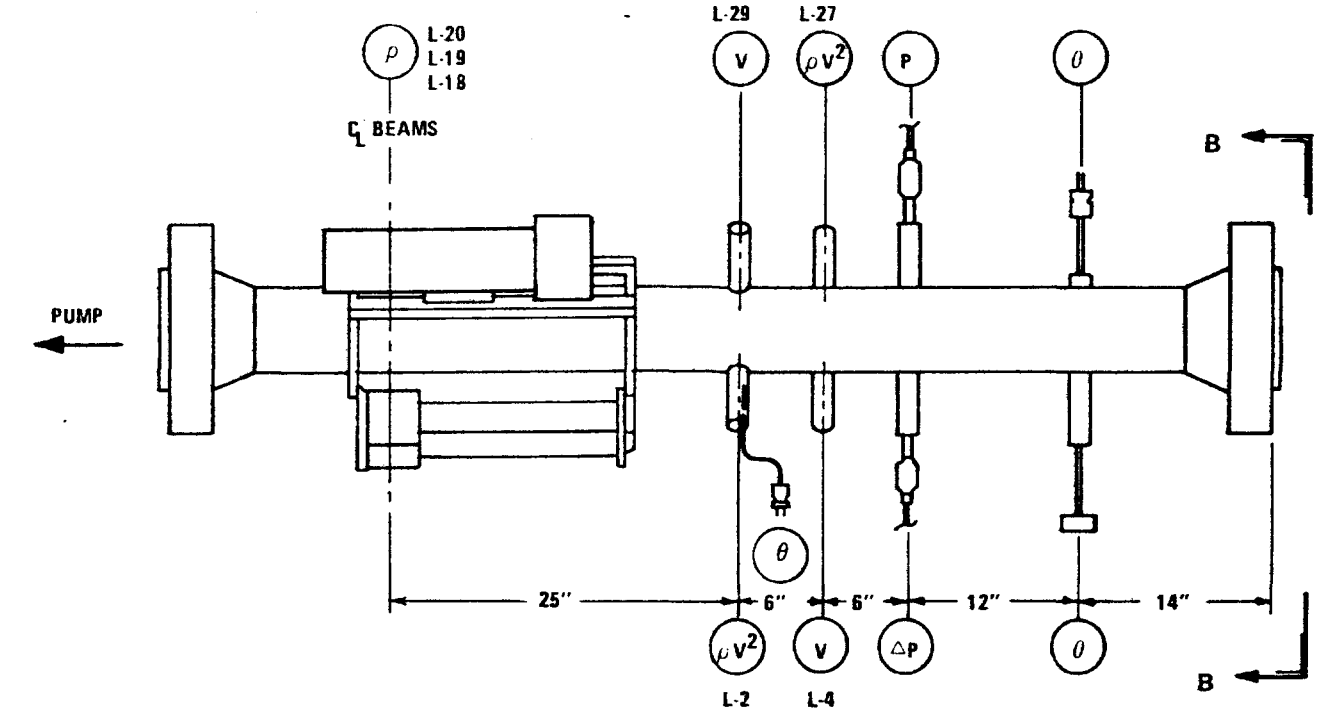
INSTRUMENTATION LIST (Cont'd.)

TEST 1179

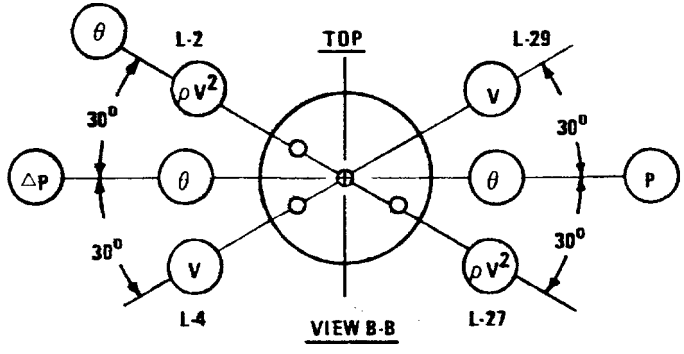
Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-39	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid



TEST 1211 SUCTION INSTRUMENT SECTION



TOP VIEW



LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 1211 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 1211

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16
9	L-9	F-22	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Cont'd).

TEST 1211

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermocouple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 1211

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-1,000,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-37	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-30	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 1211

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L	F-11	Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

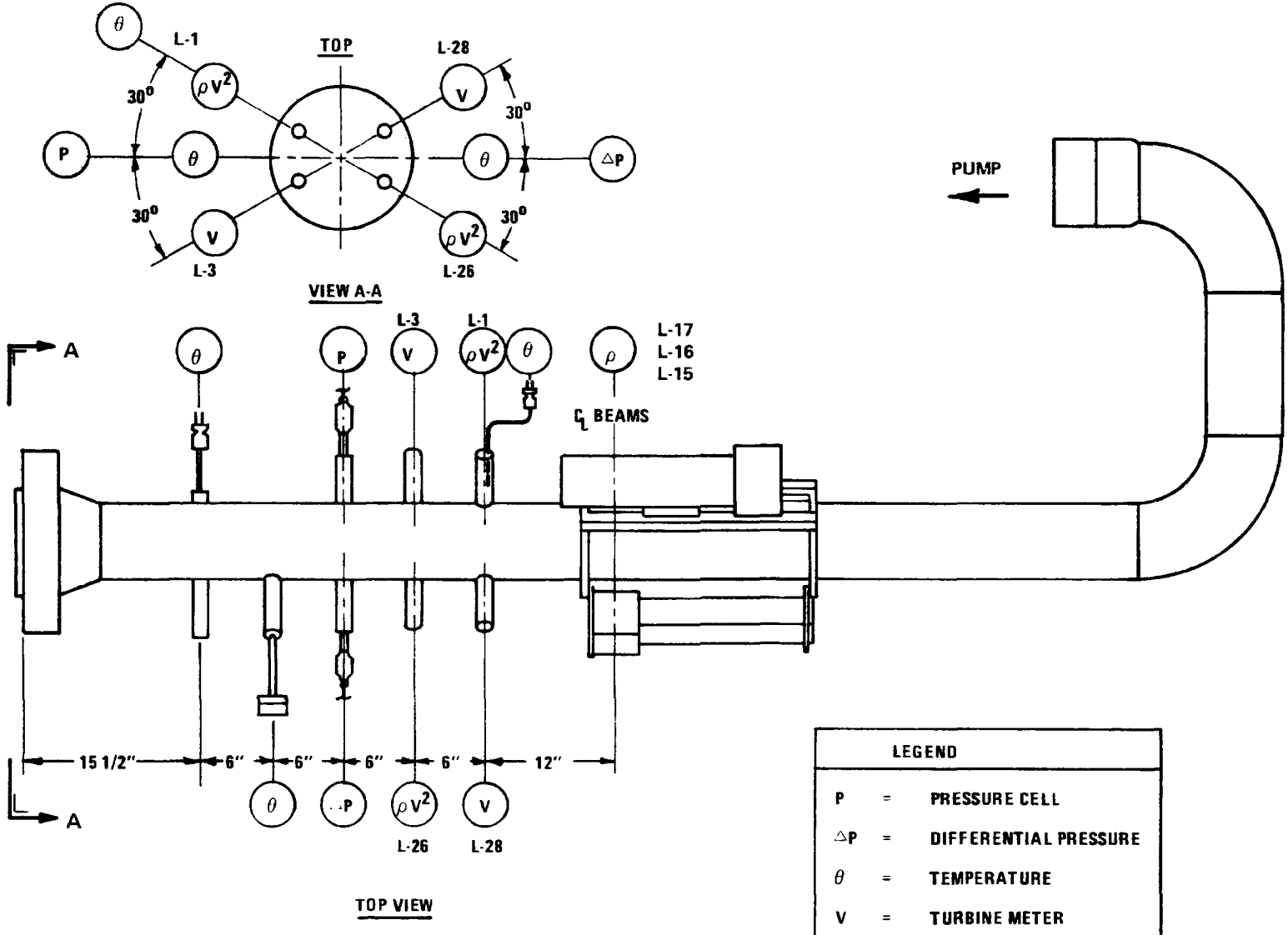
TEST 1211

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62			Not Used	
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

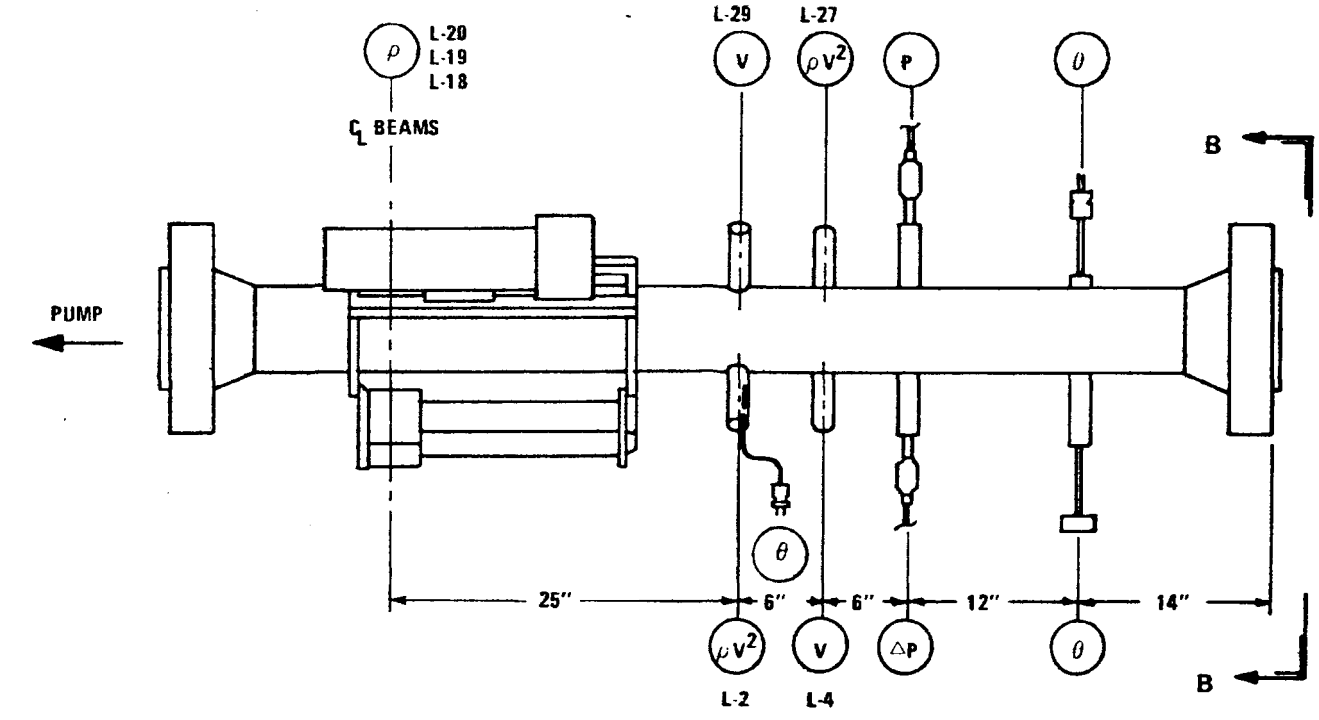
INSTRUMENTATION LIST (Cont'd.)

TEST 1211

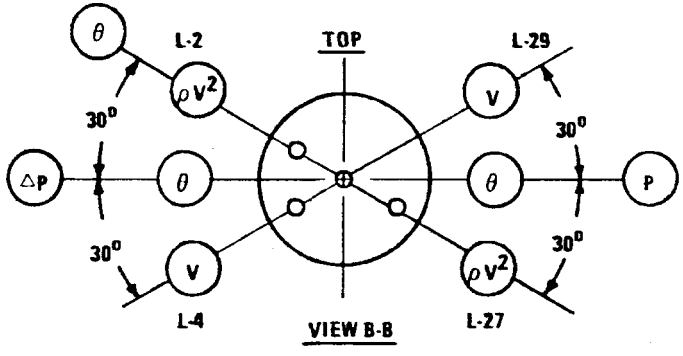
Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-39	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid



TEST 1267 SUCTION INSTRUMENT SECTION



TOP VIEW



LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 1267 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 1267

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16
9	L-9	F-22	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Cont'd).

TEST 1267

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-21	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermocouple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 1267

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-1,000,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-30	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 1267

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L	F-11	Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

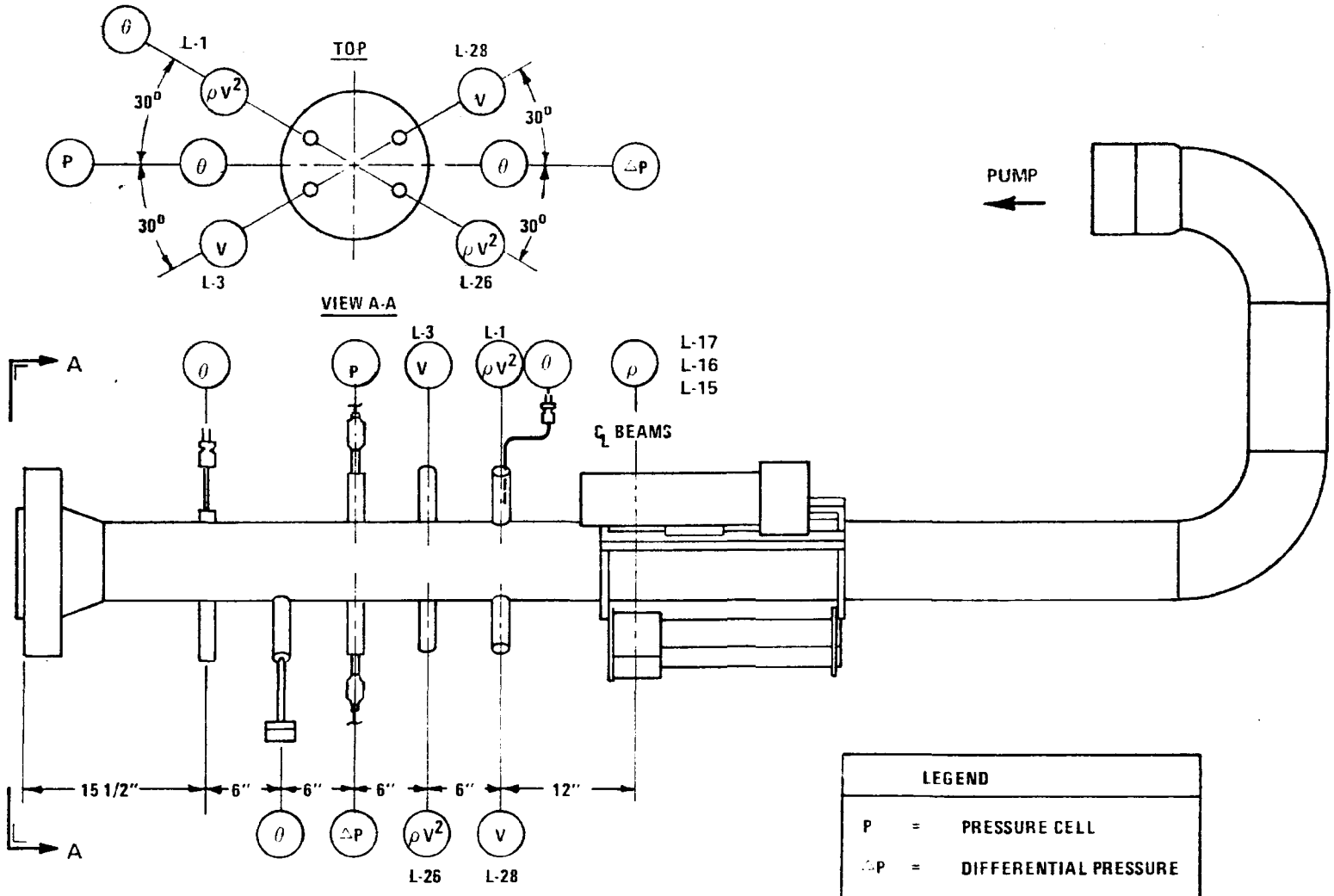
TEST 1267

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55			Not Used	
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62			Not Used	
63			Not Used	
64	L-64	F-29	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

INSTRUMENTATION LIST (Cont'd.)

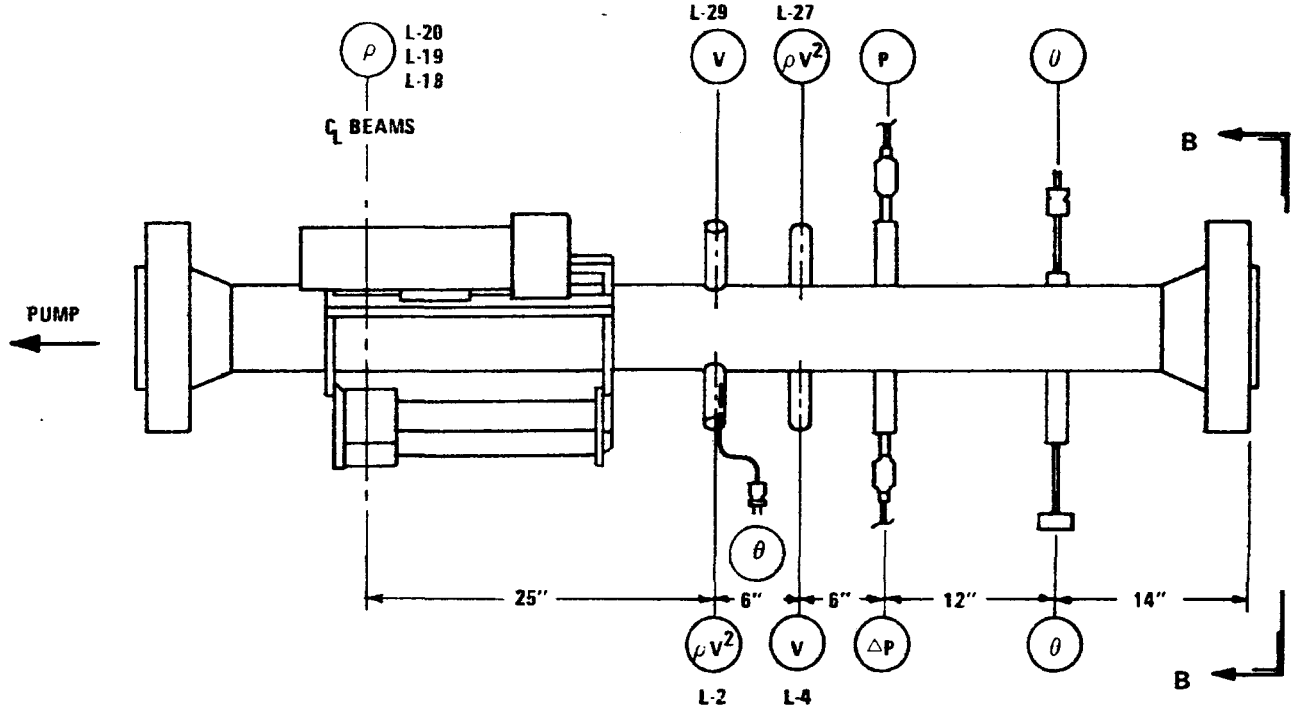
TEST 1267

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-39	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid

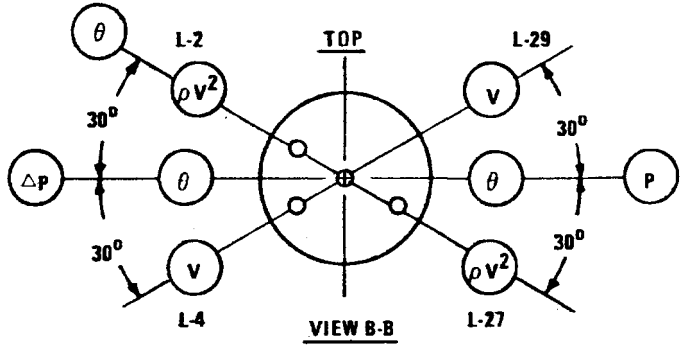


LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV²	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 1319 SUCTION INSTRUMENT SECTION



TOP VIEW



LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 1319 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 1319

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16
9	L-9	F-21	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Cont'd).

TEST 1319

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-11	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermocouple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 1319

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-1,000,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-30	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 1319

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

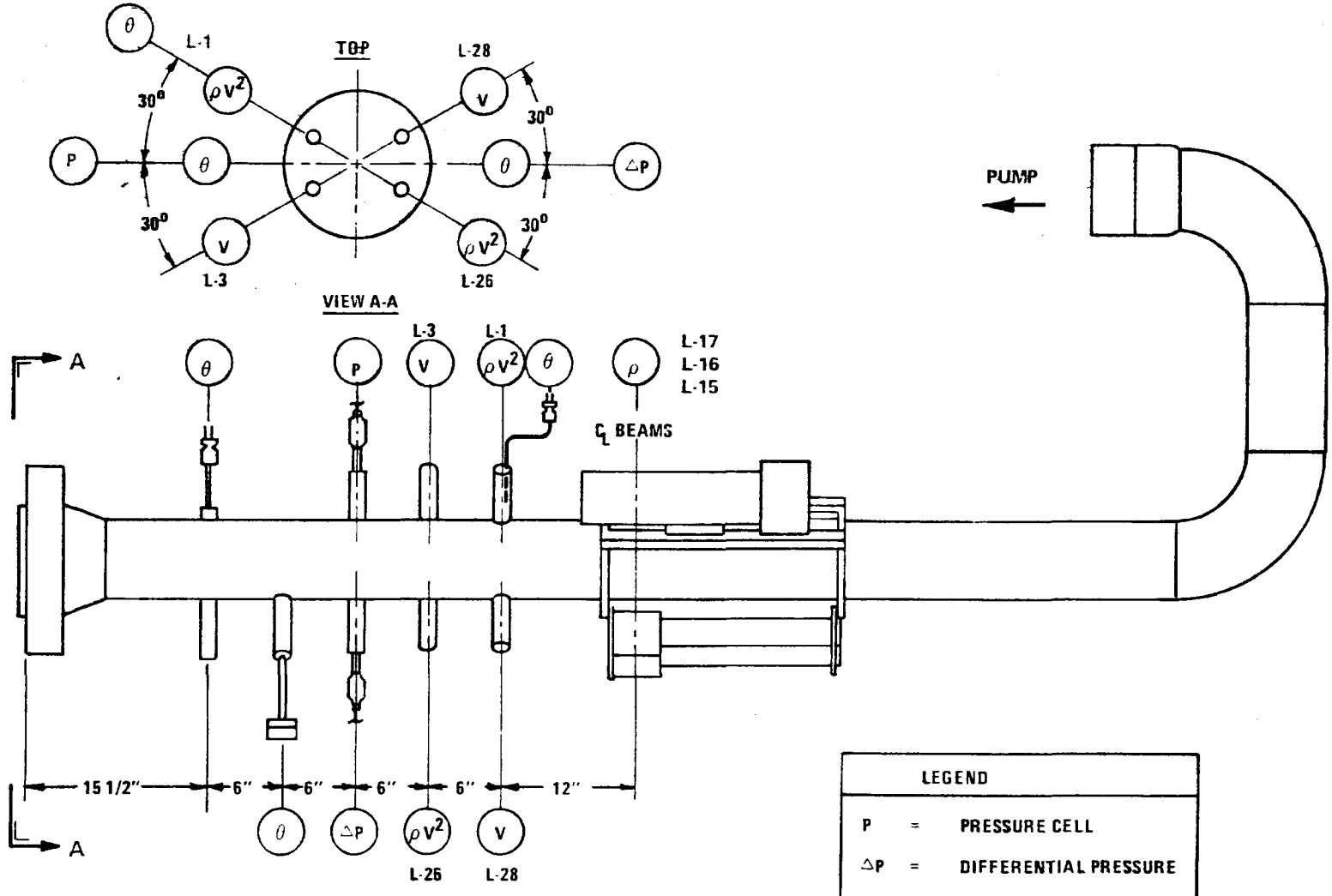
TEST 1319

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55			Not Used	
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62			Not Used	
63			Not Used	
64	L-64	F-39	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

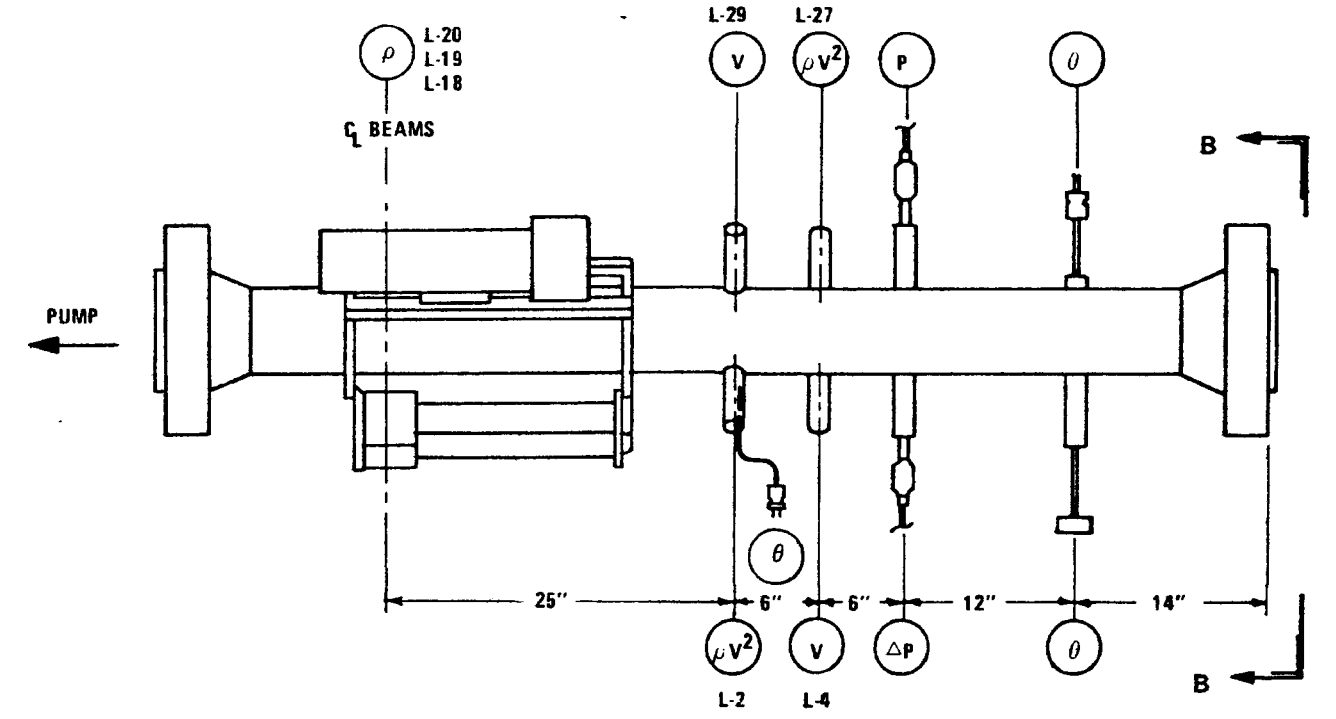
INSTRUMENTATION LIST (Cont'd.)

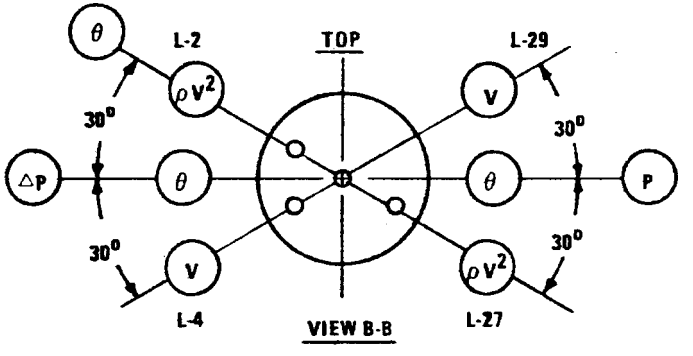
TEST 1319

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-29	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid



TEST 1351 SUCTION INSTRUMENT SECTION





TOP VIEW

LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 1351 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 1351

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16
9	L-9	F-21	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Cont'd).

TEST 1351

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-11	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermocouple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 1351

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-1,000,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-30	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 1351

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

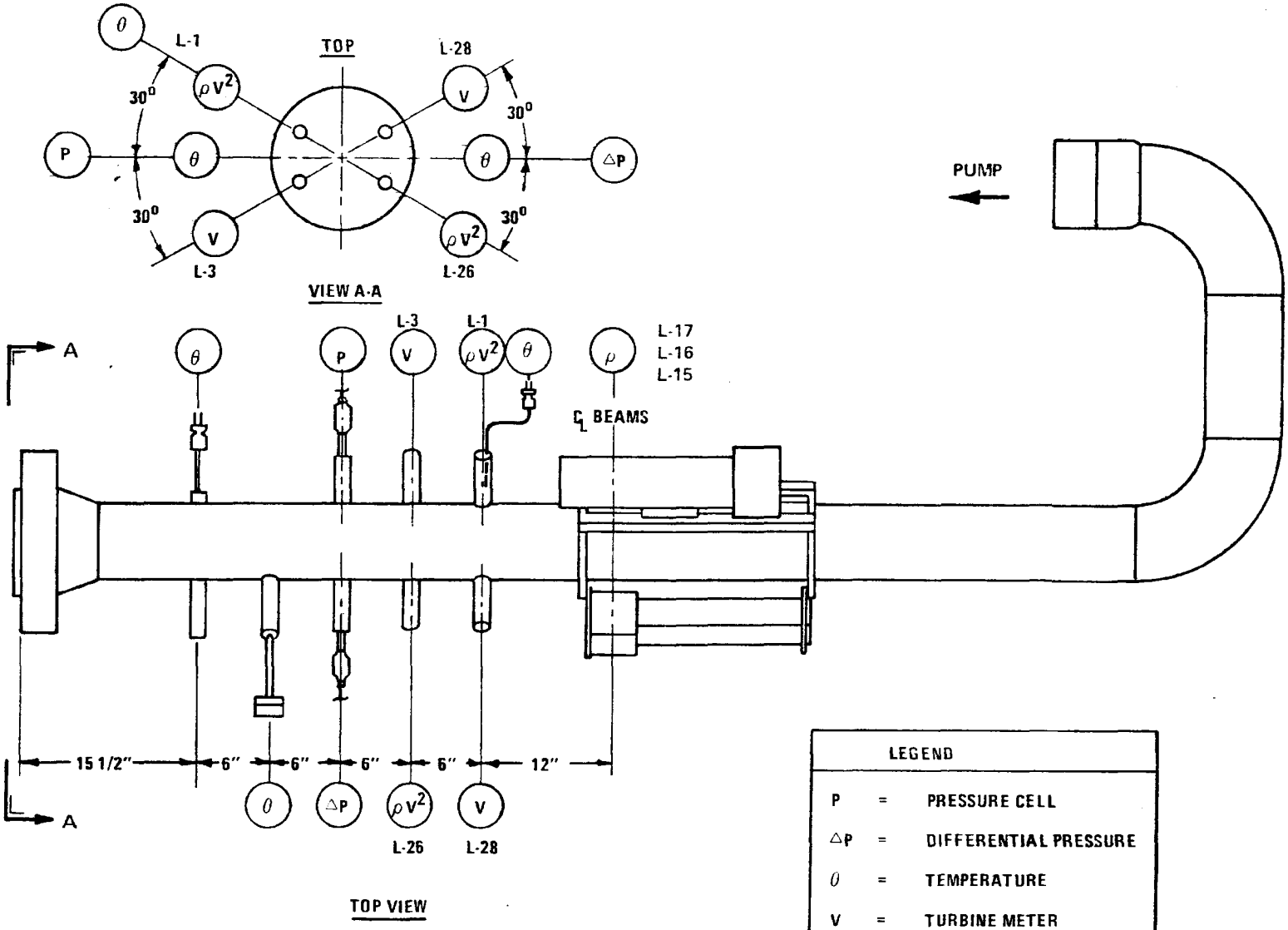
TEST 1351

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55			Not Used	
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62			Not Used	
63			Not Used	
64	L-64	F-39	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

INSTRUMENTATION LIST (Cont'd.)

TEST 1351

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-29	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid



TEST 1380 SUCTION INSTRUMENT SECTION

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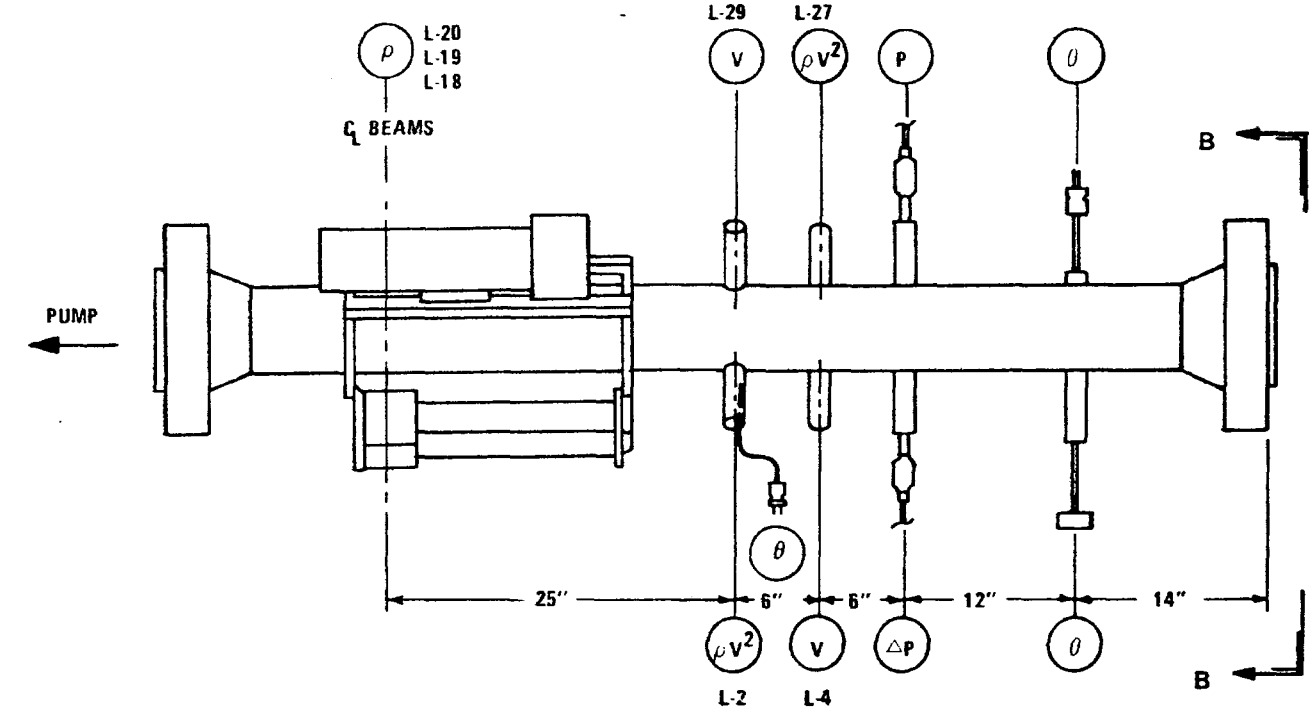
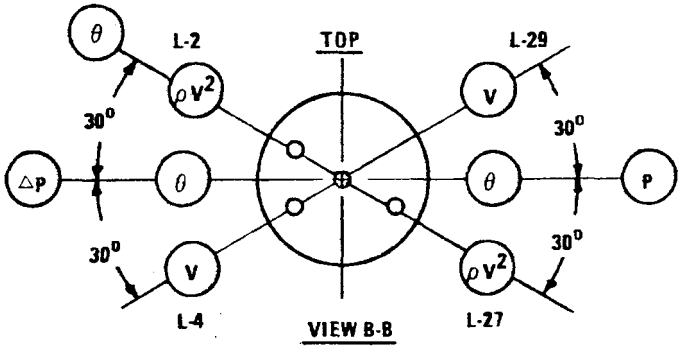


TOP VIEW



LEGEND		
P	=	PRESSURE CELL
ΔP	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 1380 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 1380

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-200,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-200,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16
9	L-9	F-21	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Cont'd).

TEST 1380

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-11	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermocouple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 1380

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-120,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-120,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30			Not Used	
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-30	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 1380

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

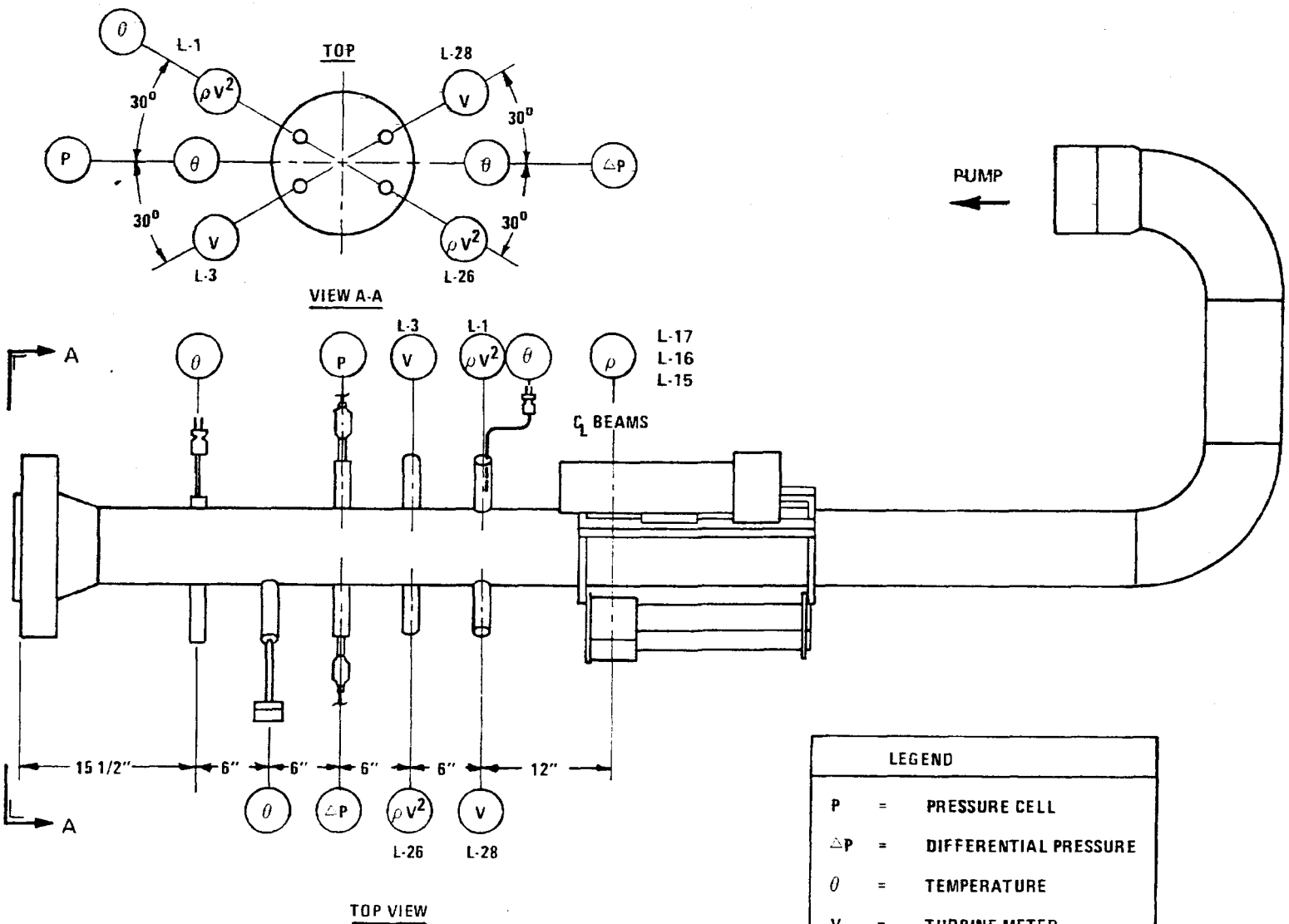
TEST 1380

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62			Not Used	
63			Not Used	
64	L-64	F-39	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

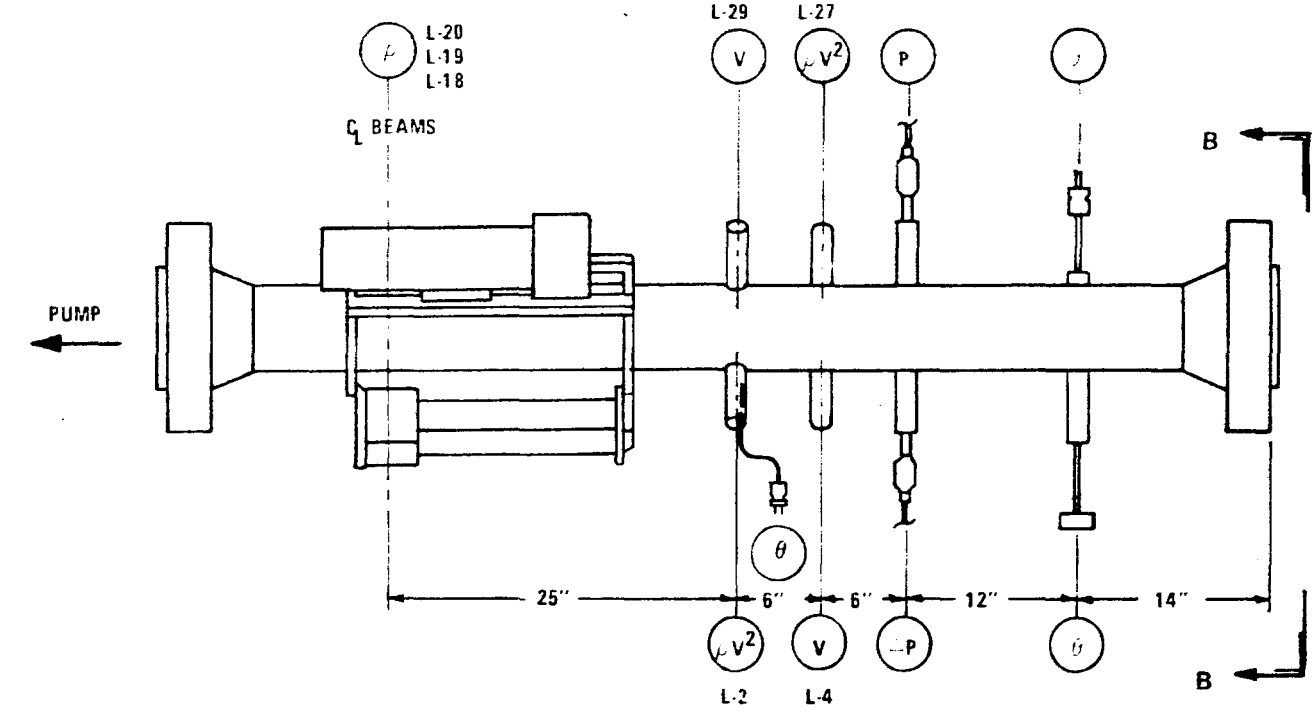
INSTRUMENTATION LIST (Cont'd.)

TEST 1380

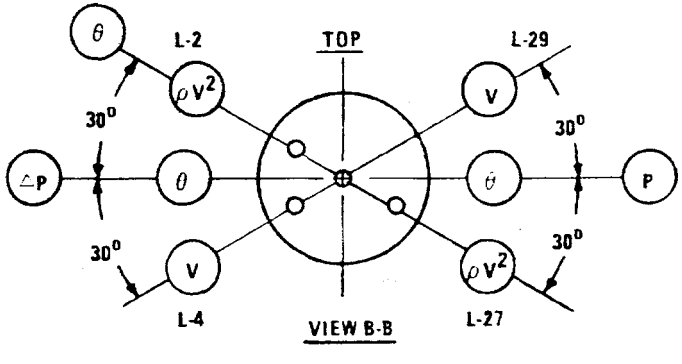
Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-29	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid



TEST 1465 SUCTION INSTRUMENT SECTION



TOP VIEW



LEGEND		
P	=	PRESSURE CELL
△P	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

TEST 1465 DISCHARGE INSTRUMENT SECTION

INSTRUMENTATION LIST

TEST 1465

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-600,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-600,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16
9	L-9	F-21	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Cont'd).

TEST 1465

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-11	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermocouple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 1465

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-600,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-1,000,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30			Not Used	
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-30	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 1465

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

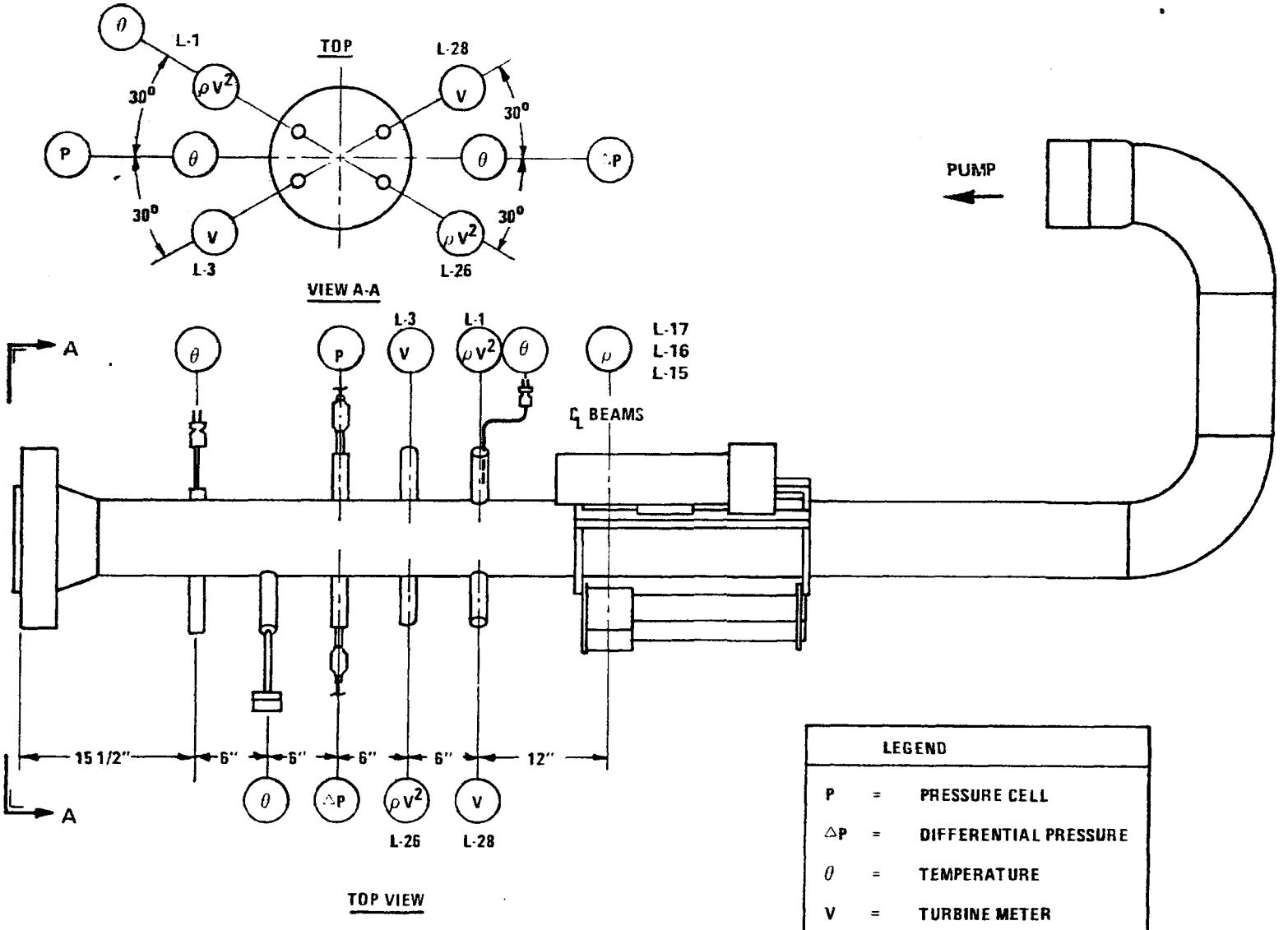
TEST 1465

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62			Not Used	
63			Not Used	
64	L-64	F-39	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

INSTRUMENTATION LIST (Cont'd.)

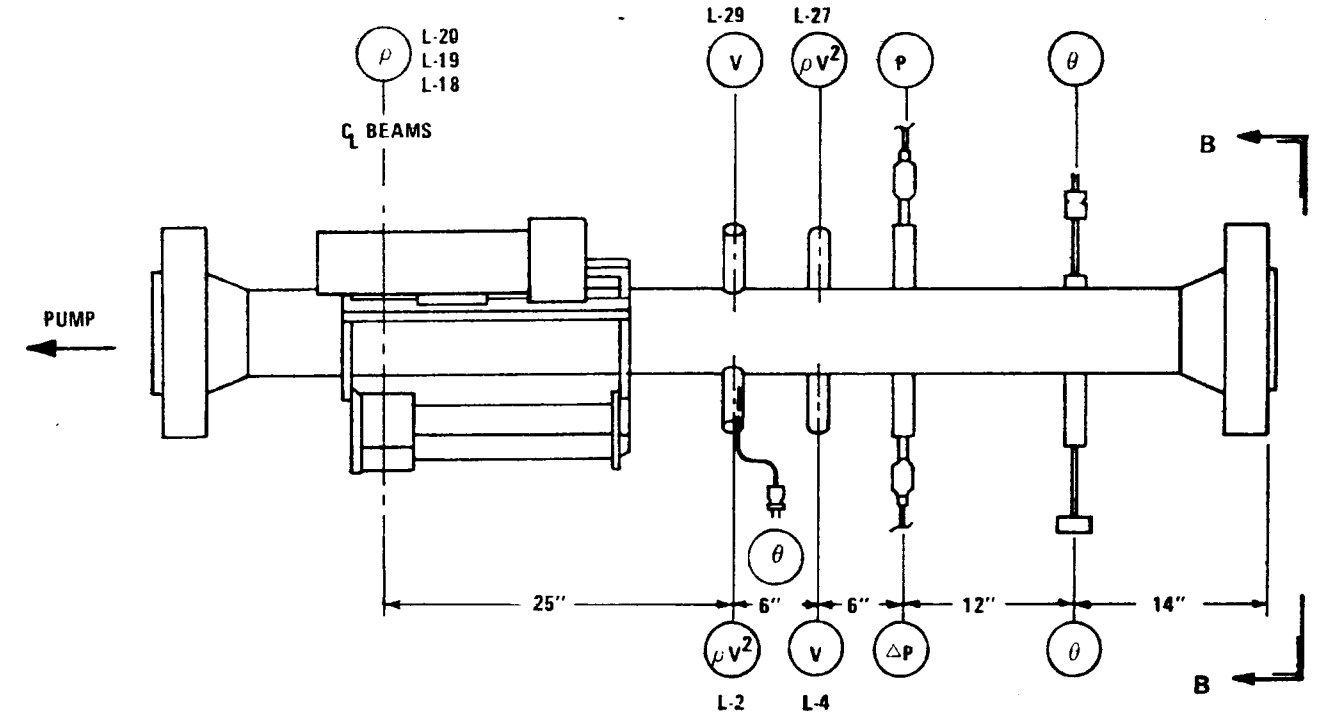
TEST 1465

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-29	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid

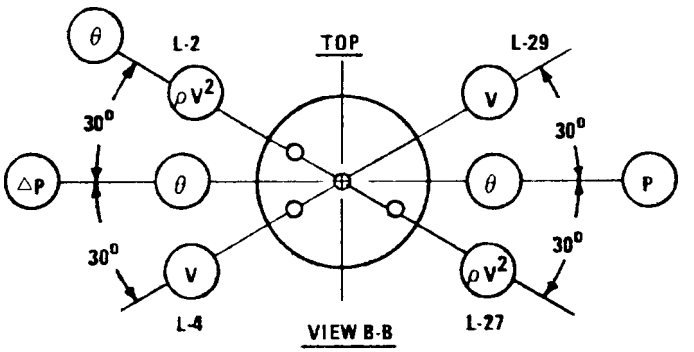


TEST 1511 SUCTION INSTRUMENT SECTION

400122



TOP VIEW



TEST 1511 DISCHARGE INSTRUMENT SECTION

LEGEND		
P	=	PRESSURE CELL
△P	=	DIFFERENTIAL PRESSURE
θ	=	TEMPERATURE
V	=	TURBINE METER
ρV^2	=	DRAG DISK
ρ	=	GAMMA DENSITOMETER

INSTRUMENTATION LIST

TEST 1511

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
1	L-1	F-2	Pump Suction Drag Disc	0-300,000#/ft-sec^2
2	L-2	F-3	Pump Discharge Drag Disc	0-200,000#/ft-sec^2
3	L-3	F-4	Pump Suction Turbine Meter	0-300 ft/sec
4	L-4	F-5	Pump Discharge Turbine Meter	0-300 ft/sec
5	L-5	F-6	Pump Suction Pressure Cell	0-1500 psi
6	L-6	F-7	Pump Discharge Pressure Cell	0-1500 psi
7	L-7H	F-8	Pump D/P Cell (Hi) (Leg-to-leg)	0-500 psid (BLH)
7A	L-7H		Pump D/P Cell (Hi) (Leg-to-leg)	-100 to +200
8	L-7L	F-9	Pump D/P Cell (Lo) (Leg-to-leg)	0-200 psid (BLH)
8A	L-7L		Pump D/P Cell (Lo) (Leg-to-leg)	-8 to +16
9	L-9	F-21	Pump Inlet Injection D/P Cell	0-25 psid
10	L-10		Pump Inlet Injection Pressure Cell	0-1500 psid
11	L-11	F-12	Pump Torque Meter	0-1200 ft-lbs

INSTRUMENTATION LIST (Cont'd).

TEST 1511

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
12	L-12	F-13	Pump Speed Meter	0-10,000 RPM
13	L-13	F-14	Pump Suction Thermocouple	0-600°F
14	L-14	F-15	Pump Discharge Thermocouple	0-600°F
15	L-15	F-16	Pump Suction Densitometer, Beam 1	0-62.4 lb/ft^3
16	L-16	F-17	Pump Suction Densitometer, Beam 2	0-62.4 lb/ft^3
17	L-17	F-18	Pump Suction Densitometer, Beam 3	0-62.4 lb/ft^3
18	L-18	F-19	Pump Discharge Densitometer, Beam 1	0-62.4 lb/ft^3
19	L-19	F-20	Pump Discharge Densitometer, Beam 2	0-62.4 lb/ft^3
20	L-20	F-11	Pump Discharge Densitometer, Beam 3	0-62.4 lb/ft^3
21	L-21		Pump Inlet Injection Flow Thermocouple	0-600°F
22	L-22		Pump Outlet Injection Flow Thermocouple	0-600°F

INSTRUMENTATION LIST (Cont'd.)

TEST 1511

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
23	L-23		High Pressure Drum ID Thermocouple	0-800°F
24	L-24		High Pressure Drum OD Thermocouple	0-800°F
25	L-25		High Pressure Water Level D/P Cell	0-2.5 psid
26	L-26	F-27	Pump Suction Drag Disc	0-120,000#/ft-sec^2
27	L-27	F-28	Pump Discharge Drag Disc	0-120,000#/ft-sec^2
28	L-28	F-10	Pump Suction Turbine Meter	0-300 ft/sec
29	L-29	F-23	Pump Discharge Turbine Meter	0-300 ft/sec
30	L-30	F-31	Pump Suction DD Thermocouple	0-600°F
31	L-31	F-32	Pump Discharge DD Thermocouple	0-600°F
32	L-32	F-33	Pump Injection Outlet Flow (Magn. F.M.)	0-100 GPM
33	L-33		Pump Suction D/P BLH (Inlet/ Across Pipe - 90°)	0 $\pm$ 500 inches H_2O
34	L-34	F-35	AECL Densitometer, Beam 3	0-62.4 lb/ft^3
35	L-35	F-36	AECL Densitometer, Beam 1	0-62.4 lb/ft^3
36	L-36	F-30	AECL Densitometer, Beam 2	0-62.4 lb/ft^3

INSTRUMENTATION LIST (Cont'd.)

TEST 1511

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
37	L-37L		Main Steam Orifice DP Cell (Lo)	0-3.5 psid
38	L-38L		Main Water Orifice DP Cell (Lo)	0-3.5 psid
39	L-39L		Bypass Steam Orifice DP Cell (Lo)	0-3.5 psid
40	L-40L		Bypass Water Orifice DP Cell (Lo)	0-3.5 psid
41	L-41		Main Steam Orifice Pressure Cell	0-1500 psi
42	L-42	F-25	Main Water Orifice Pressure Cell	0-1500 psi
43	L-37H		Main Steam Orifice DP Cell (Hi)	0-25 psid
44	L-38M		Main Water Orifice DP Cell (Hi)	0-25 psid
45	L-39H		Bypass Steam Orifice DP Cell (Hi)	0-25 psid
46	L-40H		Bypass Water Orifice DP Cell (Hi)	0-25 psid
47	L-47		Bypass Steam Orifice Pressure Cell	0-1500 psi
48	L-48		Bypass Water Orifice Pressure Cell	0-1500 psi
49	L-49		Main Steam Orifice Thermocouple	0-600°F
50	L-50	F-34	Main Water Orifice Thermocouple	0-600°F
51	L-51		Bypass Steam Orifice Thermocouple	0-600°F

INSTRUMENTATION LIST (Continued)

TEST 1511

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
52	L-52		Bypass Water Orifice Thermocouple	0-600°F
53	L-53		Bypass Water Orifice RTD	0-600°F
54	L-54		Bypass Steam Orifice RTD	0-600°F
55	L-55		Pump Suction RTD	0-600°F
56	L-56		Pump Discharge RTD	0-600°F
57	L-57		Ambient Temperature	0-200°F
58	L-58		Main Water Orifice RTD	0-600°F
59	L-59		Main Steam Orifice RTD	0-600°F
60	L-60		Loop Flow Control Valve DP Cell	0-200 psid
61	L-61		Pump Suction (Inlet Leg-to-Flange)	0-10 psid
62			Not Used	
63			Not Used	
64	L-64	F-39	Blowdown Leg Pressure Cell	0-1500 psi
65	L-65		H.P. Drum Pressure Cell	0-1500 psi

INSTRUMENTATION LIST (Cont'd.)

TEST 1511

Scanner Channel Number	Instrument Location Number	FM Number	Description	Range
66	L-66	F-29	Pump Flange to Flange DP Cell	-100 to + 200 psid
67		F-26	Blowdown Sequence Indicator	
68	L-68		Pump Impeller (Front-to-Back) D/P	0-25 psid
69	L-38H	F-38	Main Water Orifice D/P	0-100 psid

Appendix 4.2B

DIGITIZED VOLTAGE DATA CALIBRATION PROGRAM LISTING

```
      PROGRAM FEFR(INPUT=/72,OUTPUT,TAPE30,TAPE1,TAPE2,TAPE3,TAPE4,      000100
     1TAPE5,TAPE6,TAPE7,TAPE8,TAPE9,TAPE10,TAPE15)                        000110
      DIMENSION IFL(40),IRG(40),D(100),IA(14,100)                         000130
      COMMON/CONST/SFREQ,NREC,M,B1,RSEC,ICRS,CF,CZ,B(100),JFIL            000140
      COMMON/CONST1/VFUL(4),VF,JC1                                        000145
      DIMENSION C(100)                                                    000150
      REAL M                                                              000180
      INTEGER B                                                           000190
      DATA IRG/1,1,2,2,3,3,4,1,1,2,2,3,3,4,1,1,2,2,3,3,4,1,1,2,2,3,3,4,  000200
     11,1,2,2,3,3,4,4,4,4,4,4/                                            000210
      DATA IFL/1,6,1,6,1,6,1,2,7,2,7,2,7,2,3,8,3,8,3,8,3,4,9,4,9,4,9,4,  000220
     15,10,5,10,5,10,5,6,7,8,9,10/                                        000230
      LC=1                                                                000240
    2 CALL DATAIN(0,IA,0,ICK)                                             000260
      READ 1,IDATE                                                        000270
      READ 1,IRUN                                                         000275
    1 FORMAT(6X,A10)                                                      000280
      READ *,IFILE,NREC,SFREQ,BDT,SST                                     000310
      READ *,VFUL                                                         000320
      PRINT*,VFUL                                                         000321
      NFILE=0                                                             000430
      IF(IFILE.EQ.0) CALL EXIT                                            000440
   30 CALL DATAIN(IFILE,IA,9,ICK)                                         000450
      IREC=0                                                              000460
   40 CALL DATAIN(IFILE,IA,1,ICK)                                         000470
      IREC=IREC+1                                                         000480
      DO 60 I=1,10                                                        000490
      DO 50 K=1,100                                                       000500
   50 B(K)=IA(I,K)                                                        000510
   60 WRITE (1) B                                                         000520
      IF(IREC.LT.NREC) GO TO 40                                           000530
      NFILE=NFILE+1                                                       000540
      IFILE=IFILE+1                                                       000550
      IF(NFILE.LT.4) GOTO 30                                              000560
      RSEC=SFREQ/100.                                                     000562
      STIME=BDT-SST                                                       000564
      ICRS=STIME*RSEC+1.                                                  000566
      SST=BDT-ICRS/RSEC                                                   000568
  200 DO 300 JC= 1,40                                                     000570
      JC1=JC                                                              000575
      JFIL=IFL(JC)                                                        000580
      JRG= IRG(JC)                                                        000590
      REWIND JFIL                                                         000600
      JRG=JRG-1                                                           000610
      IF(JRG.EQ.0) GO TO 220                                              000620
      DO 210 I=1,JRG                                                      000630
      DO 210 K=1,NREC                                                     000640
  210 READ(JFIL) B                                                        000650
  220 CONTINUE                                                            000660
      CALL CALIB                                                          000670
      IDF=ICRS+1                                                          000680
      DO 230 J=IDF,NREC                                                   000700
      READ(JFIL) B                                                        000710
      DO 232 IC=1,100                                                     000720
  232 C(IC)=B(IC)*M+B1                                                    000721
      IF((JC.GT.1).OR.(J.NE.IDF)) GO TO 222                               000730
      NREC1=(NREC-IDF)+1                                                  000740
```

420001

```
                      PDELT=10C./SFREQ                                          000745
                      WRITE (15) IDATE,IRUN,SFREQ,NREC1,BDT,SST                 000750
     60               PRINT 25C,IDATE,IRUN,SFREQ,NREC1,BDT,SST,PDELT            000780
                  250 FORMAT(1H1,///,10X*DATE=*A10,5X*RUN=*A10,//,10X*SFREQ=*F6.2,5X*   000790
                     1NREC=*I4,10X*BDT=*F6.2,5X*SST=*F6.2,5X*PRINT OUT DELTA T = *F5.2) 000800
                   222 IF(J.NE.IDF) GO TO 257                                   000850
                      PRINT 28C,JC,M,B1,CF,CZ,VF                                000870
     65               280 FORMAT(///10X*CH=*I3//10X*SLOPE=*F8.3,10X*INT=*F8.3,5X*CF=*F8.2   000890
                     1,*CZ=*F8.2*  FSCALE VOLTS = *F8.3)                        000900
                      257 IF((LC.LT.0).OR.(JC.GT.100)) GO TO 230                000920
                      D(LC)=C(1)                                                000921
                      LC=LC+1                                                   000922
     70               IF(LC.NE.101) GO TO 23C                                   000923
                      LC=-1                                                     000924
                      PRINT 27C,D                                               000925
                   270 FORMAT(5(10X,F11.2))                                     000930
                   23C WRITE(15) C                                              000940
     75               IF(LC.EQ.-1) GO TO 290                                    000944
                      LC=LC-1                                                   000945
                      PRINT 27C,(D(I),I=1,LC)                                   000946
                   290 K=MOD(JC,2)                                              000947
                      IF(K.EQ.C)PRINT 295                                       000948
     80               295 FORMAT(1H1)                                           000949
                      300 LC=1                                                  000950
                      REWIND 15                                                 000960
                      END                                                       000980
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
35203 FEFR

VARIABLES	SN	TYPE		RELOCATION					
10	B	INTEGER	ARRAY	CONST	35623	BDT	REAL		
3	B1	REAL		CONST	40715	C	REAL	ARRAY	
6	CF	REAL		CONST	7	CZ	REAL		CONST
35761	D	REAL	ARRAY		35627	I	INTEGER		
36125	IA	INTEGER	ARRAY		35636	IC	INTEGER		
35617	ICK	INTEGER			5	ICRS	INTEGER		CONST
35620	IDATE	INTEGER			35634	IDF	INTEGER		
35622	IFILE	INTEGER			35641	IFL	INTEGER	ARRAY	
35626	IREC	INTEGER			35711	IRG	INTEGER	ARRAY	
35621	IRUN	INTEGER			35635	J	INTEGER		
35632	JC	INTEGER			5	JC1	INTEGER		CONST1
154	JFIL	INTEGER		CONST	35633	JRG	INTEGER		
35630	K	INTEGER			35616	LC	INTEGER		
2	M	REAL		CONST	35625	NFILE	INTEGER		
1	NREC	INTEGER		CONST	35637	NREC1	INTEGER		
35640	PDELT	REAL			4	RSEC	REAL		CONST
0	SFREQ	REAL		CONST	35624	SST	REAL		
35631	STIME	REAL			4	VF	REAL		CONST1
0	VFUL	REAL	ARRAY	CONST1					

420002

```
FILE NAMES          MODE
    0  INPUT       MIXED          2064  OUTPUT     MIXED          6214  TAPE1                31030  TAPE10
33104  TAPE15      UNFMT         10270  TAPE2                    12344  TAPE3                 4140  TAPE30
14420  TAPE4                     16474  TAPE5                    20550  TAPE6                22624  TAPE7
24700  TAPE8                     26754  TAPE9

EXTERNALS           TYPE    ARGS
       CALIB                     0                          DATAIN              4
       EXIT                      0

INLINE FUNCTIONS    TYPE    ARGS
       MOD         INTEGER     2  INTRIN

STATEMENT LABELS
35441  1        FMT                          0  2           INACTIVE          35224  30
35227  40                                    0  50                               0  60
    0  200           INACTIVE                0  210                          35311  220
35343  222                                35361  230                              0  232
35520  250      FMT                       35347  257                          35570  270      FMT
35550  280      FMT                       35375  290                          35605  295      FMT
    0  300

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
35233  60      * I           27 30         15B              EXT REFS  NOT INNER
35240  50        K           28 29         3B         OPT
35267  300     * JC          39 81        117B              EXT REFS  NOT INNER
35300  210     * I           46 48         11B              EXT REFS  NOT INNER
35301  210     * K           47 48          5B              EXT REFS
35315  230     * J           52 74         51B              EXT REFS  NOT INNER
35322  232       IC          54 55          5B         OPT

COMMON BLOCKS    LENGTH
       CONST        109
       CONST1         6

STATISTICS
  PROGRAM LENGTH                47777B    2559
  BUFFER LENGTH                340062B   14386
  CM LABELED COMMON LENGTH       163B     115
          520008 CM USED
```

```
      SUBROUTINE CALIB                                                  000990
      COMMON/CONST/SFREQ,NREC,M,B1,RSEC,ICRS,CF,CZ,B(100),JFIL          001000
      COMMON/CONST1/VFUL(4),VF,JC1                                      001010
      REAL M                                                            001020
      INTEGER B                                                         001030
      IREC=RSEC*2.5+.5                                                  001070
      DO 5 I=1,IREC                                                     001080
    5 READ(JFIL) B                                                      001090
      ISUM=B(20)+B(21)+B(22)+B(23)+B(24)                                001100
      CZ=ISUM/5.                                                        001110
      K=IREC+1                                                          001120
      IREC=RSEC*5.+.5                                                   001130
      DO 10 I=K,IREC                                                    001140
   10 READ (JFIL) B                                                     001150
      ISUM=B(20)+B(21)+B(22)+B(23)+B(24)                                001160
      CF=ISUM/5                                                         001170
      I=0                                                               001180
      IN=MOD(JC1,7)                                                     001182
      IF((IN.EQ.0).OR.(JC1.GT.35)) GO TO 50                             001183
      GO TO (40,40,30,30,20,20)IN                                       001184
   20 I=I+1                                                             001185
   30 I=I+1                                                             001186
   40 I=I+1                                                             001187
   50 I=I+1                                                             001188
      VF=VFUL(I)                                                        001189
      M=VF/(CF-CZ)                                                      001190
      B1=-M*CZ                                                          001200
      IREC=IREC+1                                                       001260
      IF(IREC.EQ.ICRS) RETURN                                           001270
      DO 60 J=IREC,ICRS                                                 001280
   60 READ(JFIL) B                                                      001290
      RETURN                                                            001300
      END                                                               001301
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
1 CALIB

VARIABLES	SN	TYPE		RELOCATION				
10	B	INTEGER	ARRAY	CONST	3	B1	REAL	CONST
6	CF	REAL		CONST	7	CZ	REAL	CONST
132	I	INTEGER			5	ICRS	INTEGER	CONST
135	IN	INTEGER			131	IREC	INTEGER	
133	ISUM	INTEGER			136	J	INTEGER	
5	JC1	INTEGER		CONST1	154	JFIL	INTEGER	CONST
134	K	INTEGER			2	M	REAL	CONST
1	NREC	INTEGER		CONST	4	RSEC	REAL	CONST
0	SFREQ	REAL		CONST	4	VF	REAL	CONST1
0	VFUL	REAL	ARRAY	CONST1				

```
INLINE FUNCTIONS   TYPE    ARGS
       MOD         INTEGER   2  INTRIN

STATEMENT LABELS
    0  5                                    0  10                                   64  20
   66  30                                  70  40                                   72  50
    0  60

LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
    7  5      * I            7 8         5B              EXT REFS
   27  10     * I           13 14        5B              EXT REFS
  103  60     * J           30 31        5B              EXT REFS

COMMON BLOCKS   LENGTH
       CONST       109
       CONST1        6

STATISTICS
  PROGRAM LENGTH                 137B      95
  CM LABELED COMMON LENGTH       163B     115
         52000B CM USED
```

```
      SUBROUTINE DATAIN (IFILE,A,KSWCH,IEOF)                            003150
      DIMENSION A(14,100)                                               003160
      COMMON/R1/NX(1800),DATI(361),LENG                                 003170
      INTEGER DATI,A                                                    003180
      IF(KSWCH.EQ.1) GO TO 8                                            003190
      IF(KSWCH.EQ.9) GO TO 3                                            003200
      IF(KSWCH.EQ.0) GO TO 2                                            003210
      PRINT 1,KSWCH                                                     003220
    1 FORMAT(1X,//*ILLEGAL KSWCH=*I5)                                   003230
      CALL EXIT                                                         003240
    2 KURFIL=0                                                          003250
      RETURN                                                            003260
    3 IF(IFILE.GE.KURFIL) GO TO 4                                       003270
      REWIND 30                                                         003280
      KURFIL=0                                                          003290
    4 IF(IFILE.NE.KURFIL) GO TO 7                                       003300
      NEND=NRRD+2                                                       003310
      DO 5 IB=1,NEND                                                    003320
      BACKSPACE 30                                                      003330
    5 CONTINUE                                                          003340
      KURFIL=KURFIL-1                                                   003350
    7 BUFFER IN (30,1) (DATI(1),DATI(361))                              003360
      IF(UNIT(30)) 18,18,20                                             003370
   18 LENG=LENGTH(30)                                                   003380
      IF(LENG.NE.2) GO TO 7                                             003390
      KURFIL=KURFIL+1                                                   003400
      IF(IFILE.NE.KURFIL) GO TO 7                                       003410
      NRRD=0                                                            003420
      RETURN                                                            003430
    8 BUFFER IN (30,1) (DATI(1),DATI(361))                              003440
      IF(UNIT(30)) 19,19,20                                             003450
   19 LENG=LENGTH(30)                                                   003460
      NRRD=NRRD+1                                                       003470
      IEOF=EOF(30)                                                      003480
      IF(IEOF) 9,9,12                                                   003490
    9 IF(LENG.NE.361) GO TO 13                                          003500
      CALL DECOD                                                        003510
      NN=1                                                              003520
      DO 11 I=1,100                                                     003530
       DO 10 J=1,10                                                     003540
       A(J,I)=NX(NN)                                                    003550
   10  NN=NN+1                                                          003560
       DO 11 J=11,14                                                    003570
       IHI=AND(NX(NN),77778)                                            003580
       IHI=SHIFT(IHI,12)                                                003590
       ILO=AND(NX(NN+1),77778)                                          003600
       A(J,I)=OR(IHI,ILO)                                               003610
   11 NN=NN+2                                                           003620
   12 RETURN                                                            003630
   13 PRINT 15,IFILE,NRRD,LENG                                          003640
   15 FORMAT(1X,//*FILE NO.*I3,*RECORD NO.*I3* LENG=* I5)               003650
      RETURN                                                            003660
   20 PRINT 21                                                          003670
   21 FORMAT(1X*PARITY ERROR ON TAPE 10 *)                              003680
      RETURN                                                            003690
      END                                                               003700
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 DATAIN

VARIABLES	SN	TYPE		RELOCATION					
0	A	INTEGER	ARRAY	F.P.	3410	DATI	INTEGER	ARRAY	R1
221	I	INTEGER			217	IB	INTEGER		
0	IEOF	INTEGER		F.P.	0	IFILE	INTEGER		F.P.
223	IHI	INTEGER			224	ILO	INTEGER		
222	J	INTEGER			0	KSWCH	INTEGER		F.P.
214	KURFIL	INTEGER			4161	LENG	INTEGER		R1
215	NEND	INTEGER			220	NN	INTEGER		
216	NRRD	INTEGER			0	NX	INTEGER	ARRAY	R1

FILE NAMES	MODE		
OUTPUT	FMT	TAPE30	BUF

EXTERNALS	TYPE	ARGS				
DECOD		0		EOF	REAL	1
EXIT		0		LENGTH	INTEGER	1
UNIT	REAL	1				

INLINE FUNCTIONS	TYPE	ARGS					
AND	NO TYPE	0	INTRIN	CR	NO TYPE	0	INTRIN
SHIFT	NO TYPE	2	INTRIN				

STATEMENT LABELS

150	1	FMT	15	2		17	3				
24	4		0	5		40	7				
55	8		0	9	INACTIVE	0	10				
0	11		133	12		134	13				
174	15	FMT	0	18	INACTIVE	0	19	INACTIVE			
137	20		205	21	FMT						

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES
31	5	*	IB	18 20	5B	EXT REFS
100	11	*	I	39 48	33B	NOT INNER
106	10		J	40 42	3B	OPT
121	11		J	43 48	6B	OPT

COMMON BLOCKS	LENGTH
R1	2162

STATISTICS

PROGRAM LENGTH	2308	152
CM LABELED COMMON LENGTH	41628	2162

52000B CM USED

420007

STORAGE ALLOCATION.

ADDRESS	LENGTH	BINARY CONTROL CARDS.
0	16	IDENT DECCD
16		END

BLOCKS	TYPE	ADDRESS	LENGTH
PROGRAM*	LOCAL	0	16
R1	COMMON	0	4162

ENTRY POINTS.

DECOD C+

420008

```
                                          IDENT   DECOD
                                          ENTRY   DECOD
   0                      1     DECOD     BSSZ 1
   1  5110004161 C                        SA1 B0+LENG
             63310                        SB3 B0+X1
   2  6110000001                          SB1 B0+1
             6120000060                   SB2 B0+48
   3  6150000000 C                        SB5 B0+NX
             6155777776                   SB5 B5-1
   4  5111003410 C               ONE      SA1 B1+DATI
             23621                        AX6 B2,X1
   5  5165000001                          SA6 B5+1
             5121003410 C                 SA2 B1+DATI
   6  20214                               LX2 12
          23722                            AX7 B2,X2
             5175000002                   SA7 B5+2
   7  5131003410 C                        SA3 B1+DATI
             20330                        LX3 24
                  23623                   AX6 B2,X3
  10  5165000003                          SA6 B5+3
             5141003410 C                 SA4 B1+DATI
  11  20444                               LX4 36
          23724                           AX7 B2,X4
             5175000004                   SA7 B5+4
  12  5151003410 C                        SA5 B1+DATI
             20560                        LX5 48
                  23625                   AX6 B2,X5
  13  5165000005                          SA6 B5+5
             6155000005                   SB5 B5+5
  14  6111000001                          SB1 B1+1
             0513000004 +                 NE  B1,B3,ONE
  15  0400000000 +                        EQ  DECOD
                                          USE /R1/
   0                   3410      NX       BSS 1800
3410                    551      DATI     BSS 361
4161                      1      LENG     BSS 1
  16                                      END

                 43100B CM  STORAGE USED          37 STATEMENTS       5 SYMBOLS
                            MODEL 173 ASSEMBLY     0.307 SECONDS      15 REFERENCES
```

SYMBOLIC REFERENCE TABLE.

DATI	3410	R1	2/10	2/13	2/17	2/21	2/25	2/35 L
DECOD	0	PROGRAM*	2/02 E	2/03 L	2/32			
LENG	4161	R1	2/04	2/36 L				
NX	0	R1	2/08	2/34 L				
ONE	4	PROGRAM*	2/10 L	2/31				

Appendix 4.2C

TRANSIENT DATA REDUCTION PROGRAM LISTING

```
      PROGRAM TPPPP(INPUT,TAPE7,TAPE8,OUTPUT,TAPE6=OUTPUT,TAPE10,          TPPPP      2
     1 TAPE9, TAPE11,TAPE1,TAPE41,TAPE42,TAPE43,TAPE44,TAPE45,             TPPPP      3
     2 TAPE46,TAPE47,TAPE48,TAPE49,TAPE50,TAPE51,TAPE52,TAPE53,            TPPPP      4
     C   TAPE88,                                                          TPPPP      5
     3 TAPE54,TAPE55,TAPE56,TAPE57,TAPE58,TAPE59,TAPE60)                  TPPPP      6
      COMMON DESIG(75),C(9,40),RC(40,300)                                 TPPPP      7
      COMMON IPA,IPB,IPC                                                  TPPPP      8
      LEVEL 2,SEPR,VTRS,VTRSE,VTRSN,FLUXE,FLUX,ATR,ATRE,HMSE              MJ78236    1
      LEVEL 2,VSMD1,VSMD1E,VPA1,VPA1E,VDMD1,VDMD1E,TEMP,TEMPE             TPPPP     10
      REAL MFR,MI                                                         TPPPP     11
      DIMENSION PAVG(300),PSMD(300),PDMD(300),PDA(300),RSD(300)           TPPPP     12
      DIMENSION RDD(300),VSMD(300),VDMD(300),VSD(300)                     TPPPP     13
      DIMENSION VDD(300),VPA(300),PA(300),VPDA(300),VTRSN(12,300)         TPPPP     14
      DIMENSION KCA(16),KP(11),KDP(17),KTM(2),KGD(9)                      TPPPP     15
      DIMENSION KDD(5),KT(5),KSM(2),PR(41,3),PAC(9)                       TPPPP     16
      DIMENSION ZP(11),ZDP(17),ZTM(2),ZDD(5),ZT(5),ZSM(2)                 TPPPP     17
      DIMENSION SEPR(40,300),DDZ(5), KMF(2), ZMF(2)                       TPPPP     18
      DIMENSION ATR(19,300),ATRE(16,300),PHS(300),PHD(300),PSUCTF(300)    TPPPP     19
      DIMENSION MFR(12,300),MI(12,300)                                    MJ78236    2
      DIMENSION VTRS(12,300),VTRSE(12,300)                                TPPPP     21
      DIMENSION HMS(9,300),HMSE(9,300)                                    TPPPP     22
      DIMENSION WI(300),WO(300),WL(300),WIE(300),WOE(300),WW(300)         TPPPP     23
      DIMENSION EPRN(300), EPRT(300),FRCTN(300),HYDRN(300)                TPPPP     24
      DIMENSION PAVGE(300),VSMDE(300),RDDE(300),RSDE(300)                 TPPPP     25
      DIMENSION PDAE(300),FRCT(300),FRCTE(300),HYDR(300),HYDRE(300)       TPPPP     26
      DIMENSION ETM1(2),ETM2(2),ETM3(2),ETM4(2),ETM5(2),ETM6(2),ETM7(2)   TPPPP     27
      DIMENSION ETM8(2),ETM9(2),ETM10(2),ETM11(2)                         TPPPP     28
      DIMENSION FLUX(12,300),FLUXE(12,300),VSMD1(300),VSMD1E(300),VPA1(3  TPPPP     29
     100)                                                                 TPPPP     30
      DIMENSION DATA(26,40),VPA1E(300),VDMD1(300),VDMD1E(300)             TPPPP     31
      DIMENSION VPDAE(300),VDMDE(300),VPAE(300)                           TPPPP     32
      DIMENSION VSDE(300),VDDE(300)                                       TPPPP     33
      DIMENSION TT(300),ACEL(300),ZER(300)                                TPPPP     34
      DIMENSION TEMP(300),TEMPE(300)                                      TPPPP     35
      DIMENSION PLOT(310)                                                 TPPPP     36
      DIMENSION VAECL(300),VAECLE(300),ABG(22),KFP(6)                     TPPPP     37
      COMMON /LCMC/SEPR,VTRS,VTRSE,VTRSN,FLUXE,FLUX,ATR,ATRE,HMSE         MJ78236    3
      COMMON /LCMC/VSMD1,VSMD1E,VPA1,VPA1E,VDMD1,VDMD1E,TEMP,TEMPE        TPPPP     39
      DATA ETM1/6H(PSIA),5H(BAR)/,ETM2/5H(GPM),5H(LPM)/                   TPPPP     40
      DATA ETM3/4H(FT),4H(M) /,ETM4/7H(FT,LB),7H(KGF,M)/                  TPPPP     41
      DATA ETM5/8H(LBM/HR),8H(KG/HR) /,ETM6/9H(LBM/FT3),9H(KG/M3)  /      TPPPP     42
      DATA ETM7/8H(FT/SEC),8H(M/SEC) /                                    TPPPP     43
      DATA ETM8/10H(LBM/FT-SE,10H(KG/M-SEC2/,ETM9/3HC2),3H)  /            TPPPP     44
      DATA ETM10/3HPSI,3HBAR/                                             TPPPP     45
      DATA TT/.05,.10,.15,.20,.25/                                        TPPPP     46
      DATA ETM9/3HC2),3H)  /,ETM11/5H(F)  ,5H(CEL)/                       TPPPP     47
      DATA ABG(1)/10HPUMP IN-FL/                                          TPPPP     48
      DATA ABG(2)/10HANGE, SUCT/                                          TPPPP     49
      DATA ABG(3)/10HTEST SECT-/                                          TPPPP     50
      DATA ABG(4)/10HINLET DP  /                                          TPPPP     51
      DATA ABG(5)/10HPAC12 DISC/                                          TPPPP     52
      DATA ABG(6)/10HHARGE P   /                                          TPPPP     53
      DATA ABG(7)/10HPAC16 DISC/                                          TPPPP     54
      DATA ABG(8)/10HHARGE P   /                                          TPPPP     55
      DATA ABG(9)/10HMIX TEE P /                                          TPPPP     56
      DATA ABG(10)/10H         /                                          TPPPP     57
      DATA ABG(11)/10HWATER ORIF/                                         TPPPP     58
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      DATA ABG(12)/10H PRES DROP/                                       TPPPP      59
      DATA ABG(13)/10HHIGH PRESS/                                       TPPPP      60
      DATA ABG(14)/10HURE DRUM P/                                       TPPPP      61
      DATA ABG(15)/10HPUMP INLET/                                       TPPPP      62
      DATA ABG(16)/10H-OUTLET DP/                                       TPPPP      63
      DATA ABG(17)/10HPUMP IMP F/                                       TPPPP      64
      DATA ABG(18)/10HRONT-BACK /                                       TPPPP      65
      DATA ABG(19) /10HLEG TO LEG/                                      TPPPP      66
      DATA ABG(20) /10HDP,HEAD   /                                      TPPPP      67
      DATA ABG(21) /10HAECL DP,AC/                                      TPPPP      68
      DATA ABG(22) /10HROSS PIPE /                                      TPPPP      69
C DATA INITIALIZATION FOR TEST RUN ONLY                                 TPPPP      70
      DATA ITS,NSTEP/5,1/                                               TPPPP      71
C                                                                       TPPPP      72
C.....................................................................  TPPPP      73
C     ESTABLISH DATE AND TIME OF DATA REDUCTION RUN                     TPPPP      74
C.....................................................................  TPPPP      75
       IPA=0                                                            TPPPP      76
      REWIND 7                                                          TPPPP      77
      REWIND 8                                                          TPPPP      78
      READ 4,(DESIG(I),I=1,75)                                          TPPPP      79
    4 FORMAT(8A10)                                                      TPPPP      80
    1 IPA=IPA+1                                                         TPPPP      81
        IPO=IPA-1                                                       TPPPP      82
        WRITE(88,*)IPO                                                  TPPPP      83
        REWIND 88                                                       TPPPP      84
      IPB=IPA+40                                                        TPPPP      85
      IPC=IPA+20                                                        TPPPP      86
        REWIND 8                                                        TPPPP      87
       REWIND 7                                                         TPPPP      88
      READ(8,171)NTCA,(KCA(I),I=1,NTCA)                                 TPPPP      89
      READ(8,171)NP,(KP(I),I=1,NP)                                      TPPPP      90
      READ(8,171)NDP,(KDP(I),I=1,NDP)                                   TPPPP      91
      READ(8,171)NTM,(KTM(I),I=1,NTM)                                   TPPPP      92
      READ(8,171)NDD,(KDD(I),I=1,NDD)                                   TPPPP      93
      READ(8,171)NT,(KT(I),I=1,NT)                                      TPPPP      94
      READ(8,171)NSM,(KSM(I),I=1,NSM)                                   TPPPP      95
      READ(8,171)NGD,(KGD(I),I=1,NGD)                                   TPPPP      96
      READ(8,171) NMF, (KMF(I),I=1,NMF)                                 TPPPP      97
      READ(8,201)(KFP(I),I=1,6)                                         TPPPP      98
  201 FORMAT(2X,6I3)                                                    TPPPP      99
      READ(8,179)(ZP(I),I=1,NP)                                         TPPPP     100
      READ(8,180)(ZDP(I),I=1,NDP)                                       TPPPP     101
      READ(8,182)(ZTM(I),I=1,NTM)                                       TPPPP     102
      READ(8,182)(ZDD(I),I=1,NDD)                                       TPPPP     103
      READ(8,182)(ZT(I),I=1,NT)                                         TPPPP     104
      READ(8,182)(ZSM(I),I=1,NSM)                                       TPPPP     105
      READ(8,182) (ZMF(I),I=1,NMF)                                      TPPPP     106
  171 FORMAT(5X15I3)                                                    TPPPP     107
  179 FORMAT(6F7.3)                                                     TPPPP     108
  180 FORMAT(2X,9F7.3)                                                  TPPPP     109
  182 FORMAT(5X,4F7.3)                                                  TPPPP     110
C INSTRUMENT CONVERSION AND CALIBRATION ERROR CONSTANTS                 TPPPP     111
      NI=40                                                             TPPPP     112
      DO 200 I=1,NI                                                     TPPPP     113
      READ(8,195)(C(J,I),J=1,7)                                         TPPPP     114
  195 FORMAT(6X4F13.6/1X3E13.6)                                         TPPPP     115
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115         200   CONTINUE                                                      TPPPP     116
            C READING OF SCANNER DATA FILE                                      TPPPP     117
                  CALL INDATA(RC,ITS,NSTEP,DAT,DATA,NTEST,TT,TIM,AREA)          TPPPP     118
            C                                                                   TPPPP     119
            C START OF BIG LOOP                                                 TPPPP     120
120         20    DO 802 KK=1,ITS                                               TPPPP     121
                  XI=1.5-.5*(-1)**(KK-1)                                        TPPPP     122
                  II=XI                                                         TPPPP     123
                  J=3-II                                                        TPPPP     124
                  ZER(KK)=ZER(KK)*20.                                           TPPPP     125
125         C INSTRUMENT CONVERSION                                             TPPPP     126
            C THERMOCOUPLE DATA CONVERSION                                      TPPPP     127
                  DATA PAC/-1.8533063273E+1,3.8918344612E+1,1.6645154356E-2,    TPPPP     128
                 *-7.870237448E-5,2.2835785557E-7,-3.5700231258E-10,            TPPPP     129
                 *2.9932909136E-13,-1.2849848798E-16,2.2239974336E-20/          TPPPP     130
130               DO 396 I=1,NTCA                                               TPPPP     131
                  K=KCA(I)                                                      TPPPP     132
                  IF(K.EQ.40)  GO TO 396                                        TPPPP     133
                  RC(K,KK)=RC(K,KK)*2.                                          TPPPP     134
                  IF(RC(K,KK).LT.(-2.65))GO TO 396                              TPPPP     135
135               IF(RC(K,KK).GT.40.)GO TO 396                                  TPPPP     136
                  EI=1000.*(RC(K,KK)+2.6621)                                    TPPPP     137
                  PR(K,II)=.0242*EI                                             TPPPP     138
            370   T=1.                                                          TPPPP     139
                  EL=0.                                                         TPPPP     140
140               DO 383 JA = 1,9                                               TPPPP     141
                  EL = EL + PAC(JA) * T                                         TPPPP     142
                  T=T*PR(K,II)                                                  TPPPP     143
            383   CONTINUE                                                      TPPPP     144
                  EL=EL+125.*EXP(-.5*((((PR(K,II)-127.)/65.)**2)))              TPPPP     145
145               IF(ABS(EI-EL).LT.1.)GO TO 395                                 TPPPP     146
                  PR(K,II)=PR(K,II)+.0242*(EI-EL)                               TPPPP     147
                  GO TO 370                                                     TPPPP     148
            395   PR(K,II)=PR(K,II)+C(1,K)+C(2,K)*RC(K,KK)                      TPPPP     149
                  PR(K,II)=((PR(K,II)*9.)/5.)+32.                               TPPPP     150
150               IF(K.EQ.13) PR(K,II)=C(1,39)+C(2,39)*PR(K,II)                 TPPPP     151
                  IF(K.EQ.14) PR(K,II)=C(3,39)+C(4,39)*PR(K,II)                 TPPPP     152
            396   CONTINUE                                                      TPPPP     153
            C PRESSURE CELL CONVERSION                                          TPPPP     154
                  DO 445 I=1,NP                                                 TPPPP     155
155               K=KP(I)                                                       TPPPP     156
                  IF(K.EQ.40)  GO TO 445                                        TPPPP     157
                  RC(K,KK)=RC(K,KK)*16.                                         TPPPP     158
                  RC(K,KK)=RC(K,KK)-ZP(I)                                       TPPPP     159
                  CALL SRSORT(750.,68.,VPTL,XHP,XX,1,VG,XHG,XX)                 TPPPP     160
160               V1=1./(1728.*VPTL)                                            TPPPP     161
                  PR(K,II)=C(1,K)*V1+C(2,K)+C(3,K)*RC(K,KK)+C(4,K)*RC(K,KK)*RC(K,KK) TPPPP  162
                  PR(K,II)=AMAX1(14.7,PR(K,II))                                 TPPPP     163
                  CALL SRSORT(PR(K,II),68.,VPTL,XHP,XX,1,VG,XHG,XX)             TPPPP     164
                  V1=1./(1728.*VPTL)                                            TPPPP     165
165               PR(K,II)=C(1,K)*V1+C(2,K)+C(3,K)*RC(K,KK)+C(4,K)*RC(K,KK)*RC(K,KK) TPPPP  166
                  PR(K,II)=AMAX1(0.,PR(K,II))                                   TPPPP     167
                  PR(K,II) = PR(K,II) + 14.7                                    TPPPP     168
                  IF(PR(K,II).LE.0.) PR(K,II)=14.69999                          TPPPP     169
            445   CONTINUE                                                      TPPPP     170
170         C DIFFERENTIAL PRESSURE CELL CONVERSION                             TPPPP     171
                  DO 505 I=1,NDP                                                TPPPP     172
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                K=KDP(I)                                                          TPPPP    173
                IF(K.EQ.40)  GO TO 505                                            TPPPP    174
                IF(K.EQ.KDP(1).OR.K.EQ.KDP(2))  GO TO 400                         TPPPP    175
175             RC(K,KK)=RC(K,KK)*16.                                             TPPPP    176
                GO TO 401                                                         TPPPP    177
              400 RC(K,KK)=RC(K,KK)*20.                                           TPPPP    178
              401 RC(K,KK)=RC(K,KK)-ZDP(I)                                        TPPPP    179
                IF(K.EQ.KDP(1).OR.K.EQ.KDP(2))   M=KP(1)                          TPPPP    180
180             IF(K.EQ.KDP(3))   M=KP(3)                                         TPPPP    181
                PR(K,II)=C(1,K)*V1+((C(2,K)+C(4,K)*PR(M,II))+(C(3,K)+C(5,K)*      TPPPP    182
               1PR(M,II))*RC(K,KK))*C(6,K)                                        TPPPP    183
            505   CONTINUE                                                        TPPPP    184
            C DRAG DISK CONVERSION                                                TPPPP    185
185             M=30                                                              TPPPP    186
                DO 525 I=1,NDD                                                    TPPPP    187
                K=KDD(I)                                                          TPPPP    188
                IF(K.EQ.40)  GO TO 525                                            TPPPP    189
                IF (K.EQ. KDD(1)) CK= 38.29                                       TPPPP    190
190             IF (K.EQ.KDD(2)) CK=38.41                                         TPPPP    191
                IF(K.EQ.KDD(3)) CK= 38.48                                         TPPPP    192
                IF(K.EQ.KDD(4)) CK=38.50                                          TPPPP    193
                RC(K,KK)=RC(K,KK)*CK                                              TPPPP    194
                IF(K.EQ.KDD(1)) DDZ(I)=C(3,K)*(PR(30,II)-525.)                    TPPPP    195
195             IF(K.EQ.KDD(2)) DDZ(I)=C(3,K)*(PR(31,II)-525.)                    TPPPP    196
                IF(K.EQ.KDD(3)) DDZ(I)=C(3,K)*(PR(30,II)-525.)                    TPPPP    197
                IF(K.EQ.KDD(4)) DDZ(I)=C(3,K)*(PR(31,II)-525.)                    TPPPP    198
                PR(K,II)=C(1,K)+C(2,K)*(RC(K,KK)-DDZ(I))                          TPPPP    199
            525   CONTINUE                                                        TPPPP    200
200         C TURBINE METER CONVERSION                                            TPPPP    201
                DO 550 I=1,NT                                                     TPPPP    202
                K=KT(I)                                                           TPPPP    203
                IF(K.EQ.40)  GO TO 550                                            TPPPP    204
                RC(K,KK)=RC(K,KK)*20.                                             TPPPP    205
205             RC(K,KK)=RC(K,KK)-ZT(I)                                           TPPPP    206
                PR(K,II)=C(1,K)+(C(2,K)+C(3,K))*RC(K,KK)+C(5,K)*RC(K,KK)**2       TPPPP    207
            550   CONTINUE                                                        TPPPP    208
            C GAMMA DENSITOMETER CONVERSION                                       TPPPP    209
                DO 575 I=1,NGD                                                    TPPPP    210
210             K=KGD(I)                                                          TPPPP    211
                IF(K.EQ.40)  GO TO 575                                            TPPPP    212
                RC(K,KK)=RC(K,KK)*20.                                             TPPPP    213
                DIFF=RC(K,KK)-C(3,K)                                              TPPPP    214
                IF (DIFF.LE. 0.0001) GO TO 203                                    TPPPP    215
215             PR(K,II)=C(1,K)+C(2,K)*(ALOG(RC(K,KK)-C(3,K)))                    TPPPP    216
                GO TO 204                                                         TPPPP    217
              203 PR(K,II)=0.11                                                   TPPPP    218
              204 CONTINUE                                                        TPPPP    219
                C(7,K)=((PR(K,II)-3.)/59.4)*.27+.03                               TPPPP    220
220         575   CONTINUE                                                        TPPPP    221
            C SPEEDMETER CONVERSION                                               TPPPP    222
                DO 600 I=1,NSM                                                    TPPPP    223
                K=KSM(I)                                                          TPPPP    224
                IF(K.EQ.40)  GO TO 600                                            TPPPP    225
225             RC(K,KK)=RC(K,KK)*20.                                             TPPPP    226
                RC(K,KK)=RC(K,KK)-ZSM(I)                                          TPPPP    227
                PR(K,II)=C(1,K)+(C(2,K)*RC(K,KK)+C(3,K)*RC(K,KK)*RC(K,KK))*C(4,K) TPPPP    228
            600   CONTINUE                                                        TPPPP    229
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      C TORQUEMETER CONVERSION                                          TPPPP  230
230         DO 625 I=1,NTM                                              TPPPP  231
            K=KTM(I)                                                    TPPPP  232
            IF(K.EQ.40)  GO TO 625                                      TPPPP  233
            RC(K,KK)=RC(K,KK)*39.216                                    TPPPP  234
            RC(K,KK)=RC(K,KK)-ZTM(I)                                    TPPPP  235
235         PR(K,II)=C(2,K)*(RC(K,KK)-C(3,K))                           TPPPP  236
            PR(K,II)=-PR(K,II)/12.                                      TPPPP  237
      625   CONTINUE                                                    TPPPP  238
      C MAG FLOW METER CONVERSION                                       TPPPP  239
            DO 650 I=1,NMF                                              TPPPP  240
240         K=KMF(I)                                                    TPPPP  241
            IF(K.EQ.40) GO TO 650                                       TPPPP  242
            RC(K,KK)=RC(K,KK)*16.                                       TPPPP  243
            RC(K,KK)=RC(K,KK)-ZMF(I)                                    TPPPP  244
            PR(K,II)=C(1,K)*RC(K,KK)                                    TPPPP  245
245       650 CONTINUE                                                  TPPPP  246
      C CONVERSION OF OUTPUT READING TO INPUT READING                   TPPPP  247
            DO 17 IJ=1,NI                                               TPPPP  248
            TEMP(IJ)=PR(IJ,II)                                          TPPPP  249
            TEMPE(IJ)=C(7,IJ)                                           TPPPP  250
250   17    CONTINUE                                                    TPPPP  251
            TEMP(40)=TEMPE(40)=0.0                                      TPPPP  252
            RC(1,KK)=TEMP(KDD(1))                                       TPPPP  253
            RC(2,KK)=TEMP(KDD(2))                                       TPPPP  254
            RC(26,KK)=TEMP(KDD(3))                                      TPPPP  255
255         RC(29,KK)=TEMP(KDD(4))                                      TPPPP  256
            RC(13,KK)=TEMP(KCA(1))                                      TPPPP  257
            RC(14,KK)=TEMP(KCA(2))                                      TPPPP  258
            RC(30,KK) = TEMP(KCA(3))                                    TPPPP  259
            RC(31,KK) = TEMP(KCA(4))                                    TPPPP  260
260         RC(33,KK) = TEMP(KCA(5))                                    TPPPP  261
            RC(5,KK)=TEMP(KP(1))                                        TPPPP  262
            RC(6,KK)=TEMP(KP(2))                                        TPPPP  263
            RC(27,KK)= TEMP(KP(3))                                      TPPPP  264
            RC(28,KK)= TEMP(KP(4))                                      TPPPP  265
265         RC(37,KK)= TEMP(KP(5))                                      TPPPP  266
            RC(7,KK)=TEMP(KDP(1))                                       TPPPP  267
            RC(8,KK)=TEMP(KDP(2))                                       TPPPP  268
            RC(21,KK)= TEMP(KDP(3))                                     TPPPP  269
            RC(23,KK)=TEMP(KDP(4))                                      TPPPP  270
270         RC(24,KK)=TEMP(KDP(5))                                      TPPPP  271
            RC(10,KK)= TEMP(KDP(6))                                     TPPPP  272
            RC(11,KK)=TEMP(KTM(1))                                      TPPPP  273
            RC(3,KK)=TEMP(KT(2))                                        TPPPP  274
            RC(4,KK)=TEMP(KT(1))                                        TPPPP  275
275         RC( 9,KK)=TEMP(KT(3))                                       TPPPP  276
            RC(22,KK)=TEMP(KT(4))                                       TPPPP  277
            RC(12,KK)=TEMP(KSM(1))                                      TPPPP  278
            RC(15,KK)=TEMP(KGD(1))                                      TPPPP  279
            RC(16,KK)=TEMP(KGD(2))                                      TPPPP  280
280         RC(17,KK)=TEMP(KGD(3))                                      TPPPP  281
            RC(18,KK)=TEMP(KGD(4))                                      TPPPP  282
            RC(19,KK)=TEMP(KGD(5))                                      TPPPP  283
            RC(20,KK)=TEMP(KGD(6))                                      TPPPP  284
            RC(34,KK)=TEMP(KGD(7))                                      TPPPP  285
285         RC(35,KK)=TEMP(KGD(8))                                      TPPPP  286
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                RC(36,KK)=TEMP(KGD(9))                                          TPPPP  287
                RC(32,KK)= TEMP(KMF(1))                                         TPPPP  288
                RC(40,KK) = TEMP(40)                                            TPPPP  289
                SEPR(1,KK)=TEMPE(KDD(1))                                        TPPPP  290
290             SEPR(2,KK)=TEMPE(KDD(2))                                        TPPPP  291
                SEPR(26,KK)=TEMPE(KDD(3))                                       TPPPP  292
                SEPR(29,KK)=TEMPE(KDD(4))                                       TPPPP  293
                SEPR(13,KK)=TEMPE(KCA(1))                                       TPPPP  294
                SEPR(14,KK)=TEMPE(KCA(2))                                       TPPPP  295
295             SEPR(30,KK)= TEMPE(KCA(3))                                      TPPPP  296
                SEPR(31,KK)= TEMPE(KCA(4))                                      TPPPP  297
                SEPR(33,KK) = TEMPE(KCA(5))                                     TPPPP  298
                SEPR(5,KK)=TEMPE(KP(1))                                         TPPPP  299
                SEPR(6,KK)=TEMPE(KP(2))                                         TPPPP  300
300             SEPR(27,KK)= TEMPE(KP(3))                                       TPPPP  301
                SEPR(28,KK)= TEMPE(KP(4))                                       TPPPP  302
                SEPR(37,KK)= TEMPE(KP(5))                                       TPPPP  303
                SEPR(7,KK)=TEMPE(KDP(1))                                        TPPPP  304
                SEPR(8,KK)=TEMPE(KDP(2))                                        TPPPP  305
305             SEPR(21,KK)= TEMPE(KDP(3))                                      TPPPP  306
                SEPR(23,KK)=TEMPE(KDP(4))                                       TPPPP  307
                SEPR(24,KK)=TEMPE(KDP(5))                                       TPPPP  308
                SEPR(10,KK)= TEMPE(KDP(6))                                      TPPPP  309
                SEPR(11,KK)=TEMPE(KTM(1))                                       TPPPP  310
310             SEPR(3,KK)=TEMPE(KT(2))                                         TPPPP  311
                SEPR(4,KK)=TEMPE(KT(1))                                         TPPPP  312
                SEPR( 9,KK)=TEMPE(KT(3))                                        TPPPP  313
                SEPR(22,KK)=TEMPE(KT(4))                                        TPPPP  314
                SEPR(12,KK)=TEMPE(KSM(1))                                       TPPPP  315
315             SEPR(15,KK)=TEMPE(KGD(1))                                       TPPPP  316
                SEPR(16,KK)=TEMPE(KGD(2))                                       TPPPP  317
                SEPR(17,KK)=TEMPE(KGD(3))                                       TPPPP  318
                SEPR(18,KK)=TEMPE(KGD(4))                                       TPPPP  319
                SEPR(19,KK)=TEMPE(KGD(5))                                       TPPPP  320
320             SEPR(20,KK)=TEMPE(KGD(6))                                       TPPPP  321
                SEPR(34,KK)=TEMPE(KGD(7))                                       TPPPP  322
                SEPR(35,KK)=TEMPE(KGD(8))                                       TPPPP  323
                SEPR(36,KK)=TEMPE(KGD(9))                                       TPPPP  324
                SEPR(32,KK)= TEMPE(KMF(1))                                      TPPPP  325
325             SEPR(40,KK)=TEMPE(40)                                           TPPPP  326
                PAVG(KK)=(RC(5,KK)+RC(6,KK))*.5                                 TPPPP  327
                PAVGE(KK)=SQRT((SEPR(5,KK)*.5)**2+(SEPR(6,KK)*.5)**2)           TPPPP  328
              C FRICTION TORQUE CALCULATION (TRANSIENT)                         TPPPP  329
                FRCT(KK)=-0.018*(PAVG(KK)-14.7)+0.0000305*((PAVG(KK)-14.7)**2)  TPPPP  330
330            A+0.08098*ABS(RC(12,KK))-0.000004155*(RC(12,KK)**2)              TPPPP  331
                FRCT(KK)=FRCT(KK)/12.                                           TPPPP  332
                IF(RC(12,KK).LT.0.)     FRCT(KK) = - FRCT(KK)                   TPPPP  333
                FRCTE(KK)=23.5                                                  TPPPP  334
                FRCTE(KK)=FRCTE(KK)/12.                                         TPPPP  335
335             IF(KK.EQ.1.AND.IPA.EQ.1) GO TO 18                               TPPPP  336
                IF(KK.EQ.1.AND.IPA.GT.1) GO TO 15                               TPPPP  337
                DELT=TT(KK)-TT(KK-1)                                            TPPPP  338
                ACEL(KK)=6.28319*(RC(12,KK)-RC(12,KK-1))/(60.*DELT)             TPPPP  339
                GO TO 19                                                        TPPPP  340
340           15  DELT=TT(1)-PLOT(310)                                          TPPPP  341
                ACEL(1)=6.28319*(RC(12,1)-PLOT(309))/(60.*DELT)                 TPPPP  342
                GO TO 19                                                        TPPPP  343
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   18 ACEL(KK) = 0.
   19 CONTINUE
      HYDR(KK)=RC(11,KK)-FRCT(KK)-0.0724*ACEL(KK)
      IF(KK.EQ.1) GO TO 22
      HYDRE(KK)=SQRT(SEPR(11,KK)**2+FRCTE(KK)**2+((0.0107*SEPR(12,KK))/
     1DELT)**2)
      GO TO 23
 22   HYDRE(KK)=SQRT(SEPR(11,KK)**2+FRCTE(KK)**2)
   23 CONTINUE
C  TEST PUMP INJECTION FLOW
      D= 1.16
      DO = 0.812
      CALL SRSORT (1000.,165.,VPTL,XHP, XX,1,VG,XHG,XX)
      CALL SRSORT (1050.,165.,VPTL1,XHP1,XX,1,VG1,XHG1,XX)
      CALL SRSORT (1000.,155.,VPTL2,XHP2,XX,1,VG2,XHG2,XX)
      RTL = 1./VPTL
      RTL1 =1./VPTL1
      RTL2 =1./VPTL2
      RTLP =((RTL-RTL1)/50.) * SEPR(10,KK)
      RTLT =((RTL-RTL2)/10.) * SEPR(21,KK)
      RTLE = SQRT (RTLP**2+RTLT **2)
      CALL FLOW(RC(21,KK),1000.,165.,D,DO,VPTL,1,
     AWI(KK),XK9,Y,FA)
      WI(KK)= WI(KK)/3600.
      DP= RC(21,KK)
      SDP= 0.02
      SK= 0.01*XK9
      SD= 0.001
      E1= (SK/XK9) **2+(2. *SD/DO) **2+(SDP/2.*DP)**2
      E2= (RTLE/(2.*RTL)) *2
      WIE(KK)= WI(KK)  * SQRT(E1+E2)
      CALL SRSORT(14.7,175., VIJ,HIJ,XX,1,VIJG,HIJG,XX)
      WO(KK) = (RC(32,KK)*60.) / (7.4805*VIJ)
      WO(KK) =  WO(KK)/3600.
      WL(KK) = WO(KK)-WI(KK)
      WOE(KK) = 0.05 /(7.4805 * VIJ)
C FLUID PROPERTY CALCULATIONS
 2958 FORMAT(2X5F12.6)
      RC(5,KK)=AMAX1(14.7,RC(5,KK))
      RC(6,KK)=AMAX1(14.7,RC(6,KK))
      CALL SATUR(RC(5,KK),     TSPS, VFPS, HFPS, XX,VGPS, HGPS, XX,1)
      CALL SATUR(RC(6,KK),     TSPD, VFPD, HFPD, XX,VGPD, HGPD, XX,1)
      CALL SATUR(RC(5,KK)+10.,TSPS1,VFPS1,HFPS1,XX,VGPS1,HGPS1,XX,1)
      CALL SATUR(RC(6,KK)+10.,TSPD1,VFPD1,HFPD1,XX,VGPD1,HGPD1,XX,1)
      RFPS=1./VFPS
      RFPS1=1./VFPS1
      RGPS=1./VGPS
      RGPS1=1./VGPS1
      RFPD=1./VFPD
      RGPD1=1./VGPD1
      RGPD=1./VGPD
      RFPD1=1./VFPD1
      PRINT 3178,RFPS,RGPS,RFPD,RGPD,RC(12,KK)
 3178 FORMAT(2X,5E12.6)
      VFPSE=ABS((VFPS-VFPS1)/10.)*SEPR(5,KK)
      VFPDE=ABS((VFPD-VFPD1)/10.)*SEPR(6,KK)
      VGPSE=ABS((VGPS-VGPS1)/10.)*SEPR(5,KK)
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                VGPDE=ABS((VGPD-VGPD1)/10.)*SEPR(6,KK)                                  TPPPP   401
                RFPSE=RFPS*(VFPSE/VFPS)                                                 TPPPP   402
                RGPSE=RGPS*(VGPSE/VGPS)                                                 TPPPP   403
                RFPDE=RFPD*(VFPDE/VFPD)                                                 TPPPP   404
                RGPDE=RGPD*(VGPDE/VGPD)                                                 TPPPP   405
                RDSE=ABS(((RFPS-RGPS)-(RFPS1-RGPS1))/10.)*SEPR(5,KK)                    TPPPP   406
                RDPE=ABS(((RFPD-RGPD)-(RFPD1-RGPD1))/10.)*SEPR(6,KK)                    TPPPP   407
              C DRAG DISK-TURBINE METER DENSITY CALCULATION                             TPPPP   408
                 PAVG(KK)=AMAX1(14.7,PAVG(KK))                                          TPPPP   409
                CALL SATUR(PAVG(KK),    TSAV, VFAV, HFAV, XX,VGAV, HGAV, XX,1)          TPPPP   410
                CALL SATUR(PAVG(KK)+10.,TSAV1,VFAV1,HFAV1,XX,VGAV1,HGAV1,XX,1)          TPPPP   411
                RFPA=1./VFAV                                                            TPPPP   412
                RFPA1=1./VFAV1                                                          TPPPP   413
                RGPA=1./VGAV                                                            TPPPP   414
                RGPA1=1./VGAV1                                                          TPPPP   415
                RFPAE=ABS(((1./VFAV-1./VFAV1)/10.)*PAVGE(KK))                           TPPPP   416
                RDAE=(((RFPA-RGPA)-(RFPA1-RGPA1))/10.)*PAVGE(KK)                        TPPPP   417
                KDT=1                                                                   TPPPP   418
                IDT=2                                                                   TPPPP   419
                JDT=26                                                                  TPPPP   420
                LDT=29                                                                  TPPPP   421
                MDT=3                                                                   TPPPP   422
                NDT=4                                                                   TPPPP   423
                MDT1= 9                                                                 TPPPP   424
                NDT1=22                                                                 TPPPP   425
                IF(RC(KDT,KK).EQ.0.0.OR.RC(MDT1,KK).EQ.0.0)  GO TO 1003                 TPPPP   426
                PSMD(KK)=RC(KDT,KK)/RC(MDT1,KK)**2                                      TPPPP   427
                IF(PSMD(KK).LT.RGPS)  PSMD(KK)=RGPS                                     TPPPP   428
                IF(PSMD(KK).GT.RFPS)  PSMD(KK)=RFPS                                     TPPPP   429
                VSMD(KK)=1./PSMD(KK)                                                    TPPPP   430
                PSMDE=(RC(KDT,KK)/(RC(MDT1,KK))**2)*SQRT((1./RC(KDT,KK))**2*SEPR        TPPPP   431
               *(KDT,KK)**2+(2./RC(MDT1,KK))**2*SEPR(MDT1,KK)**2)                       TPPPP   432
                IF(PSMD(KK).EQ.RGPS)  PSMDE=RGPSE                                       TPPPP   433
                IF(PSMD(KK).EQ.RFPS)  PSMDE=RFPSE                                       TPPPP   434
                VSMDE(KK)=PSMDE                                                         TPPPP   435
                GO TO 1004                                                              TPPPP   436
             1003 PSMD(KK)=0.                                                           TPPPP   437
                VSMD(KK)=0.                                                             TPPPP   438
                PSMDE=0.                                                                TPPPP   439
                VSMDE(KK)=0.                                                            TPPPP   440
             1004 CONTINUE                                                              TPPPP   441
                IF(RC(JDT,KK).EQ.0.0.OR.RC(MDT,KK).EQ.0.0)  GO TO 885                   TPPPP   442
                PSMD1=RC(JDT,KK)/RC(MDT,KK)**2                                          TPPPP   443
                IF(PSMD1.LT.RGPS)  PSMD1=RGPS                                           TPPPP   444
                IF(PSMD1.GT.RFPS)  PSMD1=RFPS                                           TPPPP   445
                VSMD1(KK)=PSMD1                                                         TPPPP   446
                PSMD1E=(PSMD1)*SQRT((1./RC(JDT,KK))**2*SEPR(KDT,KK)**2+(2./RC(MDT,      TPPPP   447
               1KK))**2*SEPR(MDT,KK)**2)                                                TPPPP   448
                IF(PSMD1.EQ.RGPS)  PSMD1E=RGPSE                                         TPPPP   449
                IF(PSMD1.EQ.RFPS)  PSMD1E=RFPSE                                         TPPPP   450
                VSMD1E(KK)=PSMD1E                                                       TPPPP   451
                GO TO 1031                                                              TPPPP   452
             885  PSMD1=0.0                                                            TPPPP   453
                VSMD1(KK)=0.0                                                           TPPPP   454
                PSMD1E=0.0                                                              TPPPP   455
                VSMD1E(KK)=0.0                                                          TPPPP   456
             1031 CONTINUE                                                              TPPPP   457
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      IF(RC(IDT,KK).EQ.0.0.OR.RC(NDT1,KK).EQ.0.0)  GO TO 1005                TPPPP     458
      PDMD(KK)=RC(IDT,KK)/RC(NDT1,KK)**2                                     TPPPP     459
      IF(PDMD(KK).LT.RGPD)  PDMD(KK)=RGPD                                    TPPPP     460
460   IF(PDMD(KK).GT.RFPD)  PDMD(KK)=RFPD                                    TPPPP     461
      VDMD(KK)=1./PDMD(KK)                                                   TPPPP     462
      PDMDE=(RC(IDT,KK)/(RC(NDT1,KK))**2)*SQRT((1./RC(IDT,KK))**2*SEPR       TPPPP     463
     *(IDT,KK)**2+(2./RC(NDT1,KK))**2*SEPR(NDT1,KK)**2)                      TPPPP     464
      IF(PDMD(KK).EQ.RGPD)  PDMDE=RGPDE                                      TPPPP     465
465   IF(PDMD(KK).EQ.RFPD)  PDMDE=RFPDE                                      TPPPP     466
      VDMDE(KK)=PDMDE                                                        TPPPP     467
      GO TO 1006                                                             TPPPP     468
1005  PDMD(KK)=0.                                                            TPPPP     469
      VDMD(KK)=0.                                                            TPPPP     470
470   PDMDE=0.                                                               TPPPP     471
      VDMDE(KK)=0.                                                           TPPPP     472
1006  CONTINUE                                                               TPPPP     473
      IF(RC(LDT,KK).EQ.0.0.OR.RC(NDT,KK).EQ.0.0)  GO TO 1032                 TPPPP     474
      PDMD1=RC(LDT,KK)/RC(NDT,KK)**2                                         TPPPP     475
475   IF(PDMD1.LT.RGPD)  PDMD1=RGPD                                          TPPPP     476
      IF(PDMD1.GT.RFPD)  PDMD1=RFPD                                          TPPPP     477
      VDMD1(KK)=PDMD1                                                        TPPPP     478
      PDMD1E=PDMD1*SQRT((1./RC(LDT,KK))**2*SEPR(LDT,KK)**2+(2./RC(NDT,KK     TPPPP     479
     1))**2*SEPR(NDT,KK)**2)                                                 TPPPP     480
480   IF(PDMD1.EQ.RGPD)  PDMD1E=RGPDE                                        TPPPP     481
      IF(PDMD1.EQ.RFPD)  PDMD1E=RFPDE                                        TPPPP     482
      VDMD1E(KK)=PDMD1E                                                      TPPPP     483
      GO TO 1033                                                             TPPPP     484
1032  PDMD1=0.0                                                              TPPPP     485
485   VDMD1(KK)=0.0                                                          TPPPP     486
      PDMD1E=0.0                                                             TPPPP     487
      VDMD1E(KK)=0.0                                                         TPPPP     488
1033  CONTINUE                                                               TPPPP     489
      IF(PSMD(KK).EQ.0.0.OR.PDMD(KK).EQ.0.0)  GO TO 1007                     TPPPP     490
490   PA(KK)=(PSMD(KK)+PDMD(KK))*.5                                          TPPPP     491
      VPA(KK)=1./PA(KK)                                                      TPPPP     492
      PAE=SQRT((.5*PSMDE)**2+(.5*PDMDE)**2)                                  TPPPP     493
      VPAE(KK)=PAE                                                           TPPPP     494
      GO TO 1008                                                             TPPPP     495
495   PA(KK)=0.                                                              TPPPP     496
      VPA(KK)=0.                                                             TPPPP     497
      PAE=0.                                                                 TPPPP     498
      VPAE(KK)=0.                                                            TPPPP     499
1008  CONTINUE                                                               TPPPP     500
500   IF(PSMD1.EQ.0.0.OR.PDMD1.EQ.0.0)  GO TO 1034                           TPPPP     501
      PA1=(PSMD1+PDMD1)*.5                                                   TPPPP     502
      VPA1(KK)=PA1                                                           TPPPP     503
      PA1E=SQRT(PSMD1E**2+PDMD1E**2)*.5                                      TPPPP     504
      VPA1E(KK)=PA1E                                                         TPPPP     505
505   GO TO 1035                                                             TPPPP     506
1034  PA1=0.0                                                                TPPPP     507
      VPA1(KK)=0.0                                                           TPPPP     508
      PA1E=0.0                                                               TPPPP     509
      VPA1E(KK)=0.0                                                          TPPPP     510
510   1035 CONTINUE                                                          TPPPP     511
      ATR(1,KK)=(RFPS-PSMD(KK))/(RFPS-RGPS)                                  TPPPP     512
      ATR(2,KK)=(RFPD-PDMD(KK))/(RFPD-RGPD)                                  TPPPP     513
       DO 1210 IK=1,2                                                        TPPPP     514
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                ATR(IK,KK)=AMAX1(0.,ATR(IK,KK))                                   TPPPP     515
515          1210   ATR(IK,KK)=AMIN1(1.,ATR(IK,KK))                               TPPPP     516
                   ATRE(1,KK)=1./(RFPS-RGPS)*SQRT(RFPSE**2+PSMDE**2+(ATR(1,KK)*RDSE)* TPPPP     517
                  $*2)                                                            TPPPP     518
                   ATRE(2,KK)=1./(RFPD-RGPD)*SQRT(RFPDE**2+PDMDE**2+(ATR(2,KK)*RDPE)* TPPPP     519
                  $*2)                                                            TPPPP     520
520                ATR(3,KK)=(RFPA-PA(KK))/(RFPA-RGPA)                            TPPPP     521
                    ATR(3,KK)=AMAX1(0.,ATR(3,KK))                                 TPPPP     522
                    ATR(3,KK)=AMIN1(1.,ATR(3,KK))                                 TPPPP     523
                   ATRE(3,KK)=1./(RFPA-RGPA)*SQRT(RFPAE**2+PAE**2+(ATR(3,KK)*RDAE)**2 TPPPP     524
                  $)                                                              TPPPP     525
525                IF(PSMD1.EQ.0.0)  GO TO 1036                                   TPPPP     526
                   ATR(8,KK)=(RFPS-PSMD1)/(RFPS-RGPS)                             TPPPP     527
                   ATRE(8,KK)=1./(RFPS-RGPS)*SQRT(RFDSE**2+PSMD1E**2+ATR(1,KK)*RDSE TPPPP     528
                  1**2)                                                           TPPPP     529
                    ATR(8,KK)=AMAX1(0.,ATR(8,KK))                                 TPPPP     530
530                 ATR(8,KK)=AMIN1(1.,ATR(8,KK))                                 TPPPP     531
                   GO TO 1037                                                     TPPPP     532
               1036 ATR(8,KK)=0.0                                                 TPPPP     533
                   ATRE(8,KK)=0.0                                                 TPPPP     534
               1037 CONTINUE                                                      TPPPP     535
535                IF(PDMD1.EQ.0.0)  GO TO 1038                                   TPPPP     536
                   ATR(9,KK)=(RFPD-PDMD1)/(RFPD-RGPD)                             TPPPP     537
                    ATR(9,KK)=AMAX1(0.,ATR(9,KK))                                 TPPPP     538
                    ATR(9,KK)=AMIN1(1.,ATR(9,KK))                                 TPPPP     539
                   ATRE(9,KK)=1./(RFPD-RGPD)*SQRT(RFPDE**2+PDMD1E**2+(ATR(9,KK)*RDPE) TPPPP     540
540                1**2)                                                          TPPPP     541
                   GO TO 1039                                                     TPPPP     542
               1038 ATR(9,KK)=0.0                                                 TPPPP     543
                   ATRE(9,KK)=0.0                                                 TPPPP     544
               1039 CONTINUE                                                      TPPPP     545
545                IF(PDMD1.EQ.0.0.OR.PSMD1.EQ.0.0)  GO TO 1040                   TPPPP     546
                   ATR(10,KK)=(RFPA-PA1)/(RFPA-RGPA)                              TPPPP     547
                    ATR(10,KK)=AMAX1(0.,ATR(10,KK))                               TPPPP     548
                    ATR(10,KK)=AMIN1(1.,ATR(10,KK))                               TPPPP     549
                   ATRE(10,KK)=1./(RFPA-RGPA)*SQRT(RFPAE**2+PA1E**2+(ATR(10,KK)*RDAE) TPPPP     550
550                1**2)                                                          TPPPP     551
                   GO TO 1041                                                     TPPPP     552
               1040 ATR(10,KK)=0.0                                                TPPPP     553
                   ATRE(10,KK)=0.0                                                TPPPP     554
               1041 CONTINUE                                                      TPPPP     555
555            C GAMMA DENSITOMETER DENSITY CALCULATION                           TPPPP     556
                    RC(16,KK)=AMAX1(0.01*RC(16,KK))                               TPPPP     557
                   RSD(KK)=RC(16,KK)                                              TPPPP     558
                    RC(19,KK)=AMAX1(0.01*RC(19,KK))                               TPPPP     559
                   RDD(KK)=RC(19,KK)                                              TPPPP     560
560                VSD(KK)=1./RSD(KK)                                             TPPPP     561
                   VDD(KK)=1./RDD(KK)                                             TPPPP     562
                   IF(RSD(KK).EQ.0.0)  GO TO 1046                                 TPPPP     563
                   RSDE(KK)=SEPR(16,KK)                                           TPPPP     564
                   IF(RSD(KK).EQ.RGPS)  RSDE(KK)=RGPSE                            TPPPP     565
565                VSDE(KK)  = (RSDE(KK)/RSD(KK)) * VSD(KK)                      TPPPP     566
               1046 IF(RDD(KK).EQ.0.0)  GO TO 1047                                TPPPP     567
                   RDDE(KK)=SEPR(19,KK)                                           TPPPP     568
                   IF(RDD(KK).EQ.RGPD)  RDDE(KK)=RGPDE                            TPPPP     569
                   VDDE(KK)  = (RDDE(KK)/RDD(KK)) * VDD(KK)                      TPPPP     570
570            1047 IF(RDD(KK).EQ.0.0.OR.RSD(KK).EQ.0.0)  GO TO 1048             TPPPP     571
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      PDA(KK)=(RSD(KK)+RDD(KK))*.5                                      TPPPP     572
      PDAE(KK)=.5*SQRT(RSDE(KK)**2+RDDE(KK)**2)                         TPPPP     573
      VPDA(KK)=1./PDA(KK)                                               TPPPP     574
      VPDAE(KK) = (PDAE(KK)/PDA(KK)) * VPDA(KK)                         TPPPP     575
575  1048 CONTINUE                                                      TPPPP     576
      ATR(4,KK)=(RFPS-RSD(KK))/(RFPS-RGPS)                              TPPPP     577
       ATR(4,KK)=AMAX1(0.,ATR(4,KK))                                    TPPPP     578
       ATR(4,KK)=AMIN1(1.,ATR(4,KK))                                    TPPPP     579
      ATRE(4,KK)=1./(RFPS-RGPS)*SQRT(RFPSE**2+RSDE(KK)**2+(ATR(4,KK)    TPPPP     580
580  $*RDSE)**2)                                                        TPPPP     581
      IF(RSD(KK).EQ.0.0)  ATRE(4,KK)=0.0                                TPPPP     582
      ATR(5,KK)=(RFPD-RDD(KK))/(RFPD-RGPD)                              TPPPP     583
       ATR(5,KK)=AMAX1(0.,ATR(5,KK))                                    TPPPP     584
       ATR(5,KK)=AMIN1(1.,ATR(5,KK))                                    TPPPP     585
585   ATRE(5,KK)=1./(RFPD-RGPD)*SQRT(RFPDE**2+RDDE(KK)**2+(ATR(5,KK)*RD TPPPP     586
     *PE)**2)                                                           TPPPP     587
      IF(RDD(KK).EQ.0.0)  ATRE(5,KK)=0.0                                TPPPP     588
      ATR(6,KK) = (RFPA-PDA(KK))/(RFPA-RGPA)                            TPPPP     589
       ATR(6,KK)=AMAX1(0.,ATR(6,KK))                                    TPPPP     590
590    ATR(6,KK)=AMIN1(1.,ATR(6,KK))                                    TPPPP     591
      ATRE(6,KK)=1./(RFPA-RGPA)*SQRT(RFPAE**2+PDAE(KK)**2+              TPPPP     592
     *(ATR(6,KK)*RDAE)**2)                                              TPPPP     593
      IF(RDD(KK).EQ.0.0.OR.RSD(KK).EQ.0.0)  ATRE(6,KK)=0.0              TPPPP     594
      IF(ATR(4,KK).EQ.0.0.OR.ATR(5,KK).EQ.0.0) GO TO 1049               TPPPP     595
595   ATR(7,KK)=(ATR(4,KK)+ATR(5,KK))*.5                                TPPPP     596
       ATR(7,KK)=AMAX1(0.,ATR(7,KK))                                    TPPPP     597
       ATR(7,KK)=AMIN1(1.,ATR(7,KK))                                    TPPPP     598
      ATRE(7,KK)=SQRT(ATRE(4,KK)**2+ATRE(5,KK)**2)*.5                   TPPPP     599
 1049 CONTINUE                                                          TPPPP     600
600    DO 3500 IK=15,20                                                 TPPPP     601
3500     RC(IK,KK)=AMAX1(0.01,RC(IK,KK))                                TPPPP     602
      IF(RC(15,KK).EQ.RGPS)  SEPR(15,KK)=RGPSE                          TPPPP     603
      IF(RC(16,KK).EQ.RGPS)  SEPR(16,KK)=RGPSE                          TPPPP     604
      IF(RC(17,KK).EQ.RGPS)  SEPR(17,KK)=RGPSE                          TPPPP     605
605   IF(RC(18,KK).EQ.RGPD)  SEPR(18,KK)=RGPDE                          TPPPP     606
      IF(RC(19,KK).EQ.RGPD)  SEPR(19,KK)=RGPDE                          TPPPP     607
      IF(RC(20,KK).EQ.RGPD)  SEPR(20,KK)=RGPDE                          TPPPP     608
      ATR(11,KK)=(RFPS-RC(15,KK))/(RFPS-RGPS)                           TPPPP     609
      ATR(12,KK)=(RFPS-RC(16,KK))/(RFPS-RGPS)                           TPPPP     610
610   ATR(13,KK)=(RFPS-RC(17,KK))/(RFPS-RGPS)                           TPPPP     611
      ATR(14,KK)=(RFPD-RC(18,KK))/(RFPS-RGPS)                           TPPPP     612
      ATR(15,KK)=(RFPD-RC(19,KK))/(RFPS-RGPS)                           TPPPP     613
      ATR(16,KK)=(RFPD-RC(20,KK))/(RFPD-RGPD)                           TPPPP     614
       DO 1000 IK=11,16                                                 TPPPP     615
615     ATR(IK,KK)=AMAX1(0.,ATR(IK,KK))                                 TPPPP     616
1000    ATR(IK,KK)=AMIN1(1.,ATR(IK,KK))                                 TPPPP     617
       RC(35,KK)=AMAX1(0.01,RC(35,KK))                                  TPPPP     618
      IF(RC(35,KK).EQ.RGPS)  SEPR(35,KK)=RGPSE                          TPPPP     619
      VAECL(KK)=RC(35,KK)                                               TPPPP     620
620   VAECLE(KK)=SEPR(35,KK)                                            TPPPP     621
      RC(34,KK)=AMAX1(0.01,RC(34,KK))                                   TPPPP     622
      RC(36,KK)=AMAX1(0.01,RC(36,KK))                                   TPPPP     623
      IF(RC(34,KK).EQ.RGPS)  SEPR(34,KK)=RGPSE                          TPPPP     624
      IF(RC(36,KK).EQ.RGPS)  SEPR(36,KK)=RGPSE                          TPPPP     625
625   C                                                                 TPPPP     626
      C AECL GD VOID FRACTION CALC                                      TPPPP     627
      C                                                                 TPPPP     628
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                PSUCTF(KK)=RC(5,KK)-RC(24,KK)                                    TPPPP     629
                 PSUCTF(KK)=AMAX1(14.7,PSUCTF(KK))                               TPPPP     630
630             CALL SATUR(PSUCTF(KK),TSPSF,VFPSF,HFPSF,XX,VGPSF,HGPSF,XX,1)    TPPPP     631
                RFPSF=1./VFPSF                                                   TPPPP     632
                RGPSF=1./VGPSF                                                   TPPPP     633
                ATR(17,KK)=(RFPSF-RC(34,KK))/(RFPSF-RGPSF)                       TPPPP     634
                ATR(18,KK)=(RFPSF-RC(35,KK))/(RFPSF-RGPSF)                       TPPPP     635
635             ATR(19,KK)=(RFPSF-RC(36,KK))/(RFPSF-RGPSF)                       TPPPP     636
                 DO 1200 IK=17,19                                                TPPPP     637
                 ATR(IK,KK)=AMAX1(0.,ATR(IK,KK))                                 TPPPP     638
           1200   ATR(IK,KK)=AMIN1(1.,ATR(IK,KK))                                TPPPP     639
           C TEST PUMP HEAD CALCULATION                                          TPPPP     640
640             IF(KDP(1).EQ.40)   GO TO 750                                     TPPPP     641
                IF(KDP(2).EQ.40)   GO TO 1052                                    TPPPP     642
                IF(RC(7,KK).LT.200..AND.RC(7,KK).GT.-200.)  GO TO 750            TPPPP     643
            1052 K=7                                                             TPPPP     644
                GO TO 1053                                                       TPPPP     645
645          750 K=8                                                             TPPPP     646
            1053 CONTINUE                                                        TPPPP     647
           C DRAG DISK-TURBINE METER DENSITY                                     TPPPP     648
                IF(PSMD(KK).EQ.0.0)GO TO 1009                                    TPPPP     649
                HMS(1,KK)=(RC(K,KK)/PSMD(KK))*144.                               TPPPP     650
650             GO TO 1010                                                       TPPPP     651
            1009 HMS(1,KK)=0.                                                    TPPPP     652
            1010 CONTINUE                                                        TPPPP     653
                IF(PDMD(KK).EQ.0.0)GO TO 1011                                    TPPPP     654
                HMS(2,KK)=(RC(K,KK)/PDMD(KK))*144.                               TPPPP     655
655             GO TO 1012                                                       TPPPP     656
            1011 HMS(2,KK)=0.                                                    TPPPP     657
            1012 CONTINUE                                                        TPPPP     658
                IF(PA(KK).EQ.0.0)GO TO 1013                                      TPPPP     659
                HMS(3,KK)=(RC(K,KK)/PA(KK))*144.                                 TPPPP     660
660             GO TO 1014                                                       TPPPP     661
            1013 HMS(3,KK)=0.                                                    TPPPP     662
            1014 CONTINUE                                                        TPPPP     663
                IF(PSMD(KK).EQ.0.0)GO TO 1015                                    TPPPP     664
                HMSE(1,KK)=HMS(1,KK)*SQRT((SEPR(K,KK)/RC(K,KK))**2+(PSMDE/PSMD(KK TPPPP     665
665            $))**2)                                                           TPPPP     666
                GO TO 1016                                                       TPPPP     667
            1015 HMSE(1,KK)=0.                                                   TPPPP     668
            1016 CONTINUE                                                        TPPPP     669
                IF(PDMD(KK).EQ.0.0)GO TO 1017                                    TPPPP     670
670             HMSE(2,KK)=HMS(2,KK)*SQRT((SEPR(K,KK)/RC(K,KK))**2+(PDMDE/PDMD(KK TPPPP     671
               $))**2)                                                           TPPPP     672
                GO TO 1018                                                       TPPPP     673
            1017 HMSE(2,KK)=0.                                                   TPPPP     674
            1018 CONTINUE                                                        TPPPP     675
675             IF(PA(KK).EQ.0.0)GO TO 1019                                      TPPPP     676
                HMSE(3,KK)=HMS(3,KK)*SQRT((SEPR(K,KK)/RC(K,KK))**2 +            TPPPP     677
               $(PAE/PA(KK))**2)                                                 TPPPP     678
                GO TO 1020                                                       TPPPP     679
            1019 HMSE(3,KK)=0.                                                   TPPPP     680
680         1020 CONTINUE                                                        TPPPP     681
                IF(PSMD1.EQ.0.0) GO TO 1070                                      TPPPP     682
                HMS(7,KK)=(RC(K,KK)/PSMD1)*144.                                  TPPPP     683
                HMSE(7,KK)=HMS(7,KK)*SQRT((SEPR(K,KK)/RC(K,KK))**2+(PSMD1E/PSMD1) TPPPP     684
               1**2)                                                             TPPPP     685
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      GO TO 1071                                                                TPPPP  686
 1070 HMS(7,KK)=0.0                                                             TPPPP  687
      HMSE(7,KK)=0.0                                                            TPPPP  688
 1071 IF(PDMD1.EQ.0.0)  GO TO 1072                                              TPPPP  689
      HMS(8,KK)=(RC(K,KK)/PDMD1)*144.                                           TPPPP  690
      HMSE(8,KK)=HMS(8,KK)*SQRT((SEPR(K,KK)/RC(K,KK))**2+(PDMD1E/PDMD1)        TPPPP  691
     1**2)                                                                      TPPPP  692
      GO TO 1073                                                                TPPPP  693
 1072 HMS(8,KK)=0.0                                                             TPPPP  694
      HMSE(8,KK)=0.0                                                            TPPPP  695
 1073 IF(PA1.EQ.0.0)  GO TO 1074                                                TPPPP  696
      HMS(9,KK)=(RC(K,KK)/PA1)*144.                                             TPPPP  697
      HMSE(9,KK)=HMS(9,KK)*SQRT((SEPR(K,KK)/RC(K,KK))**2+(PA1E/PA1)**2)        TPPPP  698
      GO TO 1075                                                                TPPPP  699
 1074 HMS(9,KK)=0.0                                                             TPPPP  700
      HMSE(9,KK)=0.0                                                            TPPPP  701
 1075 CONTINUE                                                                  TPPPP  702
C GAMMA DENSITOMETER DENSITY                                                    TPPPP  703
      IF(RSD(KK).EQ.0.0)  GO TO 1054                                            TPPPP  704
      HMS(4,KK)=(RC(K,KK)/RSD(KK))*144.                                         TPPPP  705
 1054 IF(RDD(KK).EQ.0.0)  GO TO 1055                                            TPPPP  706
      HMS(5,KK)=(RC(K,KK)/RDD(KK))*144.                                         TPPPP  707
 1055 IF(PDA(KK).EQ.0.0)  GO TO 1056                                            TPPPP  708
      HMS(6,KK)=(RC(K,KK)/PDA(KK))*144.                                         TPPPP  709
 1056 CONTINUE                                                                  TPPPP  710
      HUPS=(144.*RC(5,KK))/RC(16,KK)                                            TPPPP  711
      HDNS=(144.*RC(6,KK))/RC(19,KK)                                            TPPPP  712
      PHS(KK)=HDNS-HUPS                                                         TPPPP  713
      PHS(KK)=PHS(KK)/252.                                                      TPPPP  714
      HUPD=HUPS+(RC(MDT,KK)**2)/(2.*32.174)                                     TPPPP  715
      HDND=HDNS+(RC(NDT,KK)**2)/(2.*32.174)                                     TPPPP  716
      PHD(KK)=HDND-HUPD+1.0                                                     TPPPP  717
      PHD(KK)=PHD(KK)/252.                                                      TPPPP  718
      EPRN(KK)=RC(12,KK)/4500.                                                  TPPPP  719
      EPRT(KK)=RC(11,KK)/308.                                                   TPPPP  720
      FRCTN(KK)=FRCT(KK)/308.                                                   TPPPP  721
      HYDRN(KK)=HYDR(KK)/308.                                                   TPPPP  722
      IF(RSD(KK).EQ.0.0)  GO TO 1057                                            TPPPP  723
      HMSE(4,KK)=HMS(4,KK)*SQRT((SEPR(K,KK)/RC(K,KK))**2+(RSDE(KK)/RSD(K       TPPPP  724
     $K))**2)                                                                   TPPPP  725
 1057 IF(RDD(KK).EQ.0.0)  GO TO 1058                                            TPPPP  726
      HMSE(5,KK)=HMS(5,KK)*SQRT((SEPR(K,KK)/RC(K,KK))**2+(RDDE(KK)/RDD(K       TPPPP  727
     $K))**2)                                                                   TPPPP  728
 1058 IF(PDA(KK).EQ.0.0)  GO TO 1059                                            TPPPP  729
      HMSE(6,KK)=HMS(6,KK)*SQRT((SEPR(K,KK)/RC(K,KK))**2 +                     TPPPP  730
     $(PDAE(KK)/PDA(KK))**2)                                                    TPPPP  731
 1059 CONTINUE                                                                  TPPPP  732
  801 CONTINUE                                                                  TPPPP  733
C TEST PUMP VOLUMETRIC FLOW CALCULATION                                         TPPPP  734
C DRAG DISK-GAMMA DENSITOMETER DENSITY                                          TPPPP  735
      IDENS=0                                                                   TPPPP  736
      IHD=0                                                                     TPPPP  737
      IHEAD=0                                                                   TPPPP  738
      IDEND=0                                                                   TPPPP  739
      IJEAD=0                                                                   TPPPP  740
      ILEAD=0                                                                   TPPPP  741
      IF(RC(KDT,KK).GT.0.)  GO TO 5                                             TPPPP  742
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                RC(KDT,KK)=-RC(KDT,KK)                                          TPPPP    743
                IHEAD=1                                                         TPPPP    744
              5 IF(RSD(KK).GT.0.)  GO TO 6                                      TPPPP    745
745             RSD(KK)=-RSD(KK)                                                TPPPP    746
                IDENS=1                                                         TPPPP    747
              6 IF(RDD(KK).GT.0.)  GO TO 7                                      TPPPP    748
                RDD(KK)=-RDD(KK)                                                TPPPP    749
                IDEND=1                                                         TPPPP    750
750           7 IF(RC(IDT,KK).GT.0.)  GO TO 12                                  TPPPP    751
                RC(IDT,KK)=-RC(IDT,KK)                                          TPPPP    752
                IHD=1                                                           TPPPP    753
             12 IF(RC(JDT,KK).GT.0.) GO TO 30                                   TPPPP    754
                RC(JDT,KK)=-RC(JDT,KK)                                          TPPPP    755
755             IJEAD=1                                                         TPPPP    756
             30 IF(RC(LDT,KK).GT.0.) GO TO 31                                   TPPPP    757
                RC(LDT,KK)=-RC(LDT,KK)                                          TPPPP    758
                ILEAD=1                                                         TPPPP    759
             31 CONTINUE                                                        TPPPP    760
760             IF(RSD(KK).EQ.0.0)  GO TO 1060                                  TPPPP    761
                VTRS(4,KK)=SQRT(RC(KDT,KK)/RSD(KK))*81.233                      TPPPP    762
                VTRS(1,KK)=SQRT(RC(JDT,KK)/RSD(KK))*81.233                      TPPPP    763
           1060 IF(RDD(KK).EQ.0.0)  GO TO 1061                                  TPPPP    764
                VTRS(5,KK)=SQRT(RC(IDT,KK)/RDD(KK))*81.233                      TPPPP    765
765             VTRS(2,KK)=SQRT(RC(LDT,KK)/RDD(KK))*81.233                      TPPPP    766
           1061 IF(RSD(KK).EQ.0.0.OR.RDD(KK).EQ.0.0)  GO TO 1062                TPPPP    767
                VTRS(6,KK)=(VTRS(1,KK)+VTRS(4,KK))*0.5                          MJ78236    4
                VTRS(3,KK)=(VTRS(2,KK)+VTRS(5,KK))*0.5                          MJ78236    5
           1062 CONTINUE                                                        TPPPP    770
770             DO 50 KKK=1,6                                                   TPPPP    771
             50 VTRSN(KKK,KK)=VTRS(KKK,KK)/3500.                                TPPPP    772
                IF(IHEAD.LT.1)  GO TO 8                                         TPPPP    773
                RC(KDT,KK)=-RC(KDT,KK)                                          TPPPP    774
              8 IF(IDENS.LT.1)  GO TO 9                                         TPPPP    775
775             RSD(KK)=-RSD(KK)                                                TPPPP    776
              9 IF(IDEND.LT.1)  GO TO 11                                        TPPPP    777
                RDD(KK)=-RDD(KK)                                                TPPPP    778
             11 IF(IHD.LT.1)   GO TO 13                                         TPPPP    779
                RC(IDT,KK)=-RC(IDT,KK)                                          TPPPP    780
780          13 IF(IJEAD.LT.1) GO TO 32                                         TPPPP    781
                RC(JDT,KK)=-RC(JDT,KK)                                          TPPPP    782
             32 IF(ILEAD.LT.1) GO TO 33                                         TPPPP    783
                RC(LDT,KK)=-RC(LDT,KK)                                          TPPPP    784
             33 CONTINUE                                                        TPPPP    785
785             IF(RC(KDT,KK).EQ.0.0.OR.RSD(KK).EQ.0.0)  GO TO 1021             TPPPP    786
                VTRSE(4,KK)=.5*VTRS(4,KK)*SQRT((SEPR(KDT,KK)/RC(KDT,KK))**2     TPPPP    787
               $+(RSDE(KK)/RSD(KK))**2)                                         TPPPP    788
                GO TO 1022                                                      TPPPP    789
           1021 VTRSE(4,KK)=0.                                                  TPPPP    790
790        1022 CONTINUE                                                        TPPPP    791
                VTRSE(5,KK)=.5*VTRS(5,KK)*SQRT((SEPR(IDT,KK)/RC(IDT,KK))**2     TPPPP    792
               $+(RDDE(KK)/RDD(KK))**2)                                         TPPPP    793
                GO TO 1024                                                      TPPPP    794
           1023 VTRSE(5,KK)=0.                                                  TPPPP    795
795        1024 CONTINUE                                                        TPPPP    796
                VTRSE(6,KK)=SQRT((.5*VTRSE(4,KK))**2+(VTRSE(5,KK)*.5)**2)       TPPPP    797
                IF(RC(JDT,KK).EQ.0.0.OR.RSD(KK).EQ.0.0)  GO TO 601              TPPPP    798
                VTRSE(1,KK)=.5*VTRS(1,KK)*SQRT((SEPR(JDT,KK)/RC(JDT,KK))**2     TPPPP    799
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     1+(RSDE(KK)/RSD(KK))**2)                                          TPPPP     800
      GO TO 602                                                        TPPPP     801
  601 VTRSE(1,KK)=0.0                                                  TPPPP     802
  602 IF(RC(LDT,KK).EQ.0.0.OR.RDD(KK).EQ.0.0)  GO TO 603               TPPPP     803
      VTRSE(2,KK)=.5*VTRS(2,KK)*SQRT((SEPR(LDT,KK)/RC(LDT,KK))**2      TPPPP     804
     1+(RDDE(KK)/RDD(KK))**2)                                          TPPPP     805
      GO TO 604                                                        TPPPP     806
  603 VTRSE(2,KK)=0.0                                                  TPPPP     807
  604 IF(VTRSE(1,KK).EQ.0.0.OR.VTRSE(2,KK).EQ.0.0)  GO TO 605           TPPPP     808
      VTRSE(3,KK)=.5*SQRT(VTRSE(1,KK)**2+VTRSE(2,KK)**2)               TPPPP     809
      GO TO 606                                                        TPPPP     810
  605 VTRSE(3,KK)=0.0                                                  TPPPP     811
  606 CONTINUE                                                         TPPPP     812
C     TURBINE METER VOLUMETRIC FLOW RATE                               TPPPP     813
      VTRS(7,KK)=RC(MDT,KK)*81.233                                     TPPPP     814
      VTRS(10,KK)=RC(MDT1,KK)*81.233                                   TPPPP     815
      VTRS(8,KK)=RC(NDT,KK)*81.233                                     TPPPP     816
      VTRS(11,KK)=RC(NDT1,KK)*81.233                                   TPPPP     817
      VTRS(9,KK)=(VTRS(7,KK)+VTRS(10,KK))*0.5                          MJ78236     6
      VTRS(12,KK)=(VTRS(8,KK)+VTRS(11,KK))*0.5                         MJ78236     7
      VTRSE(7,KK)=SEPR(MDT,KK) * 81.233                                TPPPP     820
      VTRSE(8,KK)=SEPR(NDT,KK) * 81.233                                TPPPP     821
      VTRSE(9,KK)=SQRT((.5*VTRSE(7,KK))**2+(.5*VTRSE(8,KK))**2)        TPPPP     822
      VTRSE(10,KK)=SEPR(MDT1,KK)*81.233                                TPPPP     823
      VTRSE(11,KK)=SEPR(NDT1,KK)*81.233                                TPPPP     824
      VTRSE(12,KK)=.5*SQRT(VTRSE(10,KK)**2+VTRSE(11,KK)**2)            TPPPP     825
      DO 52 KKK=7,12                                                   TPPPP     826
   52 VTRSN(KKK,KK)=VTRS(KKK,KK)/3500.                                 TPPPP     827
C MOMENTUM FLUX CALCULATION                                            TPPPP     828
C GAMMA DENSITOMETER DENSITY - TURBINE METER VELOCITY                  TPPPP     829
      IF(RC(MDT,KK).EQ.0.0.OR.RC(NDT,KK).EQ.0.0)  GO TO 1063           TPPPP     830
      VELT =.5*(RC(MDT,KK)+RC(NDT,KK))                                 TPPPP     831
      VELTE=.5*SQRT(SEPR(MDT,KK)**2 + SEPR(NDT,KK)**2)                 TPPPP     832
      GO TO 1064                                                       TPPPP     833
 1063 VELT=0.0                                                         TPPPP     834
      VELTE=0.0                                                        TPPPP     835
 1064 CONTINUE                                                         TPPPP     836
      IF(RC(MDT1,KK).EQ.0.0.OR.RC(NDT1,KK).EQ.0.0)  GO TO 1100         TPPPP     837
      VELT1=.5*(RC(MDT1,KK)+RC(NDT1,KK))                               TPPPP     838
      VELT1E=.5*SQRT(SEPR(MDT1,KK)**2+SEPR(NDT1,KK)**2)                TPPPP     839
      GO TO 1102                                                       TPPPP     840
 1100 VELT1=0.0                                                        TPPPP     841
      VELT1E=0.0                                                       TPPPP     842
 1102 CONTINUE                                                         TPPPP     843
      FLUX(1,KK)= RSD(KK) * RC(MDT,KK)**2                              TPPPP     844
      FLUX(2,KK)= RDD(KK) * RC(NDT,KK)**2                              TPPPP     845
      FLUX(3,KK)= PDA(KK) * VELT**2                                    TPPPP     846
      FLUX(10,KK)=RSD(KK)*RC(MDT1,KK)**2                               TPPPP     847
      FLUX(11,KK)=RDD(KK)*RC(NDT1,KK)**2                               TPPPP     848
      FLUX(12,KK)=PDA(KK)*VELT1**2                                     TPPPP     849
      IF(RC(MDT,KK).EQ.0.0.OR.RSD(KK).EQ.0.0)  GO TO 1025              TPPPP     850
      FLUXE(1,KK)=FLUX(1,KK)*SQRT((RSDE(KK)/RSD(KK))**2 +              TPPPP     851
     $(2.* SEPR(MDT,KK)/RC(MDT,KK)) **2 )                              TPPPP     852
      GO TO 1026                                                       TPPPP     853
 1025 FLUXE(1,KK)=0.                                                   TPPPP     854
 1026 CONTINUE                                                         TPPPP     855
      IF(RC(NDT,KK).EQ.0.0.OR.RDD(KK).EQ.0.0)  GO TO 1027              TPPPP     856
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                FLUXE(2,KK)=FLUX(2,KK)*SQRT((RDDE(KK)/RDD(KK))**2+                TPPPP   857
               $(2.* SEPR(NDT,KK)/RC(NDT,KK)) **2 )                               TPPPP   858
                GO TO 1028                                                        TPPPP   859
             1027 FLUXE(2,KK)=0.                                                  TPPPP   860
860          1028 CONTINUE                                                        TPPPP   861
                IF(PDA(KK).EQ.0.0.OR.VELT.EQ.0.0)  GO TO 1029                     TPPPP   862
                FLUXE(3,KK) = FLUX(3,KK) * SQRT((RDAE/PDA(KK))**2 +               TPPPP   863
               $(2.* VELTE/VELT) ** 2 )                                           TPPPP   864
                GO TO 1030                                                        TPPPP   865
865          1029 FLUXE(3,KK)=0.                                                  TPPPP   866
             1030 CONTINUE                                                        TPPPP   867
                IF(RC(MDT1,KK).EQ.0.0.OR.RSD(KK).EQ.0.0)  GO TO 1104              TPPPP   868
                FLUXE(10,KK)=FLUX(10,KK)*SQRT((RSDE(KK)/RSD(KK))**2+              TPPPP   869
               1(2.*SEPR(MDT1,KK)/RC(MDT1,KK))**2)                                TPPPP   870
870             GO TO 1106                                                        TPPPP   871
             1104 FLUXE(10,KK)=0.0                                                TPPPP   872
             1106 CONTINUE                                                        TPPPP   873
                IF(RC(NDT1,KK).EQ.0.0.OR.RDD(KK).EQ.0.0) GO TO 1108               TPPPP   874
                FLUXE(11,KK)=FLUX(11,KK)*SQRT((RDDE(KK)/RDD(KK))**2+              TPPPP   875
875            1(2.*SEPR(NDT1,KK)/RC(NDT1,KK))**2)                                TPPPP   876
                GO TO 1110                                                        TPPPP   877
             1108 FLUXE(11,KK)=0.0                                                TPPPP   878
             1110 CONTINUE                                                        TPPPP   879
                IF(PDA(KK).EQ.0.0.OR.VELT1.EQ.0.0)  GO TO 1112                    TPPPP   880
880             FLUXE(12,KK)=FLUX(12,KK)*SQRT((RDAE/PDA(KK))**2+                  TPPPP   881
               1(2.*VELT1E/VELT1)**2)                                             TPPPP   882
                GO TO 1114                                                        TPPPP   883
             1112 FLUXE(12,KK)=0.0                                                TPPPP   884
             1114 CONTINUE                                                        TPPPP   885
885          C DRAG DISK MOMENTUM FLUX                                            TPPPP   886
                FLUX(4,KK)=RC(KDT,KK)                                             TPPPP   887
                FLUX(5,KK)=RC(IDT,KK)                                             TPPPP   888
                IF(RC(KDT,KK).EQ.0.0.OR.RC(IDT,KK).EQ.0.0)  GO TO 1066            TPPPP   889
                FLUX(6,KK)=(RC(KDT,KK)+RC(IDT,KK))*.5                             TPPPP   890
890          1066 FLUX(7,KK)=RC(JDT,KK)                                           TPPPP   891
                FLUX(8,KK)=RC(LDT,KK)                                             TPPPP   892
                IF(RC(JDT,KK).EQ.0.0.OR.RC(LDT,KK).EQ.0.0)  GO TO 1065            TPPPP   893
                FLUX(9,KK)=.5*(RC(JDT,KK)+RC(LDT,KK))                             TPPPP   894
             1065 CONTINUE                                                        TPPPP   895
895             FLUXE(4,KK)=SEPR(KDT,KK)                                          TPPPP   896
                FLUXE(5,KK)=SEPR(IDT,KK)                                          TPPPP   897
                IF(RC(KDT,KK).EQ.0.0.OR.RC(IDT,KK).EQ.0.0)  GO TO 1067            TPPPP   898
                FLUXE(6,KK)=SQRT((.5*SEPR(KDT,KK))**2+(.5*SEPR(IDT,KK))**2)       TPPPP   899
             1067 FLUXE(7,KK)=SEPR(JDT,KK)                                        TPPPP   900
900             FLUXE(8,KK)=SEPR(LDT,KK)                                          TPPPP   901
                IF(RC(JDT,KK).EQ.0.0.OR.RC(LDT,KK).EQ.0.0)  GO TO 1068            TPPPP   902
                FLUXE(9,KK)=.5*SQRT(SEPR(LDT,KK)**2+SEPR(JDT,KK)**2)              TPPPP   903
             1068 CONTINUE                                                        TPPPP   904
             C                                                                    TPPPP   905
905          C MASS FLOW RATE CALCULATION                                         TPPPP   906
             C                                                                    TPPPP   907
                IF(RC( 1,KK).LE. 0.) GO TO 299                                    TPPPP   908
                MFR(1,KK)=SQRT(RC(1,KK)*RC(16,KK))*0.181                          TPPPP   909
                GO TO 300                                                         TPPPP   910
910          299  MFR(1,KK)=0.                                                    TPPPP   911
             300  CONTINUE                                                        TPPPP   912
                IF(RC(26,KK).LE. 0.) GO TO 397                                    TPPPP   913
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                MFR(2,KK)=SQRT(RC(26,KK)*RC(16,KK))*0.181                       TPPPP     914
                GO TO 301                                                       TPPPP     915
915          397 MFR(2,KK)=0.                                                   TPPPP     916
             301 CONTINUE                                                       TPPPP     917
                MFR(3,KK)=RC(16,KK)*RC(MDT1,KK)*0.181                           TPPPP     918
                MFR(4,KK)=RC(16,KK)*RC(MDT,KK)*0.181                            TPPPP     919
                IF(RC( 2,KK).LE. 0.) GO TO 302                                  TPPPP     920
920             MFR(5,KK)=SQRT(RC(2,KK)*RC(19,KK))*0.181                        TPPPP     921
                GO TO 303                                                       TPPPP     922
             302 MFR(5,KK)=0.                                                   TPPPP     923
             303 CONTINUE                                                       TPPPP     924
                IF(RC(29,KK).LE. 0.) GO TO 308                                  TPPPP     925
925             MFR(6,KK)=SQRT(RC(29,KK)*RC(19,KK))*0.181                       TPPPP     926
                GO TO 309                                                       TPPPP     927
             308 MFR(6,KK)=0.                                                   TPPPP     928
             309 CONTINUE                                                       TPPPP     929
                MFR(7,KK)=RC(19,KK)*RC(NDT1,KK)*0.181                           TPPPP     930
930             MFR(8,KK)=RC(19,KK)*RC(NDT,KK)*0.181                            TPPPP     931
                MFR(9,KK)=0.5*(MFR(1,KK)+MFR(2,KK))                             MJ78236     8
                MFR(10,KK)=0.5*(MFR(5,KK)+MFR(6,KK))                            MJ78236     9
                MFR(11,KK)=0.5*(MFR(3,KK)+MFR(4,KK))                            MJ78236    10
                MFR(12,KK)=0.5*(MFR(7,KK)+MFR(8,KK))                            MJ78236    11
935          C                                                                  TPPPP     932
             C INTEGRATED MASS CALCULATION                                      TPPPP     933
             C                                                                  TPPPP     934
                IF(NTEST.EQ.1156) TTR=12.55                                     MJ78236    12
                IF(NTEST.EQ.1179) TTR=12.73                                     MJ78236    13
940             IF(NTEST.EQ.1211) TTR=12.15                                     MJ78236    14
                IF(NTEST.EQ.1267) TTR=5.79                                      MJ78236    15
                IF(NTEST.EQ.1319) TTR=5.7                                       MJ78236    16
                IF(NTEST.EQ.1351) TTR=5.7                                       MJ78236    17
                IF(NTEST.EQ.1380) TTR=5.96                                      MJ78236    18
945             IF(TT(KK).LE.TTR.AND.IPA.EQ.1) GO TO 304                        TPPPP     936
                IF(IPA.GT.1.AND.KK.EQ.1) GO TO 206                              TPPPP     937
                DO 305 J=1,12                                                   MJ78236    19
                MI(J,KK)=MI(J,KK-1)+ABS(MFR(J,KK))*DELT-0.5*(ABS(MFR(J,KK))-ABS(TPPPP     939
               1MFR(J,KK-1)))*DELT                                              TPPPP     940
950          305 CONTINUE                                                       TPPPP     941
                GO TO 306                                                       TPPPP     942
             206 DO 205 J=1,12                                                  MJ78236    20
             205 MI(J,1)=PLOT(J)+ABS(MFR(J,1))*DELT-0.5*(ABS(MFR(J,1))-         TPPPP     944
                1 ABS(PLOT(J+12)))*DELT                                         MJ78236    21
955             GO TO 306                                                       TPPPP     946
             304 CONTINUE                                                       TPPPP     947
                DO 307 I=1,8                                                    TPPPP     948
                MI(I,KK)=0.                                                     TPPPP     949
             307 CONTINUE                                                       TPPPP     950
960          306 CONTINUE                                                       TPPPP     951
             802 CONTINUE                                                       TPPPP     952
             C END BIG LOOP                                                     TPPPP     953
             C                                                                  TPPPP     954
                DO 3180 J=1,ITS                                                 TPPPP     955
965             PRINT 3181, RC(12,J),EPRN(J)                                    TPPPP     956
             3181 FORMAT(4X,8E12.6)                                             TPPPP     957
             3180 CONTINUE                                                      TPPPP     958
             C.....WRITE PLOT FILE                                              TPPPP     959
                DO 701  I=1,6                                                   TPPPP     960
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                  701 C(I,40)=0.                                                    TPPPP     961
                      PLOT(1)=NTEST                                                 TPPPP     962
                      PLOT(2)=ITS                                                   TPPPP     963
                      PLOT(3)=100                                                   TPPPP     964
                      PLOT(4)=0                                                     TPPPP     965
                      PLOT(5)=0.                                                    TPPPP     966
                      PLOT(6)=0                                                     TPPPP     967
                      PLOT(7)=0                                                     TPPPP     968
                      DO 700 I=1,ITS                                                TPPPP     969
                      PLOT(7+I)=TT(I)                                               TPPPP     970
                  700 CONTINUE                                                      TPPPP     971
                      REWIND 11                                                     TPPPP     972
                      WRITE(11)RC,VSD,VDD,VPA,RSD,RDD,PDA,PAVG,PSMD,PDMD,VSMD,VDMD,PA TPPPP     973
                     1,VPDAE,VDMDE,VPAE,VSDE,VDDE,VPDA,WIE,WDE,WW,PAVGE,VSMDE,RDDE, MJ78236    22
                     2RSDE,PDAE,FRCT,FRCTE,HYDR,HYDRE                               MJ78236    23
                      BUFFEROUT(IPB,0) (PLOT(1),PLOT(ITS+7))                        TPPPP     975
                      IF (UNIT(IPB)) 900,900,900                                    TPPPP     976
                  900 CONTINUE                                                      TPPPP     977
                      PLOT(310)=TT(ITS)                                             TPPPP     978
                      PLOT(309)=RC(12,ITS)                                          TPPPP     979
                      DO 702 I=1,12                                                 MJ78236    24
                      PLOT(I)=MI(I,ITS)                                             TPPPP     981
                  702 PLOT(I+12)=MFR(I,ITS)                                         MJ78236    25
                      DO 1500 JK=1,ITS                                              TPPPP     983
                      VSD(JK)=MFR(1,JK)                                             TPPPP     984
                      VDD(JK)=MFR(2,JK)                                             TPPPP     985
                      VPA(JK)=MFR(3,JK)                                             TPPPP     986
                      RSD(JK)=MFR(4,JK)                                             TPPPP     987
                      RDD(JK)=MFR(5,JK)                                             TPPPP     988
                      PDA(JK)=MFR(6,JK)                                             TPPPP     989
                      VPDAE(JK)=MFR(7,JK)                                           TPPPP     990
                      VDMDE(JK)=MFR(8,JK)                                           TPPPP     991
                      PAVG(JK)=MI(1,JK)                                             TPPPP     992
                      PSMD(JK)=MI(2,JK)                                             TPPPP     993
                      PDMD(JK)=MI(3,JK)                                             TPPPP     994
                      VSMD(JK)=MI(4,JK)                                             TPPPP     995
                      VDMD(JK)=MI(5,JK)                                             TPPPP     996
                      PA(JK)=MI(6,JK)                                               TPPPP     997
                      VPAE(JK)=MI(7,JK)                                             TPPPP     998
                      VPDA(JK)=MI(8,JK)                                             TPPPP     999
                      RC(12,JK)=VTRSN(10,JK)                                        TPPPP    1000
                      RC(40,JK)=VTRSN(11,JK)                                        TPPPP    1001
                      VSDE(JK)=FLUX(10,JK)                                          TPPPP    1002
                      VDDE(JK)=FLUX(11,JK)                                          TPPPP    1003
                      WIE(JK)=VTRSN(6,JK)                                           MJ78236    26
                      WDE(JK)=VTRSN(3,JK)                                           MJ78236    27
                      WW(JK)=VTRSN(9,JK)                                            MJ78236    28
                      PAVGE(JK)=VTRSN(12,JK)                                        MJ78236    29
                      VSMDE(JK)=MFR(9,JK)                                           MJ78236    30
                      RDDE(JK)=MFR(10,JK)                                           MJ78236    31
                      RSDE(JK)=MFR(11,JK)                                           MJ78236    32
                      PDAE(JK)=MFR(12,JK)                                           MJ78236    33
                      FRCT(JK)=MI(9,JK)                                             MJ78236    34
                      FRCTE(JK)=MI(10,JK)                                           MJ78236    35
                      HYDR(JK)=MI(11,JK)                                            MJ78236    36
                      HYDRE(JK)=MI(12,JK)                                           MJ78236    37
                      DO 1501 JM=1,2                                                TPPPP    1004
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                RC(JM,JK)=FLUX(JM,JK)                                   TPPPP  1005
             1501 CONTINUE                                              TPPPP  1006
                DO 1502 N=3,4                                           TPPPP  1007
1030            RC(N,JK)=FLUX(N+1,JK)                                   TPPPP  1008
             1502 CONTINUE                                              TPPPP  1009
                RC(9,JK)=FLUX(7,JK)                                     TPPPP  1010
                RC(11,JK)=FLUX(8,JK)                                    TPPPP  1011
                DO 1503 NM=21,22                                        TPPPP  1012
1035            RC(NM,JK)=VTRSN(NM-20,JK)                               TPPPP  1013
             1503 CONTINUE                                              TPPPP  1014
                DO 1504 NN=23,24                                        TPPPP  1015
                RC(NN,JK)=VTRSN(NN-19,JK)                               TPPPP  1016
             1504 CONTINUE                                              TPPPP  1017
1040            DO 1505 NJ=25,26                                        TPPPP  1018
                RC(NJ,JK)=VTRSN(NJ-18,JK)                               TPPPP  1019
             1505 CONTINUE                                              TPPPP  1020
                RC(27,JK)=ATR(11,JK)                                    TPPPP  1021
                DO 1506 MD=29,33                                        TPPPP  1022
1045            RC(MD,JK)=ATR(MD-17,JK)                                 TPPPP  1023
             1506 CONTINUE                                              TPPPP  1024
                DO 1507 ME=37,39                                        TPPPP  1025
                RC(ME,JK)=ATR(ME-20,JK)                                 TPPPP  1026
             1507 CONTINUE                                              TPPPP  1027
1050         1500 CONTINUE                                              TPPPP  1028
                CALL BUFFER1(1,5,5,ITS)                                 TPPPP  1029
                CALL BUFFER1(2,6,6,ITS)                                 TPPPP  1030
                CALL BUFFER1(3,28,28,ITS)                               TPPPP  1031
                CALL BUFFER1(4,13,13,ITS)                               TPPPP  1032
1055            CALL BUFFER1(5,14,14,ITS)                               TPPPP  1033
                CALL BUFFER1(6,15,15,ITS)                               TPPPP  1034
                CALL BUFFER1(7,16,16,ITS)                               TPPPP  1035
                CALL BUFFER1(8,17,17,ITS)                               TPPPP  1036
                CALL BUFFER1(9,18,18,ITS)                               TPPPP  1037
1060            CALL BUFFER1(10,19,19,ITS)                              TPPPP  1038
                CALL BUFFER1(11,20,20,ITS)                              TPPPP  1039
                CALL BUFFER1(12,34,34,ITS)                              TPPPP  1040
                CALL BUFFER1(13,35,35,ITS)                              TPPPP  1041
                CALL BUFFER1(14,36,36,ITS)                              TPPPP  1042
1065            CALL BUFFER1(15,15,27,ITS)                              TPPPP  1043
                CALL BUFFER1(16,16,29,ITS)                              TPPPP  1044
                CALL BUFFER1(17,17,30,ITS)                              TPPPP  1045
                CALL BUFFER1(18,18,31,ITS)                              TPPPP  1046
                CALL BUFFER1(19,19,32,ITS)                              TPPPP  1047
1070            CALL BUFFER1(20,20,33,ITS)                              TPPPP  1048
                CALL BUFFER1(21,34,37,ITS)                              TPPPP  1049
                CALL BUFFER1(22,35,38,ITS)                              TPPPP  1050
                CALL BUFFER1(23,36,39,ITS)                              TPPPP  1051
                CALL BUFFER1(24,26,21,ITS)                              TPPPP  1052
1075            CALL BUFFER1(26,1,23,ITS)                               TPPPP  1053
                CALL BUFFER1(28,3,25,ITS)                               TPPPP  1054
                CALL BUFFER1(30,9,12,ITS)                               TPPPP  1055
                CALL BUFFER1(25,29,22,ITS)                              TPPPP  1056
                CALL BUFFER1(27,2,24,ITS)                               TPPPP  1057
1080            CALL BUFFER1(29,4,26,ITS)                               TPPPP  1058
                CALL BUFFER1(31,22,40,ITS)                              TPPPP  1059
                CALL BUFFER2(DESIG,C,VSD,32,1,ITS)                      TPPPP  1060
                CALL BUFFER2(DESIG,C,VDD,33,26,ITS)                     TPPPP  1061
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                CALL BUFFER2(DESIG,C,RDD,34,2,ITS)                                TPPPP   1062
1085            CALL BUFFER2(DESIG,C,PDA,35,29,ITS)                               TPPPP   1063
                CALL BUFFER1(36,3,1,ITS)                                          TPPPP   1064
                CALL BUFFER2(DESIG,C,VSDE,38,9,ITS)                               TPPPP   1065
                CALL BUFFER1(42,26,9,ITS)                                         TPPPP   1066
                CALL BUFFER1(40,1,3,ITS)                                          TPPPP   1067
1090            CALL BUFFER1(37,4,2,ITS)                                          TPPPP   1068
                CALL BUFFER2(DESIG,C,VDDE,39,22,ITS)                              TPPPP   1069
                CALL BUFFER1(43,29,11,ITS)                                        TPPPP   1070
                CALL BUFFER1(41,2,4,ITS)                                          TPPPP   1071
                CALL BUFFER1(44,K,K,ITS)                                          TPPPP   1072
1095            CALL BUFFER2(DESIG,C,PHS,45,16,ITS)                               TPPPP   1073
                CALL BUFFER2(DESIG,C,PHD,46,19,ITS)                               TPPPP   1074
                CALL BUFFER2(DESIG,C,EPRN,47,12,ITS)                              TPPPP   1075
                CALL BUFFER2(DESIG,C,EPRT,48,11,ITS)                              TPPPP   1076
                CALL BUFFER2(DESIG,C,HYDRN,49,11,ITS)                             TPPPP   1077
1100            CALL BUFFER2(DESIG,C,PAVG,50,1,ITS)                               TPPPP   1078
                CALL BUFFER2(DESIG,C,PSMD,51,26,ITS)                              TPPPP   1079
                CALL BUFFER2(DESIG,C,VDMD,52,2,ITS)                               TPPPP   1080
                CALL BUFFER2(DESIG,C,PA,53,29,ITS)                                TPPPP   1081
                CALL BUFFER2(DESIG,C,VPA,54,9,ITS)                                TPPPP   1082
1105            CALL BUFFER2(DESIG,C,RSD,55,3,ITS)                                TPPPP   1083
                CALL BUFFER2(DESIG,C,VPDAE,56,22,ITS)                             TPPPP   1084
                CALL BUFFER2(DESIG,C,VDMDE,57,4,ITS)                              TPPPP   1085
                CALL BUFFER2(DESIG,C,ACEL,58,12,ITS)                              TPPPP   1086
                CALL BUFFER2(DESIG,C,FRCTN,59,11,ITS)                             TPPPP   1087
1110            CALL BUFFER2(DESIG,C,PDMD,60,9,ITS)                               TPPPP   1088
                CALL BUFFER2(DESIG,C,VSMD,61,3,ITS)                               TPPPP   1089
                CALL BUFFER2(DESIG,C,VPAE,62,22,ITS)                              TPPPP   1090
                CALL BUFFER2(DESIG,C,VPDA,63,4,ITS)                               TPPPP   1091
                CALL BUFFER2(DESIG,C,WI,64,28,ITS)                                TPPPP   1092
1115            CALL BUFFER2(DESIG,C,WO,65,28,ITS)                                TPPPP   1093
                CALL BUFFER2(DESIG,C,WL,66,28,ITS)                                TPPPP   1094
                CALL BUFFER2(DESIG,C,WIE,67,28,ITS)                               MJ78236   38
                CALL BUFFER2(DESIG,C,WOE,68,28,ITS)                               MJ78236   39
                CALL BUFFER2(DESIG,C,WW,69,28,ITS)                                MJ78236   40
1120            CALL BUFFER2(DESIG,C,PAVGE,70,28,ITS)                             MJ78236   41
                CALL BUFFER2(DESIG,C,VSMDE,71,28,ITS)                             MJ78236   42
                CALL BUFFER2(DESIG,C,RDDE,72,28,ITS)                              MJ78236   43
                CALL BUFFER2(DESIG,C,RSDE,73,28,ITS)                              MJ78236   44
                CALL BUFFER2(DESIG,C,PDAE,74,28,ITS)                              MJ78236   45
1125            CALL BUFFER2(DESIG,C,FRCT,75,28,ITS)                              MJ78236   46
                CALL BUFFER2(DESIG,C,FRCTE,75,28,ITS)                             MJ78236   47
                CALL BUFFER2(DESIG,C,HYDR,75,28,ITS)                              MJ78236   48
                CALL BUFFER2(DESIG,C,HYDRE,75,28,ITS)                             MJ78236   49
                REWIND 11                                                         TPPPP   1096
1130            READ(11) RC,VSD,VDD,VPA,RSD,RDD,PDA,PAVG,PSMD,PDMD,VSMD,VDMD,PA   TPPPP   1097
               1,VPDAE,VDMDE,VPAE,VSDE,VDDE,VPDA,WIE,WOE,WW,PAVGE,VSMDE,RDDE,     MJ78236   50
               2RSDE,PDAE,FRCT,FRCTE,HYDR,HYDRE                                   MJ78236   51
           C.....END PLOT FILE                                                    TPPPP   1099
           C                                                                      TPPPP   1100
1135            L = NPAGE = 0                                                     TPPPP   1101
                CALL SECOND(ETIME)                                                TPPPP   1102
            7495 L=L+1                                                            TPPPP   1103
                PRT1 =ETM1(L)                                                     TPPPP   1104
                PRT2 =ETM2(L)                                                     TPPPP   1105
1140            PRT3 =ETM3(L)                                                     TPPPP   1106
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                PRT4 =ETM4(L)                                          TPPPP  1107
                PRT5 =ETM5(L)                                          TPPPP  1108
                PRT6 =ETM6(L)                                          TPPPP  1109
                PRT7 =ETM7(L)                                          TPPPP  1110
1145            PRT8 =ETM8(L)                                          TPPPP  1111
                PRT9 =ETM9(L)                                          TPPPP  1112
                PRT10=ETM10(L)                                         TPPPP  1113
                PRT11=ETM11(L)                                         TPPPP  1114
                IF(L.LT.2)  GO TO 4300                                 TPPPP  1115
1150        C                                                          TPPPP  1116
            C     ENGLISH TO METRIC CONVERSION                         TPPPP  1117
                  DO 760 J=1,ITS                                       TPPPP  1118
            C THERMOCOUPLE CONVERSION                                  TPPPP  1119
                  DO 720 I=1,NTCA                                      TPPPP  1120
1155              KI=KCA(I)                                            TPPPP  1121
                  RC(KI,J)=(RC(KI,J)-32.)*5./9.                        TPPPP  1122
              720 CONTINUE                                             TPPPP  1123
            C PRESSURE CELL CONVERSION                                 TPPPP  1124
                  DO 722 I=1,NP                                        TPPPP  1125
1160              KI=KP(I)                                             TPPPP  1126
              722 RC(KI,J)=RC(KI,J)*.0703                              TPPPP  1127
            C DIFFERENTIAL PRESSURE CELL CONVERSION                    TPPPP  1128
                  DO 723 I=1,NDP                                       TPPPP  1129
                  KI=KDP(I)                                            TPPPP  1130
1165          723 RC(KI,J)=RC(KI,J)*.0703                              TPPPP  1131
            C GAMMA DENSITOMETER CONVERSION                            TPPPP  1132
                  DO 729 I=1,NGD                                       TPPPP  1133
                  KI=KGD(I)                                            TPPPP  1134
              729 RC(KI,J)=RC(KI,J)*.0624                              TPPPP  1135
1170        C TORQUEMETER CONVERSION                                   TPPPP  1136
                  DO 737 I=1,NTM                                       TPPPP  1137
                  KI=KTM(I)                                            TPPPP  1138
              737 RC(KI,J)=RC(KI,J)/7.2182                             TPPPP  1139
            C VOLUMETRIC FLOW CONVERSION                               TPPPP  1140
1175              DO 901 I=1,9                                         TPPPP  1141
                  VTRS(I,J)=VTRS(I,J)*3.785                            TPPPP  1142
              901 VTRSE(I,J)=VTRSE(I,J)*3.785                          TPPPP  1143
            C PUMP HEAD CONVERSION                                     TPPPP  1144
                  DO 902 I=1,9                                         TPPPP  1145
1180              HMS(I,J)=HMS(I,J)*.3048                              TPPPP  1146
              902 HMSE(I,J)=HMSE(I,J)*.3048                            TPPPP  1147
            C FLUID MOMENTUM FLUX CONVERSION                           TPPPP  1148
                  DO 904 I=1,9                                         TPPPP  1149
                  FLUX(I,J)=FLUX(I,J)*1.488                            TPPPP  1150
1185          904 FLUXE(I,J)=FLUXE(I,J)*1.488                          TPPPP  1151
            C SPECIFIC VOLUME CONVERSION                               TPPPP  1152
                  VSMD(J)=VSMD(J)*.0624                                TPPPP  1153
                  VDMD(J)=VDMD(J)*.0624                                TPPPP  1154
                  VPA(J) =VPA(J) *.0624                                TPPPP  1155
1190              VSD(J) =VSD(J) *.0624                                TPPPP  1156
                  VDD(J) =VDD(J) *.0624                                TPPPP  1157
                  VPDA(J)=VPDA(J)*.0624                                TPPPP  1158
                  VSMD1(J)=VSMD1(J)*.0624                              TPPPP  1159
                  VDMD1(J)=VDMD1(J)*.0624                              TPPPP  1160
1195              VPA1(J)=VPA1(J)*.0624                                TPPPP  1161
            C     FRICTION,HYDRAULIC TORQUE CONVERSIONS                TPPPP  1162
                  FRCT(J)=FRCT(J)/7.2182                               TPPPP  1163
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                HYDR(J)=HYDR(J)/7.2182                                          TPPPP   1164
                DO 10 I=15,20                                                   TPPPP   1165
1200          10 RC(I,J)=RC(I,J)*.0624                                          TPPPP   1166
                DO 16 I=34,36                                                   TPPPP   1167
              16 RC(I,J)=RC(I,J)*.0624                                          TPPPP   1168
             760 CONTINUE                                                       TPPPP   1169
              C WRITE OUTPUT DATA                                               TPPPP   1170
1205         4300 I = 1                                                         TPPPP   1171
             804 II = I + 6 * NSTEP                                             TPPPP   1172
                NPAGE=NPAGE+1                                                   TPPPP   1173
                IF(II.GT.ITS) II=ITS                                            TPPPP   1174
                PRINT 100,NTEST,DAT,TIM,AREA,NPAGE                              TPPPP   1175
1210            PRINT 102,(TT(J),J=I,II,NSTEP)                                  TPPPP   1176
                PRINT 104                                                       TPPPP   1177
                PRINT 106,PRT1,(RC(5,J),SEPR(5,J),    J=I,II,NSTEP)             TPPPP   1178
                PRINT 108,PRT2,(VTRS(4,J),VTRSE(4,J),J=I,II,NSTEP)              TPPPP   1179
                PRINT 109,(VTRS(1,J),VTRSE(1,J),J=I,II,NSTEP)                   TPPPP   1180
1215            PRINT 168,(VTRS(10,J),VTRSE(10,J),J=I,II,NSTEP)                 TPPPP   1181
                PRINT 110,(VTRS(7,J),VTRSE(7,J),J=I,II,NSTEP)                   TPPPP   1182
                PRINT 112,(ATR(1,J),ATRE(1,J),   J=I,II,NSTEP)                  TPPPP   1183
                PRINT 113,(ATR(8,J),ATRE(8,J),J=I,II,NSTEP)                     TPPPP   1184
                PRINT 114,(ATR(4,J),ATRE(4,J),   J=I,II,NSTEP)                  TPPPP   1185
1220            PRINT 116,(RC(12,J),SEPR(12,J), J=I,II,NSTEP)                   TPPPP   1186
                PRINT 118,PRT3,(HMS(1,J),HMSE(1,J),   J=I,II,NSTEP)             TPPPP   1187
                PRINT 119,(HMS(7,J),HMSE(7,J),J=I,II,NSTEP)                     TPPPP   1188
                PRINT 115,(HMS(4,J),HMSE(4,J),J=I,II,NSTEP)                     TPPPP   1189
                PRINT 128,PRT4,(HYDR(J),HYDRE(J),J=I,II,NSTEP)                  TPPPP   1190
1225            PRINT 129                                                       TPPPP   1191
                PRINT 106,PRT1,(RC(6,J),SEPR(6,J),    J=I,II,NSTEP)             TPPPP   1192
                PRINT 108,PRT2,(VTRS(5,J),VTRSE(5,J),J=I,II,NSTEP)              TPPPP   1193
                PRINT 109,(VTRS(2,J),VTRSE(2,J),J=I,II,NSTEP)                   TPPPP   1194
                PRINT 168,(VTRS(11,J),VTRSE(11,J),J=I,II,NSTEP)                 TPPPP   1195
1230            PRINT 110,(VTRS(8,J),VTRSE(8,J), J=I,II,NSTEP)                  TPPPP   1196
                PRINT 112,(ATR(2,J),ATRE(2,J),   J=I,II,NSTEP)                  TPPPP   1197
                PRINT 113,(ATR(9,J),ATRE(9,J),J=I,II,NSTEP)                     TPPPP   1198
                PRINT 114,(ATR(5,J),ATRE(5,J),   J=I,II,NSTEP)                  TPPPP   1199
                PRINT 116,(RC(12,J),SEPR(12,J), J=I,II,NSTEP)                   TPPPP   1200
1235            PRINT 118,PRT3,(HMS(2,J),HMSE(2,J),   J=I,II,NSTEP)             TPPPP   1201
                PRINT 119,(HMS(8,J),HMSE(8,J),J=I,II,NSTEP)                     TPPPP   1202
                PRINT 115,(HMS(5,J),HMSE(5,J),J=I,II,NSTEP)                     TPPPP   1203
                PRINT 128,PRT4,(HYDR(J),HYDRE(J),J=I,II,NSTEP)                  TPPPP   1204
                PRINT 130                                                       TPPPP   1205
1240            PRINT 106,PRT1,(PAVG(J),PAVGE(J),          J=I,II,NSTEP)        TPPPP   1206
                PRINT 108,PRT2,(VTRS(6,J),VTRSE(6,J),J=I,II,NSTEP)              TPPPP   1207
                PRINT 109,(VTRS(3,J),VTRSE(3,J),J=I,II,NSTEP)                   TPPPP   1208
                PRINT 168,(VTRS(12,J),VTRSE(12,J),J=I,II,NSTEP)                 TPPPP   1209
                PRINT 110,(VTRS(9,J),VTRSE(9,J),J=I,II,NSTEP)                   TPPPP   1210
1245            PRINT 112,(ATR(3,J),ATRE(3,J),   J=I,II,NSTEP)                  TPPPP   1211
                PRINT 113,(ATR(10,J),ATRE(10,J),J=I,II,NSTEP)                   TPPPP   1212
                PRINT 114,(ATR(6,J),ATRE(6,J),   J=I,II,NSTEP)                  TPPPP   1213
                PRINT 116,(RC(12,J),SEPR(12,J), J=I,II,NSTEP)                   TPPPP   1214
                PRINT 118,PRT3,(HMS(3,J),HMSE(3,J),   J=I,II,NSTEP)             TPPPP   1215
1250            PRINT 119,(HMS(9,J),HMSE(9,J),J=I,II,NSTEP)                     TPPPP   1216
                PRINT 115,(HMS(6,J),HMSE(6,J),J=I,II,NSTEP)                     TPPPP   1217
                PRINT 128,PRT4,(HYDR(J),HYDRE(J),J=I,II,NSTEP)                  TPPPP   1218
                IF(II.EQ.ITS) GO TO 806                                         TPPPP   1219
                I=II+NSTEP                                                      TPPPP   1220
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      GO TO 804                                                          TPPPP  1221
  806 I=1                                                                TPPPP  1222
  808 II = I + 6 * NSTEP                                                 TPPPP  1223
      NPAGE=NPAGE+1                                                      TPPPP  1224
      IF(II.GT.ITS) II=ITS                                               TPPPP  1225
      PRINT 100,NTEST,DAT,TIM,AREA,NPAGE                                 TPPPP  1226
      PRINT 103,(TT(J),J=I,II,NSTEP)                                     TPPPP  1227
      PRINT 104                                                          TPPPP  1228
      PRINT 132,PRT1                                                     TPPPP  1229
      PRINT 134, (RC(28,J),SEPR(28,J),J=I,II,NSTEP)                      TPPPP  1230
      PRINT 138,PRT11,(RC(13,J),SEPR(13,J), J=I,II,NSTEP)                TPPPP  1231
      PRINT 140,(RC(14,J),SEPR(14,J), J=I,II,NSTEP)                      TPPPP  1232
      PRINT 151, PRI6,(PSMD(J),VSMDE(J),J=I,II,NSTEP)                    TPPPP  1233
      PRINT 152, (PDMD(J),VDMDE(J),J=I,II,NSTEP)                         TPPPP  1234
      PRINT 153, (PA(J),VPAE(J),J=I,II,NSTEP)                            TPPPP  1235
      PRINT 220,(VSMD1(J),VSMD1E(J),J=I,II,NSTEP)                        TPPPP  1236
      PRINT 152,(VDMD1(J),VDMD1E(J),J=I,II,NSTEP)                        TPPPP  1237
      PRINT 153,(VPA1(J),VPA1E(J),J=I,II,NSTEP)                          TPPPP  1238
      PRINT 154,(RC(15,J),SEPR(15,J),J=I,II,NSTEP)                       TPPPP  1239
      PRINT 155,(RC(16,J),SEPR(16,J),J=I,II,NSTEP)                       TPPPP  1240
      PRINT 156,(RC(17,J),SEPR(17,J),J=I,II,NSTEP)                       TPPPP  1241
      PRINT 153, (RSD(J),RSDE(J),J=I,II,NSTEP)                           TPPPP  1242
      PRINT 158,(RC(18,J),SEPR(18,J),J=I,II,NSTEP)                       TPPPP  1243
      PRINT 155,(RC(19,J),SEPR(19,J),J=I,II,NSTEP)                       TPPPP  1244
      PRINT 156,(RC(20,J),SEPR(20,J),J=I,II,NSTEP)                       TPPPP  1245
      PRINT 153, (RDD(J),RDDE(J),J=I,II,NSTEP)                           TPPPP  1246
      PRINT 160,(RC(34,J),SEPR(34,J),J=I,II,NSTEP)                       TPPPP  1247
      PRINT 155,(RC(35,J),SEPR(35,J),J=I,II,NSTEP)                       TPPPP  1248
      PRINT 156,(RC(36,J),SEPR(36,J),J=I,II,NSTEP)                       TPPPP  1249
      PRINT 153,(VAECL(J),VAECLE(J), J=I,II,NSTEP)                       TPPPP  1250
      PRINT 162,PRT8,PRT9,(FLUX(1,J),FLUXE(1,J), J=I,II,NSTEP)           TPPPP  1251
      PRINT 163,(FLUX(2,J),FLUXE(2,J),J=I,II,NSTEP)                      TPPPP  1252
      PRINT 164,(FLUX(3,J),FLUXE(3,J),J=I,II,NSTEP)                      TPPPP  1253
      PRINT 166,(FLUX(10,J),FLUXE(10,J),J=I,II,NSTEP)                    TPPPP  1254
      PRINT 163,(FLUX(11,J),FLUXE(11,J),J=I,II,NSTEP)                    TPPPP  1255
      PRINT 164,(FLUX(12,J),FLUXE(21,J),J=I,II,NSTEP)                    TPPPP  1256
      PRINT 165,(FLUX(4,J),FLUXE(4,J),J=I,II,NSTEP)                      TPPPP  1257
      PRINT 163,(FLUX(5,J),FLUXE(5,J),J=I,II,NSTEP)                      TPPPP  1258
      PRINT 164,(FLUX(6,J),FLUXE(6,J),J=I,II,NSTEP)                      TPPPP  1259
      PRINT 226,(FLUX(7,J),FLUXE(7,J),J=I,II,NSTEP)                      TPPPP  1260
      PRINT 163,(FLUX(8,J),FLUXE(8,J),J=I,II,NSTEP)                      TPPPP  1261
      PRINT 164,(FLUX(9,J),FLUXE(9,J),J=I,II,NSTEP)                      TPPPP  1262
      PRINT 1575,PRT10                                                   TPPPP  1263
      DO 1572 JI=1,6                                                     TPPPP  1264
      NF=KFP(JI)                                                         TPPPP  1265
      IF(JI.EQ.1) MF=40                                                  TPPPP  1266
      IF(JI.EQ.2) MF=40                                                  TPPPP  1267
      IF(JI.EQ.3) MF=23                                                  TPPPP  1268
      IF(JI.EQ.4) MF=40                                                  TPPPP  1269
      IF(JI.EQ.5)  MF=K                                                  TPPPP  1270
      IF(JI.EQ.6) MF=40                                                  TPPPP  1271
      PRINT 1580,ABG(2*NF-1),ABG(2*NF),(RC(MF,J),SEPR(MF,J),J=I,II,      TPPPP  1272
     INSTEP)                                                             TPPPP  1273
 1572 CONTINUE                                                           TPPPP  1274
      PRINT 124,PRT4,(RC(11,J),SEPR(11,J),J=I,II,NSTEP)                  TPPPP  1275
      PRINT 126,(FRCT(J),FRCTE(J),J=I,II,NSTEP)                          TPPPP  1276
      IF(II.EQ.ITS)      GO TO 762                                       TPPPP  1277
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                I=II+NSTEP                                                      TPPPP  1278
                GO TO 808                                                       TPPPP  1279
              762 IF(L.LT.2)     GO TO 7495                                     TPPPP  1280
1315           GO TO 1                                                          TPPPP  1281
             100  FORMAT(1H1,                                                   TPPPP  1282
                 11X*CE-EPRI TWO-PHASE PUMP PERFORMANCE TEST - TRANSIENT RUN*/  TPPPP  1283
                 22X*TEST NO.*,I4,6X*DATE *,A10,4X*TIME *,A10,4X*BLOWDOWN AREA *,  TPPPP  1284
                 3A10,37X*PAGE *,I3/)                                           TPPPP  1285
1320         102  FORMAT(                                                       TPPPP  1286
                 U2X*PUMP PERFORMANCE BASED ON SUCTION CONDITIONS*/             TPPPP  1287
                 2       2X*ELAPSED TIME (SEC)*,6X7(F7.3,9X))                  TPPPP  1288
             103  FORMAT(2X*ELAPSED TIME (SEC)*,6X7(F7.3,9X))                   TPPPP  1289
             104  FORMAT(23X7(16H VALUE   UNCTY  ))                             TPPPP  1290
1325         106  FORMAT(3X*PRESSURE *,A6,5X7(2F7.1,2X))                        TPPPP  1291
             108  FORMAT(3X*VOL FLOW *,A5/                                      TPPPP  1292
                 1         4X*DD(HI)-GAM DEN*,5X7(2F7.1,2X))                   TPPPP  1293
              109 FORMAT(4X*DD(LO)-GAM DEN*,5X7(2F7.1,2X))                      TPPPP  1294
              110  FORMAT(4X*TURBINE METER(LO)*,2X7(2F7.1,2X))                  TPPPP  1295
1330          168 FORMAT(4X*TURBINE METER(HI)*,2X7(2F7.1,2X))                   TPPPP  1296
             112  FORMAT(3X*VOID FRACTION     */                               TPPPP  1297
                 1         4X*DD(HI)-TUR MTR(HI) *,7(2F7.3,2X))                TPPPP  1298
              113 FORMAT(4X*DD(LO)-TUR MTR(LO) *,7(2F7.3,2X))                   TPPPP  1299
             114  FORMAT( 4X*GAMMA DEN         *,2X7(2F7.3,2X))                 TPPPP  1300
1335          115 FORMAT(4X*GAMMA DEN*10X7(2F7.0,2X))                           TPPPP  1301
             116  FORMAT(3X*PUMP SPEED (RPM)  *,2X7(2F7.1,2X))                  TPPPP  1302
             118  FORMAT(3X*PUMP HEAD *,A4/                                     TPPPP  1303
                 1         4X*DD(HI)-TUR MTR(HI) *,7(2F7.0,2X))                TPPPP  1304
              119 FORMAT(4X*DD(LO)-TUR MTR(LO) *,7(2F7.0,2X))                   TPPPP  1305
1340         122  FORMAT( 4XA3,*             *,2X7(2F7.1,2X))                   TPPPP  1306
              124 FORMAT( 3X*PUMP TORQUE *,A7/                                  TPPPP  1307
                 1         4X*SHAFT             *,2X7(2F7.1,2X))               TPPPP  1308
             126  FORMAT( 4X*FRICTION          *,2X7(2F7.1,2X))                 TPPPP  1309
              128 FORMAT(3X*PUMP TORQUE*,A7/                                    TPPPP  1310
1345             1         4X*HYDRAULIC TORQUE *2X7(2F7.1,2X))                  TPPPP  1311
             129  FORMAT(/                                                      TPPPP  1312
                 U2X*PUMP PERFORMANCE BASED ON DISCHARGE CONDITIONS*)           TPPPP  1313
             130  FORMAT(/                                                      TPPPP  1314
                 U2X*PUMP PERFORMANCE BASED ON SUCTION AND DISCHARGE AVERAGE*)  TPPPP  1315
1350          132 FORMAT(3X*LOOP PRESSURE *,A6)                                 TPPPP  1316
             134  FORMAT( 4X*BLOW DOWN ORIF    *,2X7(2F7.1,2X))                 TPPPP  1317
             136  FORMAT( 4X*HIGH PRES DRUM    *,2X7(2F7.1,2X))                 TPPPP  1318
             138  FORMAT(3X*LOOP TEMPERATURES *,A5/                             TPPPP  1319
                 1         4X*SUCTION           *,2X7(2F7.1,2X))               TPPPP  1320
1355          140  FORMAT( 4X*DISCHARGE         *2X7(2F7.1,2X))                TPPPP  1321
             142  FORMAT( 4X*PUMP INJ INLET    *,2X7(2F7.1,2X))                 TPPPP  1322
             144  FORMAT( 4X*PUMP INJ OUTLET   *,2X7(2F7.1,2X))                 TPPPP  1323
              1575 FORMAT(3X*LOOP PRESSURE DROP DATA, (*A3,*)*)                 TPPPP  1324
              1580 FORMAT(4x,A10,A10,7(F6.1,1X,F6.1,3X))                        TPPPP  1325
1360          151 FORMAT(3X*LOOP DENSITIES*,A9/                                 TPPPP  1326
                 1         4X*DD(HI)-TUR MTR(HI)*5X/                           TPPPP  1327
                 2          5X*SUCTION          *,2X7(2F7.4,2X))               TPPPP  1328
              152  FORMAT(  5X*DISCHARGE        *,2X7(2F7.4,2X))                TPPPP  1329
             153  FORMAT(  5X*AVERAGE          *,2X7(2F7.4,2X))                 TPPPP  1330
1365          220 FORMAT(4X*DD(LO)-TUR MTR(LO)*5X/                              TPPPP  1331
                 1       5X*SUCTION*10X7(2F7.4,2X))                           TPPPP  1332
             154  FORMAT(3X*GAMMA DENSITOMETER  */                              TPPPP  1333
                 1         4X*SUCTION            */                            TPPPP  1334
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             2         5X*BEAM1            *,2X7(2F7.4,2X))               TPPPP   1335
           155  FORMAT(  5X*BEAM2            *,2X7(2F7.4,2X))               TPPPP   1336
           156  FORMAT(  5X*BEAM3            *,2X7(2F7.4,2X))               TPPPP   1337
            158 FORMAT( 4X*DISCHARGE          */                            TPPPP   1338
             1         5X*BEAM1            *,2X7(2F7.4,2X))               TPPPP   1339
            160 FORMAT(4X*SUCTION (AECL)    */                            TPPPP   1340
             1         5X*BEAM1            *,2X7(2F7.4,2X))               TPPPP   1341
           162  FORMAT(3X*MOMENTUM FLUX *,A10,A3/                         TPPPP   1342
             1        4X*TUR MTR(LO)-GAM DEN*/                            TPPPP   1343
             2         5X*SUCTION          *,2X7(2F7.0,2X))               TPPPP   1344
            163 FORMAT(  5X*DISCHARGE        *,2X7(2F7.0,2X))               TPPPP   1345
             165 FORMAT(4X*DRAG DISK (HI)   */                            TPPPP   1346
             1         5X*SUCTION          *,2X7(2F7.0,2X))               TPPPP   1347
             164 FORMAT(5X*AVERAGE*,11X7(2F7.0,2X))                       TPPPP   1348
             226 FORMAT(4X*DRAG DISK (LO)   */                            TPPPP   1349
             1        5X*SUCTION *10X7(2F7.0,2X))                         TPPPP   1350
             166 FORMAT(4X*TUR MTR(HI)-GAM DEN*/                          TPPPP   1351
             1        5X*SUCTION          *,2X7(2F7.0,2X))                TPPPP   1352
               END                                                        TPPPP   1353
```

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CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

    45      I      TT        DATA VARIABLE LIST EXCEEDS ITEM LIST. EXCESS VARIABLES NOT INITIALIZED.
   986      I      900       THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.
  1320      I      49CD1322  TOTAL RECORD LENGTH IS GREATER THAN 137 CHARACTERS.  IT MAY EXCEED THE I/O DEVICE CAPACITY.
  1323      I      49CD1323  TOTAL RECORD LENGTH IS GREATER THAN 137 CHARACTERS.  IT MAY EXCEED THE I/O DEVICE CAPACITY.
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       SYMBOLIC REFERENCE MAP (R=2)

 ENTRY POINTS      DEF LINE      REFERENCES
   761  TPPPP          1

 VARIABLES      SN  TYPE           RELOCATION
 75547  ABG         REAL       ARRAY                     REFS        36   2*1306  DEFINED       47       48       49       50
                                                           51        52       53       54       55       56       57       58
                                                           59        60       61       62       63       64       65       66
                                                           67        68
 72601  ACEL        REAL       ARRAY                     REFS        33      345     1108  DEFINED      338      341      343
 14375  AREA        REAL                                 REFS       117     1209     1260
 72460  ATR         REAL       ARRAY    LCMC             REFS         8       18       37      514      515      516      518
                                                          521       522      523      527      529      530      537      538
                                                          539       547      548      549      577      578      579      583
                                                          584       585      589      590      591    2*594    2*595      596
                                                          597       615      616      637      638     1043     1045     1048
                                                         1217      1218     1219     1231     1232     1233     1245     1246
                                                         1247   DEFINED      511      512      514      515      520      521
                                                          522       526      529      530      532      536      537      538
                                                          542       546      547      548      552      576      577      578
                                                          582       583      584      588      589      590      595      596
                                                          597       608      609      610      611      612      613      615
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VARIABLES	SN	TYPE	RELOCATION								
					616	633	634	635	637	638		
105564	ATRE	REAL	ARRAY	LCMC	REFS	8	18	37	2*598	1217	1218	1219
					1231	1232	1233	1245	1246	1247		
					DEFINED	516	518	523	527	533	539	543
					549	553	579	581	585	587	591	593
					598							
113	C	REAL	ARRAY	/ /	REFS	6	2*148	2*150	2*151	4*161	4*165	6*181
					194	195	196	197	2*198	4*206	213	3*215
					4*227	2*235	244	249	1082	1083	1084	1085
					1087	1091	1095	1096	1097	1098	1099	1100
					1101	1102	1103	1104	1105	1106	1107	1108
					1109	1110	1111	1112	1113	1114	1115	1116
					1117	1118	1119	1120	1121	1122	1123	1124
					1125	1126	1127	1128	DEFINED	113	219	970
14415	CK	REAL			REFS	193	DEFINED	189	190	191	192	
14421	D	REAL			REFS	364	DEFINED	353				
14372	DAT	REAL			REFS	117	1209	1260				
65151	DATA	REAL	ARRAY		REFS	30	117					
42766	DDZ	REAL	ARRAY		REFS	17	198	DEFINED	194	195	196	197
14420	DELT	REAL			REFS	338	341	347	2*948	2*953		
					DEFINED	337	340					
0	DESIG	REAL	ARRAY	/ /	REFS	6	1082	1083	1084	1085	1087	1091
					1095	1096	1097	1098	1099	1100	1101	1102
					1103	1104	1105	1106	1107	1108	1109	1110
					1111	1112	1113	1114	1115	1116	1117	1118
					1119	1120	1121	1122	1123	1124	1125	1126
					1127	1128	DEFINED	78				
14416	DIFF	REAL			REFS	214	DEFINED	213				
14422	DO	REAL			REFS	364	371	DEFINED	354			
14444	DP	REAL			REFS	371	DEFINED	367				
14402	EI	REAL			REFS	137	145	146	DEFINED	136		
14404	EL	REAL			REFS	141	144	145	146	DEFINED	139	141
					144							
55427	EPRN	REAL	ARRAY		REFS	23	965	1097	DEFINED	718		
56103	EPRT	REAL	ARRAY		REFS	23	1098	DEFINED	719			
14630	ETIME	* REAL			REFS	1136						
65123	ETM1	REAL	ARRAY		REFS	26	1138	DEFINED	39			
65145	ETM10	REAL	ARRAY		REFS	27	1147	DEFINED	44			
65147	ETM11	REAL	ARRAY		REFS	27	1148	DEFINED	46			
65125	ETM2	REAL	ARRAY		REFS	26	1139	DEFINED	39			
65127	ETM3	REAL	ARRAY		REFS	26	1140	DEFINED	40			
65131	ETM4	REAL	ARRAY		REFS	26	1141	DEFINED	40			
65133	ETM5	REAL	ARRAY		REFS	26	1142	DEFINED	41			
65135	ETM6	REAL	ARRAY		REFS	26	1143	DEFINED	41			
65137	ETM7	REAL	ARRAY		REFS	26	1144	DEFINED	42			
65141	ETM8	REAL	ARRAY		REFS	27	1145	DEFINED	43			
65143	ETM9	REAL	ARRAY		REFS	27	1146	DEFINED	43	46		
14450	E1	REAL			REFS	373	DEFINED	371				
14451	E2	REAL			REFS	373	DEFINED	372				
14443	FA	* REAL			REFS	364						
63440	FLUX	REAL	ARRAY	LCMC	REFS	8	28	37	850	856	862	868
					874	880	1012	1013	1027	1030	1032	1033
					1184	1285	1286	1287	1288	1289	1290	1291
					1292	1293	1294	1295	1296	DEFINED	843	844
					845	846	847	848	886	887	889	890
					891	893	1184					
54420	FLUXE	REAL	ARRAY	LCMC	REFS	8	28	37	1185	1285	1286	1287

VARIABLES	SN	TYPE		RELOCATION								
					1288	1289	1290	1291	1292	1293	1294	1295
					1296	DEFINED	850	853	856	859	862	865
					868	871	874	877	880	883	895	896
					898	899	900	902	1185			
62643	FRCT	REAL	ARRAY		REFS	25	331	332	345	720	982	1125
					1197	1310	DEFINED	329	331	332	1022	1130
					1197							
63317	FRCTE	REAL	ARRAY		REFS	25	334	347	350	982	1126	1310
					DEFINED	333	334	1023	1130			
56557	FRCTN	REAL	ARRAY		REFS	23	1109	DEFINED	720			
14601	HDND	REAL			REFS	716	DEFINED	715				
14577	HDNS	REAL			REFS	712	715	DEFINED	711			
14526	HFAV	* REAL			REFS	409						
14533	HFAV1	* REAL			REFS	410						
14465	HFPD	* REAL			REFS	384						
14477	HFPD1	* REAL			REFS	386						
14460	HFPS	* REAL			REFS	383						
14571	HFPSF	* REAL			REFS	630						
14472	HFPS1	* REAL			REFS	385						
14530	HGAV	* REAL			REFS	409						
14535	HGAV1	* REAL			REFS	410						
14467	HGPD	* REAL			REFS	384						
14501	HGPD1	* REAL			REFS	386						
14462	HGPS	* REAL			REFS	383						
14573	HGPSF	* REAL			REFS	630						
14474	HGPS1	* REAL			REFS	385						
14453	HIJ	* REAL			REFS	374						
14455	HIJG	* REAL			REFS	374						
44603	HMS	REAL	ARRAY		REFS	21	664	670	676	683	690	697
					723	726	729	1180	1221	1222	1223	1235
					1236	1237	1249	1250	1251	DEFINED	649	651
					654	656	659	661	682	686	689	693
					696	699	704	706	708	1180		
117064	HMSE	REAL	ARRAY	LCMC	REFS	8	21	37	1181	1221	1222	1223
					1235	1236	1237	1249	1250	1251		
					DEFINED	664	667	670	673	676	679	683
					687	690	694	697	700	723	726	729
					1181							
14600	HUPD	REAL			REFS	716	DEFINED	714				
14576	HUPS	REAL			REFS	712	714	DEFINED	710			
63773	HYDR	REAL	ARRAY		REFS	25	721	982	1127	1198	1224	1238
					1252	DEFINED	345	1024	1130	1198		
64447	HYDRE	REAL	ARRAY		REFS	25	982	1128	1224	1238	1252	
					DEFINED	347	350	1025	1130			
57233	HYDRN	REAL	ARRAY		REFS	23	1099	DEFINED	721			
14355	I	INTEGER			REFS	78	88	89	90	91	92	93
					94	95	96	97	99	100	101	102
					103	104	105	113	131	155	158	172
					178	187	194	195	196	197	198	202
					205	210	223	226	231	234	240	243
					958	970	2*979	2*991	2*992	1155	1160	1164
					1168	1172	2*1176	2*1177	2*1180	2*1181	2*1184	2*1185
					2*1200	2*1202	1206	1210	1212	1213	1214	1215
					1216	1217	1218	1219	1220	1221	1222	1223
					1224	1226	1227	1228	1229	1230	1231	1232
					1233	1234	1235	1236	1237	1238	1240	1241
					1242	1243	1244	1245	1246	1247	1248	1249

VARIABLES	SN	TYPE	RELOCATION							
				1250	1251	1252	1257	1261	1264	1265	1266
				1267	1268	1269	1270	1271	1272	1273	1274
				1275	1276	1277	1278	1279	1280	1281	1282
				1283	1284	1285	1286	1287	1288	1289	1290
				1291	1292	1293	1294	1295	1296	1306	1309
				1310	DEFINED	78	88	89	90	91	92
				93	94	95	96	97	99	100	101
				102	103	104	105	112	130	154	171
				186	201	209	222	230	239	957	969
				978	990	1154	1159	1163	1167	1171	1175
				1179	1183	1199	1201	1205	1254	1256	1312
14605	IDEND	INTEGER		REFS	776	DEFINED	738	749			
14602	IDENS	INTEGER		REFS	774	DEFINED	735	746			
14545	IDT	INTEGER		REFS	457	458	3*462	750	2*751	764	2*779
				2*791	887	888	889	896	897	898	
				DEFINED	418						
14603	IHD	INTEGER		REFS	778	DEFINED	736	752			
14604	IHEAD	INTEGER		REFS	772	DEFINED	737	743			
14400	II	INTEGER		REFS	123	137	142	144	2*146	2*148	2*149
				2*150	2*151	161	2*162	163	165	2*166	2*167
				2*168	3*181	194	195	196	197	198	206
				215	217	219	227	235	2*236	244	248
				1208	1210	1212	1213	1214	1215	1216	1217
				1218	1219	1220	1221	1222	1223	1224	1226
				1227	1228	1229	1230	1231	1232	1233	1234
				1235	1236	1237	1238	1240	1241	1242	1243
				1244	1245	1246	1247	1248	1249	1250	1251
				1252	1253	1254	1259	1261	1264	1265	1266
				1267	1268	1269	1270	1271	1272	1273	1274
				1275	1276	1277	1278	1279	1280	1281	1282
				1283	1284	1285	1286	1287	1288	1289	1290
				1291	1292	1293	1294	1295	1296	1306	1309
				1310	1311	1312	DEFINED	122	1206	1208	1257
				1259							
14417	IJ	INTEGER		REFS	2*248	2*249	DEFINED	247			
14606	IJEAD	INTEGER		REFS	780	DEFINED	739	755			
14565	IK	INTEGER		REFS	2*514	2*515	2*601	2*615	2*616	2*637	2*638
				DEFINED	513	600	614	636			
14607	ILEAD	INTEGER		REFS	782	DEFINED	740	758			
30223	IPA	INTEGER	/ /	REFS	7	80	81	84	85	335	336
				945	946	DEFINED	75	80			
30224	IPB	INTEGER	/ /	REFS	7	986	DEFINED	84	I/O REFS	985	
30225	IPC	INTEGER	/ /	REFS	7	DEFINED	85				
14356	IPO	INTEGER		REFS	82	DEFINED	81				
11745	ITS	INTEGER		REFS	117	120	964	972	978	985	988
				989	991	992	993	1051	1052	1053	1054
				1055	1056	1057	1058	1059	1060	1061	1062
				1063	1064	1065	1066	1067	1068	1069	1070
				1071	1072	1073	1074	1075	1076	1077	1078
				1079	1080	1081	1082	1083	1084	1085	1086
				1087	1088	1089	1090	1091	1092	1093	1094
				1095	1096	1097	1098	1099	1100	1101	1102
				1103	1104	1105	1106	1107	1108	1109	1110
				1111	1112	1113	1114	1115	1116	1117	1118
				1119	1120	1121	1122	1123	1124	1125	1126
				1127	1128	1152	2*1208	1253	2*1259	1311	
				DEFINED	70						

VARIABLES	SN	TYPE	RELOCATION							
14371	J	INTEGER		REFS	113	5*948	5*953	2*965	2*1156	2*1161	2*1165
				2*1169	2*1173	2*1176	2*1177	2*1180	2*1181	2*1184	2*1185
				2*1187	2*1188	2*1189	2*1190	2*1191	2*1192	2*1193	2*1194
				2*1195	2*1197	2*1198	2*1200	2*1202	1210	2*1212	2*1213
				2*1214	2*1215	2*1216	2*1217	2*1218	2*1219	2*1220	2*1221
				2*1222	2*1223	2*1224	2*1226	2*1227	2*1228	2*1229	2*1230
				2*1231	2*1232	2*1233	2*1234	2*1235	2*1236	2*1237	2*1238
				2*1240	2*1241	2*1242	2*1243	2*1244	2*1245	2*1246	2*1247
				2*1248	2*1249	2*1250	2*1251	2*1252	1261	2*1264	2*1265
				2*1266	2*1267	2*1268	2*1269	2*1270	2*1271	2*1272	2*1273
				2*1274	2*1275	2*1276	2*1277	2*1278	2*1279	2*1280	2*1281
				2*1282	2*1283	2*1284	2*1285	2*1286	2*1287	2*1288	2*1289
				2*1290	2*1291	2*1292	2*1293	2*1294	2*1295	2*1296	2*1306
				2*1309	2*1310	DEFINED	113	123	947	952	964
				1152	1210	1212	1213	1214	1215	1216	1217
				1218	1219	1220	1221	1222	1223	1224	1226
				1227	1228	1229	1230	1231	1232	1233	1234
				1235	1236	1237	1238	1240	1241	1242	1243
				1244	1245	1246	1247	1248	1249	1250	1251
				1252	1261	1264	1265	1266	1267	1268	1269
				1270	1271	1272	1273	1274	1275	1276	1277
				1278	1279	1280	1281	1282	1283	1284	1285
				1286	1287	1288	1289	1290	1291	1292	1293
				1294	1295	1296	1306	1309	1310		
14405	JA	INTEGER		REFS	141	DEFINED	140				
14546	JDT	INTEGER		REFS	441	442	446	753	2*754	762	2*781
				797	2*798	890	892	893	899	901	902
				DEFINED	419						
14646	JI	INTEGER		REFS	1299	1300	1301	1302	1303	1304	1305
				DEFINED	1298						
14616	JK	INTEGER		REFS	2*994	2*995	2*996	2*997	2*998	2*999	2*1000
				2*1001	2*1002	2*1003	2*1004	2*1005	2*1006	2*1007	2*1008
				2*1009	2*1010	2*1011	2*1012	2*1013	2*1014	2*1015	2*1016
				2*1017	2*1018	2*1019	2*1020	2*1021	2*1022	2*1023	2*1024
				2*1025	2*1027	2*1030	2*1032	2*1033	2*1035	2*1038	2*1041
				2*1043	2*1045	2*1048	DEFINED	993			
14617	JM	INTEGER		REFS	2*1027	DEFINED	1026				
14401	K	INTEGER		REFS	132	2*133	134	135	136	137	142
				144	2*146	5*148	2*149	3*150	3*151	156	2*157
				2*158	8*161	2*162	163	8*165	2*166	2*167	2*168
				173	2*174	2*175	2*177	2*178	2*179	180	8*181
				188	189	190	191	192	2*193	2*194	2*195
				2*196	2*197	4*198	203	2*204	2*205	7*206	211
				2*212	2*213	5*215	217	2*219	224	2*225	2*226
				8*227	232	2*233	2*234	4*235	2*236	241	2*242
				2*243	3*244	649	654	659	2*664	2*670	2*676
				682	2*683	689	2*690	696	2*697	704	706
				708	2*723	2*726	2*729	2*1094	1304		
				DEFINED	131	155	172	187	202	210	223
				231	240	643	645				
42405	KCA	INTEGER	ARRAY	REFS	14	131	256	257	258	259	260
				293	294	295	296	297	1155		
				DEFINED	88						
42474	KDD	INTEGER	ARRAY	REFS	15	187	189	190	191	192	194
				195	196	197	252	253	254	255	289
				290	291	292	DEFINED	92			
42440	KDP	INTEGER	ARRAY	REFS	14	172	2*174	2*179	180	266	267

VARIABLES	SN	TYPE	RELOCATION
14544	KDT	INTEGER	
75575	KFP	INTEGER	ARRAY
42463	KGD	INTEGER	ARRAY
14644	KI	INTEGER	
14376	KK	INTEGER	

268	269	270	271	303	304	305	306
307	308	640	641	1164	DEFINED	90	
REFS	425	426	3*430	446	741	2*742	761
2*773	785	2*786	886	888	889	895	897
898	DEFINED	417					
REFS	36	1299	DEFINED	97			
REFS	14	210	278	279	280	281	282
283	284	285	286	315	316	317	318
319	320	321	322	323	1168		
DEFINED	95						
REFS	2*1156	2*1161	2*1165	2*1169	2*1173		
DEFINED	1155	1160	1164	1168	1172		
REFS	121	2*124	2*133	134	135	136	148
2*157	2*158	3*161	3*165	2*175	2*177	2*178	181
2*193	198	2*204	2*205	2*206	2*212	213	215
2*225	2*226	3*227	2*233	2*234	235	2*242	2*243
244	252	253	254	255	256	257	258
259	260	261	262	263	264	265	266
267	268	269	270	271	272	273	274
275	276	277	278	279	280	281	282
283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298
299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314
315	316	317	318	319	320	321	322
323	324	325	3*326	3*327	5*329	2*331	3*332
333	2*334	335	336	2*337	3*338	343	4*345
346	4*347	3*350	361	362	2*364	2*366	367
2*373	2*375	2*376	3*377	378	2*381	2*382	383
384	385	386	395	397	398	399	400
405	406	2*408	409	410	415	416	2*425
3*426	2*427	2*428	2*429	6*430	432	433	434
436	437	439	2*441	2*442	445	4*446	450
453	455	2*457	3*458	2*459	2*460	2*461	6*462
464	465	466	468	469	471	2*473	2*474
477	4*478	482	485	487	2*489	3*490	2*491
493	495	496	498	502	504	507	509
2*511	2*512	2*514	2*515	2*516	2*518	2*520	2*521
2*522	2*523	526	2*527	2*529	2*530	532	533
536	2*537	2*538	2*539	542	543	546	2*547
2*548	2*549	552	553	2*556	2*557	2*558	2*559
2*560	2*561	562	2*563	2*564	4*565	566	2*567
2*568	4*569	2*570	3*571	3*572	2*573	4*574	2*576
2*577	2*578	3*579	2*581	2*582	2*583	2*584	3*585
2*587	2*588	2*589	2*590	3*591	3*593	2*594	3*595
2*596	2*597	3*598	2*601	2*602	2*603	2*604	2*605
2*606	2*607	2*608	2*609	2*610	2*611	2*612	2*613
2*615	2*616	2*617	2*618	2*619	2*620	2*621	2*622
2*623	2*624	3*628	2*629	630	2*633	2*634	2*635
2*637	2*638	2*642	648	3*649	651	653	3*654
656	658	3*659	661	663	5*664	667	669
5*670	673	675	5*676	679	2*682	4*683	686
687	2*689	4*690	693	694	2*696	4*697	699
700	703	3*704	705	3*706	707	3*708	2*710
2*711	712	2*713	714	715	716	2*717	2*718
2*719	2*720	2*721	722	6*723	725	6*726	728
6*729	741	2*742	744	2*745	747	2*748	750

VARIABLES	SN	TYPE	RELOCATION	
				2*751 753 2*754 756 2*757 760 3*761 3*762
				763 3*764 3*765 2*766 3*767 3*768 2*771 2*773
				2*775 2*777 2*779 2*781 2*783 2*785 6*786 789
				6*791 794 3*796 2*797 6*798 801 2*802 6*803
				806 2*807 3*808 810 2*813 2*814 2*815 2*816
				3*817 3*818 2*819 2*820 3*821 2*822 2*823 3*824
				2*826 2*829 2*830 2*831 2*836 2*837 2*838 3*843
				3*844 2*845 3*846 3*847 2*848 2*849 6*850 853
				2*855 6*856 859 861 3*862 865 2*867 6*868
				871 2*873 6*874 877 879 3*880 883 2*886
				2*887 2*888 3*889 2*890 2*891 2*892 3*893 2*895
				2*896 2*897 3*898 2*899 2*900 2*901 3*902 907
				3*908 910 912 3*913 915 3*917 3*918 919
				3*920 922 924 3*925 927 3*929 3*930 3*931
				3*932 3*933 3*934 945 946 5*948 958
				DEFINED 120
14610	KKK	INTEGER		REFS 2*771 2*826 DEFINED 770 825
42773	KMF	INTEGER	ARRAY	REFS 17 240 287 324 DEFINED 96
42425	KP	INTEGER	ARRAY	REFS 14 155 179 180 261 262 263
				264 265 298 299 300 301 302 1160
				DEFINED 89
42506	KSM	INTEGER	ARRAY	REFS 15 223 277 314 DEFINED 94
42501	KT	INTEGER	ARRAY	REFS 15 202 273 274 275 276 310
				311 312 313 DEFINED 93
42461	KTM	INTEGER	ARRAY	REFS 14 231 272 309 1172
				DEFINED 91
14626	L	INTEGER		REFS 1137 1138 1139 1140 1141 1142 1143
				1144 1145 1146 1147 1148 1149 1314
				DEFINED 1135 1137
14547	LDT	INTEGER		REFS 473 474 2*478 756 2*757 765 2*783
				802 2*803 891 892 893 900 901 902
				DEFINED 420
14414	M	INTEGER		REFS 2*181 DEFINED 179 180 185
14624	MD	INTEGER		REFS 2*1045 DEFINED 1044
14550	MDT	INTEGER		REFS 441 442 2*446 714 813 819 829
				830 831 843 849 2*850 918
				DEFINED 421
14552	MDT1	INTEGER		REFS 425 426 3*430 814 822 836 837
				838 846 867 2*868 917 DEFINED 423
14625	ME	INTEGER		REFS 2*1048 DEFINED 1047
14650	MF	INTEGER		REFS 2*1306 DEFINED 1300 1301 1302 1303 1304
				1305
14651	MFR	REAL	ARRAY	REFS 10 19 2*931 2*932 2*933 2*934 3*948
				2*953 992 994 995 996 997 998 999
				1000 1001 1018 1019 1020 1021
				DEFINED 908 910 913 915 917 918 920
				922 925 927 929 930 931 932 933
				934
23671	MI	REAL	ARRAY	REFS 10 19 948 991 1002 1003 1004
				1005 1006 1007 1008 1009 1022 1023 1024
				1025 DEFINED 948 953 958
14620	N	INTEGER		REFS 2*1030 DEFINED 1029
14363	NDD	INTEGER		REFS 92 102 186 DEFINED 92
14361	NDP	INTEGER		REFS 90 100 171 1163 DEFINED 90
14551	NDT	INTEGER		REFS 473 474 2*478 715 815 820 829
				830 831 844 855 2*856 930
				DEFINED 422

VARIABLES	SN	TYPE	RELOCATION							
14553	NDT1	INTEGER		REFS	457	458	3*462	816	823	836	837
				838	847	873	2*874	929	DEFINED	424	
14647	NF	INTEGER		REFS	2*1306	DEFINED	1299				
14366	NGD	INTEGER		REFS	95	209	1167	DEFINED	95		
14370	NI	INTEGER		REFS	112	247	DEFINED	111			
14623	NJ	INTEGER		REFS	2*1041	DEFINED	1040				
14621	NM	INTEGER		REFS	2*1035	DEFINED	1034				
14367	NMF	INTEGER		REFS	96	105	239	DEFINED	96		
14622	NN	INTEGER		REFS	2*1038	DEFINED	1037				
14360	NP	INTEGER		REFS	89	99	154	1159	DEFINED	89	
14627	NPAGE	INTEGER		REFS	1207	1209	1258	1260	DEFINED	1135	1207
				1258							
14365	NSM	INTEGER		REFS	94	104	222	DEFINED	94		
11746	NSTEP	INTEGER		REFS	117	1206	1210	1212	1213	1214	1215
				1216	1217	1218	1219	1220	1221	1222	1223
				1224	1226	1227	1228	1229	1230	1231	1232
				1233	1234	1235	1236	1237	1238	1240	1241
				1242	1243	1244	1245	1246	1247	1248	1249
				1250	1251	1252	1254	1257	1261	1264	1265
				1266	1267	1268	1269	1270	1271	1272	1273
				1274	1275	1276	1277	1278	1279	1280	1281
				1282	1283	1284	1285	1286	1287	1288	1289
				1290	1291	1292	1293	1294	1295	1296	1306
				1309	1310	1312	DEFINED	70			
14364	NT	INTEGER		REFS	93	103	201	DEFINED	93		
14357	NTCA	INTEGER		REFS	88	130	1154	DEFINED	88		
14373	NTEST	INTEGER		REFS	117	938	939	940	941	942	943
				944	971	1209	1260				
14362	NTM	INTEGER		REFS	91	101	230	1171	DEFINED	91	
41255	PA	REAL	ARRAY	REFS	13	491	520	658	659	675	676
				982	1103	1269	DEFINED	490	495	1007	1130
42703	PAC	REAL	ARRAY	REFS	15	141	DEFINED	127			
14562	PAE	REAL		REFS	493	523	676	DEFINED	492	497	
32711	PAVG	REAL	ARRAY	REFS	11	2*329	408	409	410	982	1100
				1240	DEFINED	326	408	1002	1130		
57707	PAVGE	REAL	ARRAY	REFS	24	415	416	982	1120	1240	
				DEFINED	327	1017	1130				
14563	PA1	REAL		REFS	502	546	695	696	697		
				DEFINED	501	506					
14564	PA1E	REAL		REFS	504	549	697	DEFINED	503	508	
34515	PDA	REAL	ARRAY	REFS	11	573	574	588	707	708	728
				729	845	848	861	862	879	880	982
				1085	DEFINED	571	999	1130			
62167	PDAE	REAL	ARRAY	REFS	25	574	591	729	982	1124	
				DEFINED	572	1021	1130				
34041	PDMD	REAL	ARRAY	REFS	11	459	460	461	464	465	489
				490	512	653	654	669	670	982	1110
				1268	DEFINED	458	459	460	468	1004	1130
14557	PDMDE	REAL		REFS	466	492	518	670	DEFINED	462	464
				465	470						
14560	PDMD1	REAL		REFS	475	476	477	478	480	481	500
				501	535	536	545	688	689	690	
				DEFINED	474	475	476	484			
14561	PDMD1E	REAL		REFS	482	503	539	690	DEFINED	478	480
				481	486						
43453	PHD	REAL	ARRAY	REFS	18	717	1096	DEFINED	716	717	
42777	PHS	REAL	ARRAY	REFS	18	713	1095	DEFINED	712	713	

VARIABLES		SN	TYPE	RELOCATION								
73731	PLOT		REAL	ARRAY	REFS	35	340	341	2*953	2*985		
					DEFINED	971	972	973	974	975	976	977
					979	988	989	991	992			
42510	PR		REAL	ARRAY	REFS	15	142	144	146	148	149	150
					151	162	163	166	167	168	2*181	194
					195	196	197	219	236	248		
					DEFINED	137	146	148	149	150	151	161
					162	165	166	167	168	181	198	206
					215	217	227	235	236	244		
14645	PRI6	*	REAL	*UNDEF	REFS	1267						
14631	PRT1		REAL		REFS	1212	1226	1240	1263	DEFINED	1138	
14642	PRT10		REAL		REFS	1297	DEFINED	1147				
14643	PRT11		REAL		REFS	1265	DEFINED	1148				
14632	PRT2		REAL		REFS	1213	1227	1241	DEFINED	1139		
14633	PRT3		REAL		REFS	1221	1235	1249	DEFINED	1140		
14634	PRT4		REAL		REFS	1224	1238	1252	1309	DEFINED	1141	
14635	PRT5	*	REAL		DEFINED	1142						
14636	PRT6	*	REAL		DEFINED	1143						
14637	PRT7	*	REAL		DEFINED	1144						
14640	PRT8		REAL		REFS	1285	DEFINED	1145				
14641	PRT9		REAL		REFS	1285	DEFINED	1146				
33365	PSMD		REAL	ARRAY	REFS	11	427	428	429	432	433	489
					490	511	648	649	663	664	982	1101
					1267	DEFINED	426	427	428	436	1003	1130
14554	PSMDE		REAL		REFS	434	492	516	664	DEFINED	430	432
					433	438						
14555	PSMD1		REAL		REFS	443	444	445	446	448	449	500
					501	525	526	545	681	682	683	
					DEFINED	442	443	444	452			
14556	PSMD1E		REAL		REFS	450	503	527	683	DEFINED	446	448
					449	454						
44127	PSUCTF		REAL	ARRAY	REFS	18	629	630	DEFINED	628	629	
663	RC		REAL	ARRAY / /	REFS	6	117	133	134	135	136	148
					157	158	3*161	3*165	175	177	178	181
					193	198	204	205	2*206	212	213	215
					225	226	3*227	233	234	235	242	243
					244	2*326	2*329	332	2*338	341	345	364
					367	375	381	382	383	384	385	386
					395	2*425	2*426	4*430	2*441	2*442	2*446	2*457
					2*458	4*462	2*473	2*474	2*478	556	557	558
					559	601	602	603	604	605	606	607
					608	609	610	611	612	613	617	618
					619	621	622	623	624	2*628	633	634
					635	2*642	649	654	659	664	670	676
					682	683	689	690	696	697	704	706
					708	2*710	2*711	714	715	718	719	723
					726	729	741	742	750	751	753	754
					756	757	761	762	764	765	773	779
					781	783	785	786	791	797	798	802
					803	813	814	815	816	2*829	2*830	2*836
					2*837	843	844	846	847	849	850	855
					856	867	868	873	874	886	887	2*888
					2*889	890	891	2*892	2*893	2*897	2*901	907
					2*908	912	2*913	2*917	2*918	919	2*920	924
					2*925	2*929	2*930	965	982	989	1156	1161
					1165	1169	1173	1200	1202	1212	1220	1226
					1234	1248	1264	1265	1266	1273	1274	1275

VARIABLES	SN	TYPE	RELOCATION							
				1277	1278	1279	1281	1282	1283	1306	1309
				DEFINED	133	157	158	175	177	178	193
				204	205	212	225	226	233	234	242
				243	252	253	254	255	256	257	258
				259	260	261	262	263	264	265	266
				267	268	269	270	271	272	273	274
				275	276	277	278	279	280	281	282
				283	284	285	286	287	288	381	382
				556	558	601	617	621	622	742	751
				754	757	773	779	781	783	1010	1011
				1027	1030	1032	1033	1035	1038	1041	1043
				1045	1048	1130	1156	1161	1165	1169	1173
				1200	1202						
14543	RDAE	REAL		REFS	523	549	591	862	880		
				DEFINED	416						
35645	RDD	REAL	ARRAY	REFS	12	561	566	568	569	570	571
				582	587	593	705	706	725	726	747
				748	763	764	765	766	777	791	802
				803	844	847	855	856	873	874	982
				1084	1280	DEFINED	559	748	777	998	1130
61037	RDDE	REAL	ARRAY	REFS	24	569	572	585	726	791	803
				856	874	982	1122	1280	DEFINED	567	568
				1019	1130						
14523	RDPE	REAL		REFS	518	539	585	DEFINED	406		
14522	RDSE	REAL		REFS	516	527	579	DEFINED	405		
14566	RFDSE	* REAL	*UNDEF	REFS	527						
14536	RFPA	REAL		REFS	416	2*520	523	2*546	549	2*588	591
				DEFINED	411						
14542	RFPAE	REAL		REFS	523	549	591	DEFINED	415		
14537	RFPA1	REAL		REFS	416	DEFINED	412				
14506	RFPD	REAL		REFS	395	403	406	2*460	465	2*476	481
				2*512	518	2*536	539	2*582	585	611	612
				2*613	DEFINED	391					
14520	RFPDE	REAL		REFS	465	481	518	539	585		
				DEFINED	403						
14511	RFPD1	REAL		REFS	406	DEFINED	394				
14502	RFPS	REAL		REFS	395	401	405	2*428	433	2*444	449
				2*511	516	2*526	527	2*576	579	2*608	2*609
				2*610	611	612	DEFINED	387			
14516	RFPSE	REAL		REFS	433	449	516	579	DEFINED	401	
14574	RFPSF	REAL		REFS	2*633	2*634	2*635	DEFINED	631		
14503	RFPS1	REAL		REFS	405	DEFINED	388				
14540	RGPA	REAL		REFS	416	520	523	546	549	588	591
				DEFINED	413						
14541	RGPA1	REAL		REFS	416	DEFINED	414				
14510	RGPD	REAL		REFS	395	404	406	2*459	464	2*475	480
				512	518	536	539	568	582	585	605
				606	607	613	DEFINED	393			
14521	RGPDE	REAL		REFS	464	480	568	605	606	607	
				DEFINED	404						
14507	RGPD1	REAL		REFS	406	DEFINED	392				
14504	RGPS	REAL		REFS	395	402	405	2*427	432	2*443	448
				511	516	526	527	564	576	579	602
				603	604	608	609	610	611	612	618
				623	624	DEFINED	389				
14517	RGPSE	REAL		REFS	432	448	564	602	603	604	618
				623	624	DEFINED	402				

VARIABLES		SN	TYPE		RELOCATION							
14575	RGPSF		REAL			REFS	633	634	635	DEFINED	632	
14505	RGPS1		REAL			REFS	405	DEFINED	390			
35171	RSD		REAL	ARRAY		REFS	11	560	562	564	565	570	571
							576	581	593	703	704	722	723	744
							745	760	761	762	766	775	785	786
							797	798	843	846	849	850	867	868
							982	1105	1276	DEFINED	557	745	775	997
							1130							
61513	RSDE		REAL	ARRAY		REFS	24	565	572	579	723	786	798	
							850	868	982	1123	1276	DEFINED	563	564
							1020	1130						
14433	RTL		REAL			REFS	361	362	372	DEFINED	358			
14440	RTLE		REAL			REFS	372	DEFINED	363					
14436	RTLP		REAL			REFS	363	DEFINED	361					
14437	RTLT		REAL			REFS	363	DEFINED	362					
14434	RTL1		REAL			REFS	361	DEFINED	359					
14435	RTL2		REAL			REFS	362	DEFINED	360					
14447	SD		REAL			REFS	371	DEFINED	370					
14445	SDP		REAL			REFS	371	DEFINED	368					
0	SEPR		REAL	ARRAY	LCMC	REFS	8	17	37	2*327	2*347	350	361	
							362	397	398	399	400	405	406	2*430
							2*446	2*462	2*478	563	567	620	664	670
							676	683	690	697	723	726	729	786
							791	798	803	819	820	822	823	2*831
							2*838	850	856	868	874	895	896	2*898
							899	900	2*902	1212	1220	1226	1234	1248
							1264	1265	1266	1273	1274	1275	1277	1278
							1279	1281	1282	1283	1306	1309		
							DEFINED	289	290	291	292	293	294	295
							296	297	298	299	300	301	302	303
							304	305	306	307	308	309	310	311
							312	313	314	315	316	317	318	319
							320	321	322	323	324	325	602	603
							604	605	606	607	618	623	624	
14446	SK		REAL			REFS	371	DEFINED	369					
14403	T		REAL			REFS	141	142	DEFINED	138	142			
127710	TEMP		REAL	ARRAY	LCMC	REFS	9	34	38	252	253	254	255	
							256	257	258	259	260	261	262	263
							264	265	266	267	268	269	270	271
							272	273	274	275	276	277	278	279
							280	281	282	283	284	285	286	287
							288	DEFINED	248	251				
130364	TEMPE		REAL	ARRAY	LCMC	REFS	9	34	38	289	290	291	292	
							293	294	295	296	297	298	299	300
							301	302	303	304	305	306	307	308
							309	310	311	312	313	314	315	316
							317	318	319	320	321	322	323	324
							325	DEFINED	249	251				
14374	TIM		REAL			REFS	117	1209	1260					
14524	TSAV	*	REAL			REFS	409							
14531	TSAV1	*	REAL			REFS	410							
14463	TSPD	*	REAL			REFS	384							
14475	TSPD1	*	REAL			REFS	386							
14456	TSPS	*	REAL			REFS	383							
14567	TSPSF	*	REAL			REFS	630							
14470	TSPS1	*	REAL			REFS	385							
72125	TT		REAL	ARRAY		REFS	33	117	2*337	340	945	979	988	

VARIABLES	SN	TYPE	RELOCATION								
					1210	1261	DEFINED	45			
14615	TTR	REAL			REFS	945	DEFINED	938	939	940	941	942
					943	944						
74417	VAECL	REAL	ARRAY		REFS	36	1284	DEFINED	619			
75073	VAECLE	REAL	ARRAY		REFS	36	1284	DEFINED	620			
40125	VDD	REAL	ARRAY		REFS	13	569	982	1083	1191		
					DEFINED	561	995	1130	1191			
71451	VDDE	REAL	ARRAY		REFS	32	982	1091	DEFINED	569	1013	1130
36775	VDMD	REAL	ARRAY		REFS	12	982	1102	1188	DEFINED	461	469
					1006	1130	1188					
67645	VDMDE	REAL	ARRAY		REFS	31	982	1107	1268	DEFINED	466	471
					1001	1130						
126560	VDMD1	REAL	ARRAY	LCMC	REFS	9	30	38	1194	1271		
					DEFINED	477	485	1194				
127234	VDMD1E	REAL	ARRAY	LCMC	REFS	9	30	38	1271	DEFINED	482	487
14611	VELT	REAL			REFS	845	861	862	DEFINED	830	833	
14612	VELTE	REAL			REFS	862	DEFINED	831	834			
14613	VELT1	REAL			REFS	848	879	880	DEFINED	837	840	
14614	VELT1E	REAL			REFS	880	DEFINED	838	841			
14525	VFAV	REAL			REFS	409	411	415				
14532	VFAV1	REAL			REFS	410	412	415				
14464	VFPD	REAL			REFS	384	391	398	403			
14513	VFPDE	REAL			REFS	403	DEFINED	398				
14476	VFPD1	REAL			REFS	386	394	398				
14457	VFPS	REAL			REFS	383	387	397	401			
14512	VFPSE	REAL			REFS	401	DEFINED	397				
14570	VFPSF	REAL			REFS	630	631					
14471	VFPS1	REAL			REFS	385	388	397				
14411	VG	REAL			REFS	159	163	355				
14527	VGAV	REAL			REFS	409	413					
14534	VGAV1	REAL			REFS	410	414					
14466	VGPD	REAL			REFS	384	393	400	404			
14515	VGPDE	REAL			REFS	404	DEFINED	400				
14500	VGPD1	REAL			REFS	386	392	400				
14461	VGPS	REAL			REFS	383	389	399	402			
14514	VGPSE	REAL			REFS	402	DEFINED	399				
14572	VGPSF	REAL			REFS	630	632					
14473	VGPS1	REAL			REFS	385	390	399				
14425	VG1	* REAL			REFS	356						
14431	VG2	* REAL			REFS	357						
14452	VIJ	REAL			REFS	374	375	378				
14454	VIJG	* REAL			REFS	374						
40601	VPA	REAL	ARRAY		REFS	13	982	1104	1189	DEFINED	491	496
					996	1130	1189					
70321	VPAE	REAL	ARRAY		REFS	31	982	1112	1269	DEFINED	493	498
					1008	1130						
125430	VPA1	REAL	ARRAY	LCMC	REFS	9	28	38	1195	1272		
					DEFINED	502	507	1195				
126104	VPA1E	REAL	ARRAY	LCMC	REFS	9	30	38	1272	DEFINED	504	509
41731	VPDA	REAL	ARRAY		REFS	13	574	982	1113	1192		
					DEFINED	573	1009	1130	1192			
67171	VPDAE	REAL	ARRAY		REFS	31	982	1106	DEFINED	574	1000	1130
14406	VPTL	REAL			REFS	159	160	163	164	355	358	364
14423	VPTL1	REAL			REFS	356	359					
14427	VPTL2	REAL			REFS	357	360					
37451	VSD	REAL	ARRAY		REFS	12	565	982	1082	1190		
					DEFINED	560	994	1130	1190			

VARIABLES	SN	TYPE	RELOCATION								
70775	VSDE	REAL	ARRAY		REFS	32	982	1087	DEFINED	565	1012	1130
36321	VSMD	REAL	ARRAY		REFS	12	982	1111	1187	DEFINED	429	437
					1005	1130	1187					
60363	VSMDE	REAL	ARRAY		REFS	24	982	1121	1267	DEFINED	434	439
					1018	1130						
124300	VSMD1	REAL	ARRAY	LCMC	REFS	9	28	38	1193	1270		
					DEFINED	445	453	1193				
124754	VSMD1E	REAL	ARRAY	LCMC	REFS	9	28	38	1270	DEFINED	450	455
27340	VTRS	REAL	ARRAY	LCMC	REFS	8	20	37	2*767	2*768	771	786
					791	798	803	2*817	2*818	826	1176	1213
					1214	1215	1216	1227	1228	1229	1230	1241
					1242	1243	1244	DEFINED	761	762	764	765
					767	768	813	814	815	816	817	818
					1176							
36360	VTRSE	REAL	ARRAY	LCMC	REFS	8	20	37	2*796	2*807	2*808	2*821
					2*824	1177	1213	1214	1215	1216	1227	1228
					1229	1230	1241	1242	1243	1244		
					DEFINED	786	789	791	794	796	798	801
					803	806	808	810	819	820	821	822
					823	824	1177					
45400	VTRSN	REAL	ARRAY	LCMC	REFS	8	13	37	1010	1011	1014	1015
					1016	1017	1035	1038	1041	DEFINED	771	826
14413	V1	REAL			REFS	161	165	181	DEFINED	160	164	
52017	WI	REAL	ARRAY		REFS	22	364	366	373	377	1114	
					DEFINED	366						
53623	WIE	REAL	ARRAY		REFS	22	982	1117	DEFINED	373	1014	1130
53147	WL	REAL	ARRAY		REFS	22	1116	DEFINED	377			
52473	WO	REAL	ARRAY		REFS	22	376	377	1115	DEFINED	375	376
54277	WOE	REAL	ARRAY		REFS	22	982	1118	DEFINED	378	1015	1130
54753	WW	REAL	ARRAY		REFS	22	982	1119	DEFINED	1016	1130	
14412	XHB	REAL			REFS	159	163	355				
14426	XHB1	* REAL			REFS	356						
14432	XHB2	* REAL			REFS	357						
14407	XHP	REAL			REFS	159	163	355				
14424	XHP1	* REAL			REFS	356						
14430	XHP2	* REAL			REFS	357						
14377	XI	REAL			REFS	122	DEFINED	121				
14441	XK9	REAL			REFS	364	369	371				
14410	XX	REAL			REFS	2*159	2*163	2*355	2*356	2*357	2*374	2*383
					2*384	2*385	2*386	2*409	2*410	2*630		
14442	Y	* REAL			REFS	364						
42752	ZDD	REAL	ARRAY		REFS	16	DEFINED	102				
42727	ZDP	REAL	ARRAY		REFS	16	178	DEFINED	100			
73255	ZER	REAL	ARRAY		REFS	33	124	DEFINED	124			
42775	ZMF	REAL	ARRAY		REFS	17	243	DEFINED	105			
42714	ZP	REAL	ARRAY		REFS	16	158	DEFINED	99			
42764	ZSM	REAL	ARRAY		REFS	16	226	DEFINED	104			
42757	ZT	REAL	ARRAY		REFS	16	205	DEFINED	103			
42750	ZTM	REAL	ARRAY		REFS	16	234	DEFINED	101			

FILE NAMES		MODE									
0	INPUT	FMT		READS	78						
60	OUTPUT	FMT		WRITES	395	965	1209	1210	1211	1212	1213	1214
				1215	1216	1217	1218	1219	1220	1221	1222	1223
				1224	1225	1226	1227	1228	1229	1230	1231	1232
				1233	1234	1235	1236	1237	1238	1239	1240	1241
				1242	1243	1244	1245	1246	1247	1248	1249	1250

FILE NAMES MODE

				1251	1252	1260	1261	1262	1263	1264	1265	1266
				1267	1268	1269	1270	1271	1272	1273	1274	1275
				1276	1277	1278	1279	1280	1281	1282	1283	1284
				1285	1286	1287	1288	1289	1290	1291	1292	1293
				1294	1295	1296	1297	1306	1309	1310		
160	TAPE1											
100	TAPE10											
140	TAPE11	UNFMT		WRITES	982	READS	1130	MOTION	981	1129		
200	TAPE41											
220	TAPE42											
240	TAPE43											
260	TAPE44											
300	TAPE45											
320	TAPE46											
340	TAPE47											
360	TAPE48											
400	TAPE49											
420	TAPE50											
440	TAPE51											
460	TAPE52											
500	TAPE53											
540	TAPE54											
560	TAPE55											
600	TAPE56											
620	TAPE57											
640	TAPE58											
660	TAPE59											
60	TAPE6											
700	TAPE60											
20	TAPE7			MOTION	76	87						
40	TAPE8	FMT		READS	88	89	90	91	92	93	94	95
				96	97	99	100	101	102	103	104	105
				113	MOTION	77	86					
520	TAPE88	FREE		WRITES	82	MOTION	83					
120	TAPE9											

VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS	TYPE	ARGS		REFERENCES								
ALOG	REAL	1	LIBRARY	215								
BUFFER1		4		1051	1052	1053	1054	1055	1056	1057	1058	1059
				1060	1061	1062	1063	1064	1065	1066	1067	1068
				1069	1070	1071	1072	1073	1074	1075	1076	1077
				1078	1079	1080	1081	1086	1088	1089	1090	1092
				1093	1094							
BUFFER2		6		1082	1083	1084	1085	1087	1091	1095	1096	1097
				1098	1099	1100	1101	1102	1103	1104	1105	1106
				1107	1108	1109	1110	1111	1112	1113	1114	1115
				1116	1117	1118	1119	1120	1121	1122	1123	1124
				1125	1126	1127	1128					
EXP	REAL	1	LIBRARY	144								
FLOW		11		364								
INDATA		9		117								
SATUR		9		383	384	385	386	409	410	630		
SECOND		1		1136								
SQRT	REAL	1	LIBRARY	327	347	350	363	373	430	446	462	478
				492	503	516	518	523	527	539	549	572
				579	585	591	598	664	670	676	683	690

EXTERNALS	TYPE	ARGS	REFERENCES							
			697	723	726	729	761	762	764	765	786
			791	796	798	803	808	821	824	831	838
			850	856	862	868	874	880	898	902	908
			913	920	925						
SRSORT		9	159	163	355	356	357	374			
UNIT	REAL	1	986								

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES						
ABS	REAL	1	INTRIN	145	329	397	398	399	400	405	406
				415	3*948	3*953					
AMAX1	REAL	0	INTRIN	162	166	381	382	408	514	521	529
				537	547	556	558	577	583	589	596
				601	615	617	621	622	629	637	
AMIN1	REAL	0	INTRIN	515	522	530	538	548	578	584	590
				597	616	638					

STATEMENT LABELS			DEF LINE	REFERENCES		
771	1		80	1315		
11756	4	FMT	79	78		
4201	5		744	741		
4206	6		747	744		
4213	7		750	747		
4327	8		774	772		
4333	9		776	774		
0	10		1200	1199		
4337	11		778	776		
4221	12		753	750		
4345	13		780	778		
2244	15		340	336		
0	16		1202	1201		
0	17		250	247		
2253	18		343	335		
2255	19		344	339	342	
0	20	INACTIVE	120			
2274	22		350	346		
2302	23		351	349		
4227	30		756	753		
4235	31		759	756		
4353	32		782	780		
4361	33		784	782		
0	50		771	770		
0	52		826	825		
13433	100	FMT	1316	1209	1260	
13454	102	FMT	1320	1210		
13466	103	FMT	1323	1261		
13473	104	FMT	1324	1211	1262	
13477	106	FMT	1325	1212	1226	1240
13504	108	FMT	1326	1213	1227	1241
13513	109	FMT	1328	1214	1228	1242
13520	110	FMT	1329	1216	1230	1244
13532	112	FMT	1331	1217	1231	1245
13542	113	FMT	1333	1218	1232	1246
13547	114	FMT	1334	1219	1233	1247
13554	115	FMT	1335	1223	1237	1251
13561	116	FMT	1336	1220	1234	1248
13566	118	FMT	1337	1221	1235	1249
13575	119	FMT	1339	1222	1236	1250

STATEMENT LABELS				DEF LINE	REFERENCES								
13602	122	FMT	NO REFS	1340									
13607	124	FMT		1341	1309								
13616	126	FMT		1343	1310								
13623	128	FMT		1344	1224	1238	1252						
13632	129	FMT		1346	1225								
13641	130	FMT		1348	1239								
13651	132	FMT		1350	1263								
13655	134	FMT		1351	1264								
13662	136	FMT	NO REFS	1352									
13667	138	FMT		1353	1265								
13677	140	FMT		1355	1266								
13704	142	FMT	NO REFS	1356									
13711	144	FMT	NO REFS	1357									
13730	151	FMT		1360	1267								
13742	152	FMT		1363	1268	1271							
13747	153	FMT		1364	1269	1272	1276	1280	1284				
13763	154	FMT		1367	1273								
13775	155	FMT		1370	1274	1278	1282						
14002	156	FMT		1371	1275	1279	1283						
14007	158	FMT		1372	1277								
14017	160	FMT		1374	1281								
14027	162	FMT		1376	1285								
14041	163	FMT		1379	1286	1289	1292	1295					
14056	164	FMT		1382	1287	1290	1293	1296					
14046	165	FMT		1380	1291								
14071	166	FMT		1385	1288								
13525	168	FMT		1330	1215	1229	1243						
12137	171	FMT		106	88	89	90	91	92	93	94	95	96
12141	179	FMT		107	99								
12143	180	FMT		108	100								
12145	182	FMT		109	101	102	103	104	105				
12154	195	FMT		114	113								
0	200			115	112								
12072	201	FMT		98	97								
1624	203			217	214								
1630	204			218	216								
0	205			953	952								
5306	206			952	946								
13754	220	FMT		1365	1270								
14062	226	FMT		1383	1294								
5125	299			910	907								
5130	300			911	909								
5144	301			916	914								
5164	302			922	919								
5167	303			923	921								
5322	304			956	945								
0	305			950	947								
5332	306			960	951	955							
0	307			959	957								
5200	308			927	924								
5203	309			928	926								
1231	370			138	147								
0	383			143	140								
1271	395			148	145								
1316	396			152	130	132	134	135					
5141	397			915	912								
1422	400			177	174								

STATEMENT LABELS			DEF LINE	REFERENCES	
1425	401		178	176	
1376	445		169	154	156
1457	505		183	171	173
1551	525		199	186	188
1577	550		207	201	203
1640	575		220	209	211
1667	600		228	222	224
4451	601		801	797	
4454	602		802	800	
4473	603		806	802	
4476	604		807	805	
4512	605		810	807	
4515	606		811	809	
1713	625		237	230	232
1735	650		245	239	241
0	700		980	978	
0	701		970	969	
0	702		992	990	
0	720		1157	1154	
0	722		1161	1159	
0	723		1165	1163	
0	729		1169	1167	
0	737		1173	1171	
3656	750		645	640	642
0	760		1203	1152	
10553	762		1314	1311	
0	801	INACTIVE	732		
0	802		961	120	
6316	804		1206	1255	
7445	806		1256	1253	
7446	808		1257	1313	
2670	885		452	441	
0	900	INACTIVE	987	3*986	
0	901		1177	1175	
0	902		1181	1179	
0	904		1185	1183	
0	1000		616	614	
2620	1003		436	425	
2623	1004		440	435	
2746	1005		468	457	
2751	1006		472	467	
3036	1007		495	489	
3041	1008		499	494	
3666	1009		651	648	
3670	1010		652	650	
3677	1011		656	653	
3701	1012		657	655	
3710	1013		661	658	
3712	1014		662	660	
3726	1015		667	663	
3731	1016		668	666	
3745	1017		673	669	
3750	1018		674	672	
3764	1019		679	675	
3767	1020		680	678	
4400	1021		789	785	
4403	1022		790	788	

STATEMENT LABELS			DEF LINE	REFERENCES
0	1023	INACTIVE	794	
4422	1024		795	793
4677	1025		853	849
4702	1026		854	852
4720	1027		859	855
4723	1028		860	858
4737	1029		865	861
4742	1030		866	864
2674	1031		456	451
3015	1032		484	473
3021	1033		488	483
3056	1034		506	500
3062	1035		510	505
3176	1036		532	525
3202	1037		534	531
3223	1038		542	535
3227	1039		544	541
3254	1040		552	545
3260	1041		554	551
3301	1046		566	562
3313	1047		570	566
3332	1048		575	570
3444	1049		599	594
3654	1052		643	641
3657	1053		646	644
4061	1054		705	703
4070	1055		707	705
4077	1056		709	707
4141	1057		725	722
4154	1058		728	725
4167	1059		731	728
4254	1060		763	760
4273	1061		766	763
4310	1062		769	766
4614	1063		833	829
4616	1064		835	832
5053	1065		894	892
5037	1066		890	888
5074	1067		899	897
5114	1068		903	901
4005	1070		686	681
4010	1071		688	685
4026	1072		693	688
4031	1073		695	692
4047	1074		699	695
4052	1075		701	698
4635	1100		840	836
4637	1102		842	839
4760	1104		871	867
4763	1106		872	870
5001	1108		877	873
5004	1110		878	876
5020	1112		883	879
5023	1114		884	882
0	1200		638	636
0	1210		515	513
0	1500		1050	993

STATEMENT LABELS				DEF LINE	REFERENCES
0	1501			1028	1026
0	1502			1031	1029
0	1503			1036	1034
0	1504			1039	1037
0	1505			1042	1040
0	1506			1046	1044
0	1507			1049	1047
0	1572			1308	1298
13716	1575	FMT		1358	1297
13724	1580	FMT		1359	1306
12157	2958	FMT	NO REFS	380	
12171	3178	FMT		396	395
0	3180			967	964
12200	3181	FMT		966	965
0	3500			601	600
6315	4300			1205	1149
6100	7495			1137	1314

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES	
1163	200	*	I	112 115	118	EXT REFS	
1176	802	*	KK	120 961	41378	EXT REFS	NOT INNER
1211	396	*	I	130 152	1108	EXT REFS	NOT INNER
1242	383		JA	140 143	58	INSTACK	
1322	445	*	I	154 169	578	EXT REFS	
1410	505		I	171 183	508	OPT	
1473	525		I	186 199	578	OPT	
1562	550		I	201 207	168	OPT	
1602	575	*	I	209 220	418	EXT REFS	
1652	600		I	222 228	168	OPT	
1700	625		I	230 237	148	OPT	
1724	650		I	239 245	128	INSTACK	
1746	17		IJ	247 250	48	INSTACK	
3100	1210		IK	513 515	58	INSTACK	
3451	3500		IK	600 601	48	INSTACK	
3545	1000		IK	614 616	58	INSTACK	
3635	1200		IK	636 638	58	INSTACK	
4315	50		KKK	770 771	48	INSTACK	
4571	52		KKK	825 826	48	INSTACK	
5276	305		J	947 950	78	INSTACK	
5311	205		J	952 953	108	INSTACK	
5327	307		I	957 959	28	INSTACK	
5336	3180	*	J	964 967	128	EXT REFS	
5352	701		I	969 970	28	INSTACK	
5367	700		I	978 980	38	INSTACK	
5415	702		I	990 992	48	INSTACK	
5423	1500	*	JK	993 1050	2128	NOT INNER	
5515	1501		JM	1026 1028	28	INSTACK	
5530	1502		N	1029 1031	28	INSTACK	
5551	1503		NM	1034 1036	28	INSTACK	
5564	1504		NN	1037 1039	28	INSTACK	
5577	1505		NJ	1040 1042	28	INSTACK	
5615	1506		MD	1044 1046	28	INSTACK	
5630	1507		ME	1047 1049	28	INSTACK	
6123	760	*	J	1152 1203	1728	NOT INNER	
6130	720		I	1154 1157	68	INSTACK	
6144	722		I	1159 1161	58	INSTACK	
6157	723		I	1163 1165	58	INSTACK	

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES
6172	729		I	1167 1169	5B	INSTACK
6205	737		I	1171 1173	5B	INSTACK
6220	901		I	1175 1177	4B	INSTACK
6232	902		I	1179 1181	4B	INSTACK
6244	904		I	1183 1185	4B	INSTACK
6276	10		I	1199 1200	3B	INSTACK
6307	16		I	1201 1202	3B	INSTACK
6333		*	J	1210 1210	7B	EXT REFS
6351		*	J	1212 1212	12B	EXT REFS
6370		*	J	1213 1213	12B	EXT REFS
6407		*	J	1214 1214	12B	EXT REFS
6426		*	J	1215 1215	12B	EXT REFS
6445		*	J	1216 1216	12B	EXT REFS
6464		*	J	1217 1217	12B	EXT REFS
6503		*	J	1218 1218	12B	EXT REFS
6522		*	J	1219 1219	12B	EXT REFS
6541		*	J	1220 1220	12B	EXT REFS
6560		*	J	1221 1221	11B	EXT REFS
6576		*	J	1222 1222	11B	EXT REFS
6614		*	J	1223 1223	11B	EXT REFS
6632		*	J	1224 1224	10B	EXT REFS
6651		*	J	1226 1226	12B	EXT REFS
6670		*	J	1227 1227	12B	EXT REFS
6707		*	J	1228 1228	12B	EXT REFS
6726		*	J	1229 1229	12B	EXT REFS
6745		*	J	1230 1230	12B	EXT REFS
6764		*	J	1231 1231	12B	EXT REFS
7003		*	J	1232 1232	12B	EXT REFS
7022		*	J	1233 1233	12B	EXT REFS
7041		*	J	1234 1234	12B	EXT REFS
7060		*	J	1235 1235	11B	EXT REFS
7076		*	J	1236 1236	11B	EXT REFS
7114		*	J	1237 1237	11B	EXT REFS
7132		*	J	1238 1238	10B	EXT REFS
7151		*	J	1240 1240	10B	EXT REFS
7166		*	J	1241 1241	12B	EXT REFS
7205		*	J	1242 1242	12B	EXT REFS
7224		*	J	1243 1243	12B	EXT REFS
7243		*	J	1244 1244	12B	EXT REFS
7262		*	J	1245 1245	12B	EXT REFS
7301		*	J	1246 1246	12B	EXT REFS
7320		*	J	1247 1247	12B	EXT REFS
7337		*	J	1248 1248	12B	EXT REFS
7356		*	J	1249 1249	11B	EXT REFS
7374		*	J	1250 1250	11B	EXT REFS
7412		*	J	1251 1251	11B	EXT REFS
7430		*	J	1252 1252	10B	EXT REFS
7463		*	J	1261 1261	7B	EXT REFS
7503		*	J	1264 1264	12B	EXT REFS
7522		*	J	1265 1265	12B	EXT REFS
7541		*	J	1266 1266	12B	EXT REFS
7560		*	J	1267 1267	10B	EXT REFS
7575		*	J	1268 1268	10B	EXT REFS
7612		*	J	1269 1269	10B	EXT REFS
7627		*	J	1270 1270	11B	EXT REFS
7645		*	J	1271 1271	11B	EXT REFS
7663		*	J	1272 1272	11B	EXT REFS

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	
7701		* J	1273 1273	12B	EXT REFS	
7720		* J	1274 1274	12B	EXT REFS	
7737		* J	1275 1275	12B	EXT REFS	
7756		* J	1276 1276	10B	EXT REFS	
7773		* J	1277 1277	12B	EXT REFS	
10012		* J	1278 1278	12B	EXT REFS	
10031		* J	1279 1279	12B	EXT REFS	
10050		* J	1280 1280	10B	EXT REFS	
10065		* J	1281 1281	12B	EXT REFS	
10104		* J	1282 1282	12B	EXT REFS	
10123		* J	1283 1283	12B	EXT REFS	
10142		* J	1284 1284	10B	EXT REFS	
10157		* J	1285 1285	12B	EXT REFS	
10176		* J	1286 1286	12B	EXT REFS	
10215		* J	1287 1287	12B	EXT REFS	
10234		* J	1288 1288	12B	EXT REFS	
10253		* J	1289 1289	12B	EXT REFS	
10272		* J	1290 1290	12B	EXT REFS	
10311		* J	1291 1291	12B	EXT REFS	
10330		* J	1292 1292	12B	EXT REFS	
10347		* J	1293 1293	12B	EXT REFS	
10366		* J	1294 1294	12B	EXT REFS	
10405		* J	1295 1295	12B	EXT REFS	
10424		* J	1296 1296	12B	EXT REFS	
10442	1572	* JI	1298 1308	52B	EXT REFS	NOT INNER
10476		* J	1306 1306	12B	EXT REFS	
10517		* J	1309 1309	12B	EXT REFS	
10536		* J	1310 1310	10B	EXT REFS	

COMMON BLOCKS	LENGTH
/ /	12438
LCMC	45600 LCM

STATISTICS

PROGRAM LENGTH	74662B	31154
BUFFER LENGTH	721B	465
SCM BLANK COMMON LENGTH	30226B	12438
LCM LABELED COMMON LENGTH	131040B	45600

```
      SUBROUTINE FLOW(DP,P,T,D,DO,VPTL,I,W,XK9,Y,FA)                    FLOW        2
      REAL K,K1,K2,K3,K4,K9                                             FLOW        3
      REAL K8                                                           FLOW        4
      IF(DP.LT. 0.) DP=-DP                                              FLOW        5
      IF(I.EQ.2) GO TO 3070                                             FLOW        6
      V=VPTL                                                            FLOW        7
      Y=1.                                                              FLOW        8
      GO TO 3090                                                        FLOW        9
      V=VPTD(P,T)                                                       FLOW       10
      Y=1.-(.41+.35*((DO/D)**4.))*DP/(1.26*P)                           FLOW       11
      CALL VISC(P,T,I,VIS)                                              FLOW       12
      FA = .998721 + 1.78502E-5 * T + 2.39695E-9 * T * T                FLOW       13
      B=DO/D                                                            FLOW       14
      K9=.6                                                             FLOW       15
      K=.6                                                              FLOW       16
      K1=0.                                                             FLOW       17
      K2=0.                                                             FLOW       18
      K3=0.                                                             FLOW       19
      K4=0.                                                             FLOW       20
      K1=(.5993+.007/D)+(.364+.076/(D**.5))*(B**4.)                     FLOW       21
      IF((.07+.5/D-B).LE..0) GO TO 3190                                 FLOW       22
      K2=.4*((1.6-1./D)**5.)*((.07+.5/D-B)**2.5)                        FLOW       23
      IF((.5-B).LE..0) GO TO 3210                                       FLOW       24
      K3=-(.009+.034/D)*((.5-B)**1.5)                                   FLOW       25
      IF ((B-.7).LE..0) GO TO 3230                                      FLOW       26
      K4=(65./(D*D)+3.)*((B-.7)**2.5)                                   FLOW       27
      A=DO*(830.-5000.*B+9000.*B*B-4200.*B*B*B+530./SQRT(K))            FLOW       28
      RO = 1.E6*DO/15.                                                  FLOW       29
      K8=(K1+K2+K3+K4)/(1.+A/RO)                                        FLOW       30
      W = 359. * K9 * DO * DO * FA * Y * SQRT(27.673 * DP/V)            FLOW       31
      R = 15.28 * W / (VIS * DO)                                        FLOW       32
      IF(R.LT.1000.) R=1000.                                            FLOW       33
      K=K8*(1.+A/R)                                                     FLOW       34
      IF((ABS(K-K9)).LT..0001)GO TO 3290                                FLOW       35
      K9=K                                                              FLOW       36
      XK9=K9                                                            FLOW       37
      GO TO 3244                                                        FLOW       38
      XK9=K9                                                            FLOW       39
      RETURN                                                            FLOW       40
      END                                                               FLOW       41
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES						
3	FLOW	1	39	40					

VARIABLES	SN	TYPE	RELOCATION									
261	A	REAL		REFS	29	33	DEFINED	27				
260	B	REAL		REFS	20	21	22	23	24	25	26	
				6*27	DEFINED	13						
0	D	REAL	F.P.	REFS	10	13	2*20	21	2*22	24	2*26	
				DEFINED	1							
0	DO	REAL	F.P.	REFS	10	13	27	28	2*30	31		

VARIABLES	SN	TYPE	RELOCATION								
				DEFINED	1						
0	DP	REAL	F.P.	REFS	2*4	10	30	DEFINED	1	4	
0	FA	REAL	F.P.	REFS	30	DEFINED	1	12			
0	I	INTEGER	F.P.	REFS	5	11	DEFINED	1			
247	K	REAL		REFS	2	27	34	35	DEFINED	15	33
250	K1	REAL		REFS	2	29	DEFINED	16	20		
251	K2	REAL		REFS	2	29	DEFINED	17	22		
252	K3	REAL		REFS	2	29	DEFINED	18	24		
253	K4	REAL		REFS	2	29	DEFINED	19	26		
255	K8	REAL		REFS	3	33	DEFINED	29			
254	K9	REAL		REFS	2	30	34	36	38		
				DEFINED	14	35					
0	P	REAL	F.P.	REFS	9	10	11	DEFINED	1		
263	R	REAL		REFS	32	33	DEFINED	31	32		
262	RO	REAL		REFS	29	DEFINED	28				
0	T	REAL	F.P.	REFS	9	11	3*12	DEFINED	1		
256	V	REAL		REFS	30	DEFINED	6	9			
257	VIS	REAL		REFS	11	31					
0	VPTL	REAL	F.P.	REFS	6	DEFINED	1				
0	W	REAL	F.P.	REFS	31	DEFINED	1	30			
0	XK9	REAL	F.P.	DEFINED	1	36	38				
0	Y	REAL	F.P.	REFS	30	DEFINED	1	7	10		

EXTERNALS	TYPE	ARGS		REFERENCES	
SQRT	REAL	1	LIBRARY	27	30
VISC		4		11	
VPTD	REAL	2		9	

INLINE FUNCTIONS	TYPE	ARGS		DEF LINE	REFERENCES
ABS	REAL	1	INTRIN		34

STATEMENT LABELS			DEF LINE	REFERENCES
0	3025	INACTIVE	4	
0	3030	INACTIVE	5	
0	3040	INACTIVE	6	
0	3050	INACTIVE	7	
0	3060	INACTIVE	8	
15	3070		9	5
0	3080	INACTIVE	10	
32	3090		11	8
0	3100	INACTIVE	12	
0	3110	INACTIVE	13	
0	3120	INACTIVE	14	
0	3150	INACTIVE	16	
0	3160	INACTIVE	20	
0	3170	INACTIVE	21	
0	3180	INACTIVE	22	
75	3190		23	21
0	3200	INACTIVE	24	
105	3210		25	23
0	3220	INACTIVE	26	
115	3230		27	25
0	3240	INACTIVE	28	
0	3242	INACTIVE	29	
137	3244		30	37
0	3246	INACTIVE	31	
0	3248	INACTIVE	32	

STATEMENT LABELS			DEF LINE	REFERENCES
0	3250	INACTIVE	33	
0	3260	INACTIVE	34	
0	3270	INACTIVE	35	
0	3280	INACTIVE	37	
166	3290		38	34
0	3295	INACTIVE	40	

STATISTICS

PROGRAM LENGTH	2648	180

```
      SUBROUTINE BUFFER1(J,MJ,M,ITS)                              BUFFER1    2
      COMMON X(75),Y(9,40),Z(40,300)                              BUFFER1    3
      DIMENSION D(350)                                            BUFFER1    4
      COMMON IPA,IPB,IPC                                          MJ78191   32
      D(1)=X(J)                                                   BUFFER1    5
      DO 10 I=2,7                                                 BUFFER1    6
      D(I)=Y(I-1,MJ)                                              BUFFER1    7
   10 CONTINUE                                                    BUFFER1    8
      IT=ITS+7                                                    BUFFER1    9
      DO 20 N=8,IT                                                BUFFER1   10
      D(N)=Z(M,N-7)                                               BUFFER1   11
   20 CONTINUE                                                    BUFFER1   12
      BUFFEROUT(IPB,0) (D(1),D(IT))                               MJ78191   33
      IF(UNIT(IPB)) 1000,1000,1000                                MJ78191   34
 1000 CONTINUE                                                    BUFFER1   15
      IF(M.NE.5) GO TO 2100                                       BUFFER1   16
      BACKSPACE IPB                                               MJ78191   35
      BUFFERIN (IPB,0) (D(1),D(IT))                               MJ78191   36
      IF(UNIT(IPB)) 2101,2101,2101                                MJ78191   37
 2101 WRITE(6,906) (D(I),I=8,IT)                                  BUFFER1   20
  906 FORMAT(3X,10F10.3)                                          BUFFER1   21
 2100 CONTINUE                                                    BUFFER1   22
      RETURN                                                      BUFFER1   23
      END                                                         BUFFER1   24
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

   14      I       1000       THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.
   19      I       2101       THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.
```

```
          SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS      DEF LINE      REFERENCES
    3 BUFFER1         1            23

VARIABLES       SN  TYPE            RELOCATION
   107 D            REAL       ARRAY                 REFS      3     2*13     20    DEFINED     5      7     11
                                                      2*18
   104 I            INTEGER                          REFS    2*7       20  DEFINED       6     20
 30223 IPA          INTEGER              / /         REFS      4
 30224 IPB          INTEGER              / /         REFS      4       14      19   I/O REFS    13     17     18
 30225 IPC          INTEGER              / /         REFS      4
   105 IT           INTEGER                          REFS     10       13      18       20   DEFINED     9
     0 ITS          INTEGER               F.P.       REFS      9  DEFINED       1
     0 J            INTEGER               F.P.       REFS      5  DEFINED       1
     0 M            INTEGER               F.P.       REFS     11       16  DEFINED       1
     0 MJ           INTEGER               F.P.       REFS      7  DEFINED       1
   106 N            INTEGER                          REFS   2*11  DEFINED      10
     0 X            REAL       ARRAY     / /         REFS      2        5
   113 Y            REAL       ARRAY     / /         REFS      2        7
```

```
VARIABLES     SN  TYPE          RELOCATION
  663  Z          REAL       ARRAY    / /          REFS        2       11

FILE NAMES        MODE
      TAPE6       FMT                    WRITES       20
      VARIABLES USED AS FILE NAMES. SEE ABOVE

EXTERNALS           TYPE   ARGS       REFERENCES
      UNIT          REAL      1            14        19

STATEMENT LABELS              DEF LINE   REFERENCES
    0  10                        8          6
    0  20                       12         10
  180  906      FMT             21         20
    0  1000         INACTIVE     15        3*14
   60  2100                      22         16
    0  2101         INACTIVE     20        3*19

LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   15  10       I           6 8        38      INSTACK
   30  20       N          10 12       38      INSTACK

COMMON BLOCKS   LENGTH
      / /        12438

STATISTICS
  PROGRAM LENGTH               6458      421
  SCM BLANK COMMON LENGTH     30226B   12438
```

```
  1              SUBROUTINE BUFFER2(    XX,YY,ZZ,JJ,KK,ITS)                          BUFFER2      2
                 DIMENSION DD(350),XX(1),YY(1,1),ZZ(1)                               BUFFER2      3
                 COMMON SP(12435),IPA,IPB,IPC                                        MJ78191     38
                 DD(1)=XX(JJ)                                                        BUFFER2      4
  5              DO 10 I=2,7                                                         BUFFER2      5
                 DD(I)=YY(I-1,KK)                                                    BUFFER2      6
              10 CONTINUE                                                            BUFFER2      7
                 IT=ITS+7                                                            BUFFER2      8
                 DO 20 N=8,IT                                                        BUFFER2      9
 10              DD(N)=ZZ(N-7)                                                       BUFFER2     10
              20 CONTINUE                                                            BUFFER2     11
                 BUFFEROUT(IPB,0) (DD(1),DD(IT))                                     MJ78191     39
                 IF(UNIT(IPB)) 1001,1001,1001                                        MJ78191     40
            1001 CONTINUE                                                            BUFFER2     14
 15              RETURN                                                              BUFFER2     15
                 END                                                                 BUFFER2     16
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

    13      I      1001      THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.
```

```
      SYMBOLIC REFERENCE MAP (R=2)

 ENTRY POINTS       DEF LINE      REFERENCES
     3  BUFFER2         1            15

 VARIABLES       SN  TYPE            RELOCATION
    51  DD           REAL        ARRAY                    REFS        2       2*12    DEFINED        4          6          10
    46  I            INTEGER                              REFS      2*6    DEFINED        5
 30223  IPA          INTEGER              / /             REFS        3
 30224  IPB          INTEGER              / /             REFS        3         13    I/O REFS      12
 30225  IPC          INTEGER              / /             REFS        3
    47  IT           INTEGER                              REFS        9         12    DEFINED        8
     0  ITS          INTEGER               F.P.           REFS        8    DEFINED        1
     0  JJ           INTEGER               F.P.           REFS        4    DEFINED        1
     0  KK           INTEGER               F.P.           REFS        6    DEFINED        1
    50  N            INTEGER                              REFS     2*10    DEFINED        9
     0  SP           REAL        ARRAY    / /             REFS        3
     0  XX           REAL        ARRAY     F.P.           REFS        2          4    DEFINED        1
     0  YY           REAL        ARRAY     F.P.           REFS        2          6    DEFINED        1
     0  ZZ           REAL        ARRAY     F.P.           REFS        2         10    DEFINED        1
        VARIABLES USED AS FILE NAMES, SEE ABOVE

 EXTERNALS             TYPE   ARGS        REFERENCES
        UNIT           REAL     1             13

 STATEMENT LABELS                DEF LINE   REFERENCES
     0  10                           7          5
     0  20                          11          9
     0  1001        INACTIVE        14       3*13
```

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
15	10	I	5 7	38	INSTACK
26	20	N	9 11	28	INSTACK

COMMON BLOCKS	LENGTH
/ /	12438

STATISTICS

PROGRAM LENGTH	6078	391
SCM BLANK COMMON LENGTH	302268	12438

```
      SUBROUTINE VISC (P,T,I,VIS)                                        VISC        2
 7020 IF (I.EQ.2) GO TO 7180                                             VISC        3
C VISCOSITY OF WATER                                                     VISC        4
 7040 IF(T.GT.570.)  GO TO 7120                                          VISC        5
 7050 TC=(T + 459.67)/1.8                                                VISC        6
 7060 O = 1.0467*(TC-305.)                                               VISC        7
 7070 DPSAT=0.0689 475  729*(P-PSATT(T))                                 VISC        8
 7080 O1 = 1. + (DPSAT  * 0.1E -06)                                      VISC        9
 7090 T1=1./(TC-140.)                                                    VISC       10
 7100 VIS=241.908  831E-6*241.4*(10.**(247.8*T1*O1))                     VISC       11
 7110 GO TO 7160                                                         VISC       12
 7120 DP = P - PSATT(T)                                                  VISC       13
 7130 DVIS=1.E-7*(-.0645  877+6.53 379E-4*DP-1.06573E-7*DP*DP)           VISC       14
 7135 PSUM=5.28145*EXP(-.153669*(705.47-T))                              VISC       15
 7140 VISL=1.E-6*(195.574-27.816*ALOG(T)-PSUM)                           VISC       16
 7150 VIS=115  826. 575*(VISL+DVIS)                                      VISC       17
 7160 GO TO 7310                                                         VISC       18
C VISCOSITY OF STEAM                                                     VISC       19
 7180 TO=(T+459.67)/1.8-273.15                                           VISC       20
 7190 R=1/(VPTD(P,T)*62.4279 606)                                        VISC       21
 7200 V1=.407*TC+80.4                                                    VISC       22
 7711 VD2=-R*(1858.-5.90*TC)                                             VISC       23
 7220 VD3=353.*R+676.5*R*R+102.1*R*R*R                                   VISC       24
 7230 IF (TC.LT.300.) GO TO 7270                                         VISC       25
 7240 IF (TC.GT.375.) GO TO 7290                                         VISC       26
 7250 VISV=V1+.5*(VD2+VD3)                                               VISC       27
 7260 GO TO 7300                                                         VISC       28
 7270 VISV=V1+VD2                                                        VISC       29
 7280 GO TO 7300                                                         VISC       30
 7290 VISV=V1+VD3                                                        VISC       31
 7300 VIS=241.908  831E-6*VISV                                           VISC       32
 7310 CONTINUE                                                           VISC       33
 7320 RETURN                                                             VISC       34
      END                                                                VISC       35
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
3	VISC	1	33

VARIABLES

		SN	TYPE	RELOCATION								
205	DP		REAL		REFS	3*13	DEFINED	12				
202	DPSAT		REAL		REFS	8	DEFINED	7				
206	DVIS		REAL		REFS	16	DEFINED	13				
0	I		INTEGER	F.P.	REFS	2	DEFINED	1				
201	O	*	REAL		DEFINED	6						
203	O1		REAL		REFS	10	DEFINED	8				
0	P		REAL	F.P.	REFS	7	12	20	DEFINED	1		
207	PSUM		REAL		REFS	15	DEFINED	14				
212	R		REAL		REFS	22	6*23	DEFINED	20			
0	T		REAL	F.P.	REFS	4	5	7	12	14	15	19
					20	DEFINED	1					
200	TC		REAL		REFS	6	9	21	22	24	25	

VARIABLES	SN	TYPE	RELOCATION							
				DEFINED	5					
211	TO *	REAL		DEFINED	19					
204	T1	REAL		REFS	10	DEFINED	9			
214	VD2	REAL		REFS	26	28	DEFINED	22		
215	VD3	REAL		REFS	26	30	DEFINED	23		
0	VIS	REAL	F.P.	DEFINED	1	10	16	31		
210	VISL	REAL		REFS	16	DEFINED	15			
216	VISV	REAL		REFS	31	DEFINED	26	28	30	
213	V1	REAL		REFS	26	28	30	DEFINED	21	

EXTERNALS	TYPE	ARGS		REFERENCES	
ALOG	REAL	1	LIBRARY	15	
EXP	REAL	1	LIBRARY	14	
PSATT	REAL	1		7	12
VPTD	REAL	2		20	

STATEMENT LABELS			DEF LINE	REFERENCES	
0	7020	INACTIVE	2		
0	7040	INACTIVE	4		
0	7050	INACTIVE	5		
0	7060	INACTIVE	6		
0	7070	INACTIVE	7		
0	7080	INACTIVE	8		
0	7090	INACTIVE	9		
0	7100	INACTIVE	10		
0	7110	INACTIVE	11		
34	7120		12	4	
0	7130	INACTIVE	13		
0	7135	INACTIVE	14		
0	7140	INACTIVE	15		
0	7150	INACTIVE	16		
63	7160		17	11	
64	7180		19	2	
0	7190	INACTIVE	20		
0	7200	INACTIVE	21		
0	7220	INACTIVE	23		
0	7230	INACTIVE	24		
0	7240	INACTIVE	25		
0	7250	INACTIVE	26		
0	7260	INACTIVE	27		
120	7270		28	24	
0	7280	INACTIVE	29		
123	7290		30	25	
125	7300		31	27	29
127	7310		32	17	
0	7320	INACTIVE	33		
0	7711	INACTIVE	22		

STATISTICS

PROGRAM LENGTH	2178	143

```
      SUBROUTINE INDATA(RC,NPNT,NSTEP,DAT,DATA,NTEST,T,TIM,AREA)          INDATA      2
      DIMENSION XR(100),T(300),ITP(5),RTP(5),NUSE(300),RC(40,300)         INDATA      3
      DIMENSION DATA(26,40),ZER(300)                                      INDATA      4
      COMMON SP(12435),IPA,IPB,IPC                                        MJ78191    41
      DATA NREC,DT,JACK/26,.05,0/                                         INDATA      5
C*****************************************************************       INDATA      6
      READ(1,*)NTEST,N1,N2,JACK                                           INDATA      7
      IF(EOF(1)) 1,2                                                      MJ78191    42
    1 STOP 11211                                                          MJ78191    43
    2 CONTINUE                                                            MJ78191    44
      PRINT *,NTEST,N1,N2,JACK                                            INDATA      8
  500 FORMAT(3X,*TEST INPUTS*,4I7)                                        INDATA      9
      IF(JACK.GT.0)     PRINT 100,JACK                                    INDATA     10
  100 FORMAT(6X100(1H*)/                                                  INDATA     11
     16X40(1H*),*TEST CASE *,I5,5X40(1H*)/                                INDATA     12
     26X100(1H*))                                                         INDATA     13
      IF(JACK.EQ.0)       NPNT  = N1                                      INDATA     14
      IF(JACK.EQ.0)       NSTEP = N2                                      INDATA     15
      IF(JACK.EQ.0)       READ(1,*  )(T(N),N=1,NPNT)                      INDATA     16
      IF(JACK.EQ.0)  READ(7  ) DAT,IRUN,SFREQ,NREC,BDT,SST                INDATA     17
      WRITE(6,102)NSTEP,NPNT,(T(N),N=1,NPNT)                              INDATA     18
  102 FORMAT(1H1//                                                        INDATA     19
     16X*TWO-PHASE FLOW PUMP PERFORMANCE STUDY - TRANSIENT*//              INDATA     20
     26X*TIME STEP INTERVAL FOR PRINTOUT = *,I3//                         INDATA     21
     36X*NUMBER OF DATA POINTS *,I3//                                     INDATA     22
     46X*TIME STEPS FOR DATA EVALUATION (SECONDS)*//(2X,18F7.2))          INDATA     23
      WRITE(6,101) NREC,SFREQ                                             INDATA     24
  101 FORMAT(6X*NREC=*,I5,4X*SFREQ=*,F8.2)                                INDATA     25
      DT=SFREQ                                                            INDATA     26
      XNREC=NREC                                                          INDATA     27
      ETIME=XNREC/DT                                                      INDATA     28
      DT=1./DT                                                            INDATA     29
      NREC=NREC*100                                                       INDATA     30
   22 CALL STEPS(NPNT,DT,T,NUSE,DATA,JACK)                                INDATA     31
      DO 80 I=1,40                                                        INDATA     32
      K=0                                                                 INDATA     33
      N=1                                                                 INDATA     34
      M1=100                                                              INDATA     35
   62 K=K+100                                                             INDATA     36
      IF(K.GT.NREC)M1=NREC+100-K                                          INDATA     37
      IF(K.GT.NREC)K=NREC                                                 INDATA     38
      IF(M1.LE.0)GO TO 80                                                 INDATA     39
      IF(JACK.GT.0)     GO TO 74                                          INDATA     40
      READ(7)(XR(M),M=1,M1)                                               INDATA     41
      IF(EOF(7))     90,   64                                             INDATA     42
   90 STOP 77776                                                          INDATA     43
   64 IF(NUSE(N).GT.K)GO TO 66                                            INDATA     44
      DO 70 M=1,M1                                                        INDATA     45
      IF(NUSE(N).NE.(M+K-M1))GO TO 70                                     INDATA     46
      IF(I.EQ.1) GO TO 10                                                 INDATA     47
      RC(I-1,N)=XR(M)                                                     INDATA     48
      GO TO 15                                                            INDATA     49
   10 ZER(N)=XR(M)                                                        INDATA     50
   15 CONTINUE                                                            INDATA     51
      IF(JACK.GT.0)                                                       INDATA     52
     $WRITE(6,104)I-1,N,RC(I-1,N)                                         INDATA     53
  104 FORMAT(6X*RC(*,I2,*,*,I2,*) = *,E15.6)                              INDATA     54
```

```
                      N=N+1                                                  INDATA     55
                      IF(N.GT.NPNT)GO TO 72                                  INDATA     56
     60          70   CONTINUE                                               INDATA     57
                      GO TO 62                                               INDATA     58
                 74   DO 76 J=1,26                                           INDATA     59
                 76   XR(J)=DATA(J,I)                                        INDATA     60
                      GO TO 64                                               INDATA     61
     65          66   IF(K.EQ.NREC)GO TO 80                                  INDATA     62
                      GO TO 62                                               INDATA     63
                 72   N=NPNT+1                                               INDATA     64
                      NUSE(N)=1000000                                        INDATA     65
                      GO TO 66                                               INDATA     66
     70          80   CONTINUE                                               INDATA     67
                      RETURN                                                 INDATA     68
                      END                                                    INDATA     69
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS DEF LINE REFERENCES
3 INDATA 1 71

VARIABLES		SN	TYPE		RELOCATION								
0	AREA		REAL	*UNUSED	F.P.	DEFINED	1						
374	BDT	*	REAL			DEFINED	20						
0	DAT		REAL		F.P.	DEFINED	1	20					
0	DATA		REAL	ARRAY	F.P.	REFS	3	34	63	DEFINED	1		
224	DT		REAL			REFS	31	32	34	DEFINED	5	29	32
377	ETIME	*	REAL			DEFINED	31						
400	I		INTEGER			REFS	50	51	2*55	63	DEFINED	35	
30223	IPA		INTEGER		/ /	REFS	4						
30224	IPB		INTEGER		/ /	REFS	4						
30225	IPC		INTEGER		/ /	REFS	4						
372	IRUN	*	INTEGER			DEFINED	20						
551	ITP		INTEGER	*UNDEF		REFS	2						
404	J		INTEGER			REFS	2*63	DEFINED	62				
225	JACK		INTEGER			REFS	11	2*13	17	18	19	20	34
							43	55	DEFINED	5	7		
401	K		INTEGER			REFS	39	2*40	41	47	49	65	
						DEFINED	36	39	41				
403	M		INTEGER			REFS	44	49	51	53	DEFINED	44	48
402	M1		INTEGER			REFS	42	44	48	49	DEFINED	38	40
371	N		INTEGER			REFS	19	21	47	49	51	53	2*55
							58	59	68	DEFINED	19	21	37	58
							67						
0	NPNT		INTEGER		F.P.	REFS	19	2*21	34	59	67		
						DEFINED	1	17					
223	NREC		INTEGER			REFS	27	30	33	2*40	2*41	65	
						DEFINED	5	20	33				
0	NSTEP		INTEGER		F.P.	REFS	21	DEFINED	1	18			
0	NTEST		INTEGER		F.P.	REFS	11	DEFINED	1	7			
563	NUSE		INTEGER	ARRAY		REFS	2	34	47	49	DEFINED	68	
367	N1		INTEGER			REFS	11	17	DEFINED	7			
370	N2		INTEGER			REFS	11	18	DEFINED	7			

VARIABLES	SN	TYPE	RELOCATION								
0	RC	REAL	ARRAY	F.P.	REFS	2	55	DEFINED	1	51	
556	RTP	REAL	*UNDEF		REFS	2					
373	SFREQ	REAL			REFS	27	29	DEFINED	20		
0	SP	REAL	ARRAY	/ /	REFS	4					
375	SST	* REAL			DEFINED	20					
0	T	REAL	ARRAY	F.P.	REFS	2	21	34	DEFINED	1	19
0	TIM	REAL	*UNUSED	F.P.	DEFINED	1					
376	XNREC	REAL			REFS	31	DEFINED	30			
405	XR	REAL	ARRAY		REFS	2	51	53	DEFINED	44	63
1237	ZER	REAL	ARRAY		REFS	3	DEFINED	53			

FILE NAMES	MODE				
OUTPUT	MIXED	WRITES	11	13	
TAPE1	FREE	READS	7	19	
TAPE6	FMT	WRITES	21	27	55
TAPE7	UNFMT	READS	20	44	

EXTERNALS	TYPE	ARGS	REFERENCES	
EOF	REAL	1	8	45
STEPS		6	34	

STATEMENT LABELS			DEF LINE	REFERENCES		
0	1	INACTIVE	9	8		
24	2		10	8		
141	10		53	50		
144	15		54	52		
0	22	INACTIVE	34			
101	62		39	61	66	
124	64		47	45	64	
174	66		65	47	69	
160	70		60	48	49	
177	72		67	59		
163	74		62	43		
0	76		63	62		
203	80		70	35	42	65
0	90	INACTIVE	46	45		
253	100	FMT	14	13		
337	101	FMT	28	27		
305	102	FMT	22	21		
356	104	FMT	57	55		
243	500	FMT NO REFS	12			

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES		
76	80	* I	35 70	110B		EXT REFS	NOT INNER
130	70	* M	48 60	33B		EXT REFS	EXITS
170	76	J	62 63	3B	INSTACK		

COMMON BLOCKS	LENGTH
/ /	12438

STATISTICS		
PROGRAM LENGTH	1743B	995
SCM BLANK COMMON LENGTH	30226B	12438

```
      1              SUBROUTINE STEPS(NPNT,DT,T,NUSE,DATA,JACK)                        STEPS      2
                     DIMENSION T(300),NUSE(300),DATA(26,40)                            STEPS      3
                   C.....................................................................STEPS      4
                     DO 60 N=1,NPNT                                                    STEPS      5
      5              IF(N.EQ.1)      KP=T(1)/DT+1                                      STEPS      6
                     IF(N.GT.1)      KP = (T(N) - T(N-1))/DT + .5                      STEPS      7
                     IF(KP.LE.0)      WRITE(6,100)DT                                   STEPS      8
                   100 FORMAT(2X*SOMETHING IS NOT KOSHER HERE*/                        STEPS      9
                    $2X*DT = *,F10.5)                                                  STEPS     10
     10              IF(KP.LE.0)      STOP 55555                                       STEPS     11
                     NUSE(N) = KP                                                      STEPS     12
                     IF(N.EQ.1)      GO TO 60                                          STEPS     13
                     NUSE(N) = NUSE(N) + NUSE(N-1)                                     STEPS     14
                    60 CONTINUE                                                        STEPS     15
     15              IF(JACK.GT.0)                                                     STEPS     16
                    $READ(7,*)((DATA(I,J),I=1,26),J=1,40)                              STEPS     17
                     WRITE(6,106)(NUSE(N),N=1,NPNT)                                    STEPS     18
                   106 FORMAT(/6X*RECORD COUNT FOR DATA EVALUATION*//(2016))           STEPS     19
                     IF(JACK.EQ.0)      RETURN                                         STEPS     20
     20              DO 62 J=1,40                                                      STEPS     21
                    62 WRITE(6,102)(DATA(I,J),I=1,26)                                  STEPS     22
                   102 FORMAT(6X13F9.3)                                                STEPS     23
                     RETURN                                                            STEPS     24
                     END                                                               STEPS     25
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
3	STEPS	1	19 23

VARIABLES

		SN	TYPE		RELOCATION								
0	DATA		REAL	ARRAY	F.P.	REFS	2	21	DEFINED	1	15		
0	DT		REAL		F.P.	REFS	5	6	7	DEFINED	1		
141	I		INTEGER			REFS	15	21	DEFINED	15	21		
142	J		INTEGER			REFS	15	21	DEFINED	15	20		
0	JACK		INTEGER		F.P.	REFS	15	19	DEFINED	1			
140	KP		INTEGER			REFS	7	10	11	DEFINED	5	6	
137	N		INTEGER			REFS	5	3*6	11	12	3*13	17	
						DEFINED	4	17					
0	NPNT		INTEGER		F.P.	REFS	4	17	DEFINED	1			
0	NUSE		INTEGER	ARRAY	F.P.	REFS	2	2*13	17	DEFINED	1	11	13
0	T		REAL	ARRAY	F.P.	REFS	2	5	2*6	DEFINED	1		

FILE NAMES

	MODE				
TAPE6	FMT	WRITES	7	17	21
TAPE7	FREE	READS	15		

STATEMENT LABELS

			DEF LINE	REFERENCES	
46	60		14	4	12
0	62		21	20	
102	100	FMT	8	7	
133	102	FMT	22	21	
121	106	FMT	18	17	

420158

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES
17	60	*	N	4 14	32B	EXT REFS
64	62	*	J	20 21	11B	EXT REFS

STATISTICS
PROGRAM LENGTH 163B 115

420160

Appendix 4.2D

Transient Data Reduction Program Job Control Cards

To execute the transient data reduction program and to produce hard copy printout and microfiche, the following job control cards are required. All entries start in Column 1. Note that compilation of the program source file will produce a listing of the same.

Job Card (Example)	NLMCJOO,STMFZ,T4O,SP,SN.
Account Card (Example)	ACCOUNT ($1109948500000000000000006570140OPMPTEST M. JACØB485$)
Transient Data Reduction Program Source Deck	ATTACH(ØLDPL,TDRFWD3UPD,ID=JACØB)
Update Old Source Deck	UPDATE(F,S=TEMP,C=O)
Rewind the file TEMP	REWIND(TEMP)
Update the new file TEMP	UPDATE(F,N,W,I=TEMP)
Rewind the file CØMPILE	REWIND(CØMPILE)
Compile updated routines	FTN(I=CØMPILE,ØPT=1,R=2)
Return the file CØMPILE to System	RETURN(CØMPILE)
Rewind new binary decks	REWIND(LGØ)
Attach binary file of steam property routine	ATTACH(STMPRP,NUOO9485STEAMPRØPERTIES)
Preset the core to zero	LSDET(Preset=ZERØ)
Load binary files, STMPRP and LGØ	LØAD(STMPRP,LGØ)

Make absolute file of the transient data red. progr. and the steam property routine	NØGØ(NEW)
Attach time step schedule file	ATTACH(TAPE1,PFN,ID=JACØB)*
Attach conversion constant data file	ATTACH(TAPE8,PFN,ID=JACØB)*
Stage magnetic tape containing raw data info	STAGE(TAPE7,NT,VSN=...,Id=QUINN11099451,PRE)**
Execute transient data reduction progr.	NEW(PL=1000000)
Attach absolute file of program for combining data from various output files	ATTACH(SLZN,CØMBFIL78241ABS,ID=JACØB)
Execute the above program with TAPE 88 as the input file	SLZN(TAPE88)
Catalog plot data file on system	CATALØG(TAPE99,PFN,ID=JACØB)*
Rewind output	REWIND(ØUTPUT)
Copy output to microfilm	CØPYBF(ØUTPUT,FILMPL,10)
Rewind output	REWIND(ØUTPUT)
Suppress hardcopy printout	CØPYBF. 7/8/9
Program update	Program Update Cards (If needed) 7/8/9
Manual data input	Transient Data Red. Progr. Input Cards 7/8/9 6/7/8/9

*PFN refers to permanent file name under which file is stored on the CDC7600 system.

**VSN refers to volume serial number of the magnetic tape.

Appendix 4.2E

TSTEP Computer Program

To generate the time step schedule file containing desired time steps for processing the raw test data, the TSTEP computer program is employed. The main input parameters to this program are: the number of major time periods into which the time segment employed for the particular execution of TDR is to be divided, the time step sizes to be used in each time period, the end of each time period, and the initial value of the time segment employed for the particular execution of the TDR program. As many sets of these parameter values must be input for as many number of executions of the TDR program in a particular computer run. Note that for each execution of TDR, only 299 data points for a particular blowdown parameter can be processed and each execution of the TDR program employs a distinct time segment of the transient. From this information the program computes the time values at which digitized raw data will be processed. Subsequently, this information is stored in a data file on the CDC7600 system for later use in processing the raw data.

Within the program, the number of data points to be processed in each time period of a particular time segment of the transient is calculated as

$$TP_j = (ET_j - ET_{j-1})/\Delta t_j,\ j = 2,3,\ldots$$

$$TP_1 = [(ET_1 - STRTIM)/\Delta t_1] + 1$$

where
- j refers to time periods
- TP is the number of data points to be processed in each time period of the particular time segment
- ET is the end time of each time period, sec, and
- Δt is the time step size for each time period, sec.
- $STRTIM$ is the initial value of the time segment.

In order to obtain proper integer data point count, TP is converted to NTP as:

$$NTP_j = TP_j + 0.1$$

The serial numbers of data points to be processed at the beginning of each time period are employed as indexes for computing the time values at which digitized raw data will be processed for each period and are calculated as:

$$NT_j = NT_{j-1} + NTP_{j-1},\ j = 2,3...$$

$$NT_1 = 1$$

Finally, the time values for data evaluation in each time segment of a transient are obtained as:

$$T_i = T_{i-1} = \Delta t_j,\ i = 2,3,...;\ j = 1,2,3,...$$

$$T_1 = STRTIM$$

where i refers to the time values, and
j refers to the time periods.

The output of the program contains, for each time segment, the test number, number of data points to be processed, printout frequency for reduced transient data, number of time periods and corresponding time step sizes, end times of time period, number of data points in each time period, and the time values at which data is to be processed.

The description of the job control cards necessary for generating the time step schedule file using the TSTEP program and a listing of this program follow.

Job Control Cards for TSTEP Program

All entries start in Column 1, unless otherwise noted.

Job Card	NLMCJOO,STMFZ,T30,P40,SP.
Acc't Card	ACCØUNT($1109948500000000000000006570140OPMPTESTM.JACØB485$)
Attach Absolute File of TSTEP Program	ATTACH(TSTEP,TIMESTEP1109948577200ABS,ID=JACØB)
Execute TSTEP program	TSTEP.

Catalog time step schedule information on the system

```
CATALØG(TAPE1,PFN,ID=JACØB)*

7/8/9
Input Data Deck (See Below)
7/8/9
6/7/8/9
```

Input Data Deck

The input to the TSTEP program consists of the cards described below. For convenience, the format-free mode is employed to enter input data on these cards. That is, input values are entered on the card starting with the first column and separated by commas or blanks. The set of two cards described below must be input for each time segment of the transient for which the TDR program is to be executed. Note that more than one time segement and consequently, more than one execution of the TDR program during a data reduction computer run will be necessary if more than 299 data points for each blowdown parameter are to be processed. The last set of two cards in the input deck should contain zero values to stop execution of the TSTEP program.

Card 1

Variable	Description
NTEST	Test Number (Integer)
N2	Number of calculation steps between edits for the particular execution of TDR (Integer)
JACK	=0, initiate processing of raw transient data
	≠0, will not process raw transient data (Integer)
NS	Number of time periods to be considered in the time segment employed for the particular execution of TDR (Integer)

Card 2

Variable	Description
DELT(I),I=1,NS	Time step size of each time period, sec (Floating Point Constants)

*PFN refers to permanent file name

ET(I),I=1,NS	End time of each time period, sec (Floating Point Constant)
STRTIM	Initial value of the time segment employed for the particular execution of TDR program (Floating Point Constants)

```
      PROGRAM TSTEP(INPUT,TAPE5=INPUT,OUTPUT,TAPE6=OUTPUT,TAPE1)          TSTEP      2
      DIMENSION T(400),DELT(10),NT(11),NTP(10),ET(10),TP(10)              TSTEP      3
      REWIND 1                                                            TSTEP      4
C READING INPUT VALUES - TEST NUMBER,                              PRINT- TSTEP      5
C OUT FREQUENCY, INDEX FOR INITITATING DATA PROCESSING, AND NUMBER OF     TSTEP      6
C TIME INTERVALS                                                          TSTEP      7
 1001 READ(5,*) NTEST,N2,JACK,NS                                          TSTEP      8
      IF(NTEST.EQ.0) GO TO 1002                                           TSTEP      9
      MS=NS+1                                                             TSTEP     10
C                                                                         TSTEP     11
C READING INPUT VALUES - TIME STEP SIZES AND END TIME OF TIME INTERVALS   TSTEP     12
C                                                                         TSTEP     13
      READ(5,*) (DELT(I),I=1,NS), (ET(I),I=1,NS), STRTIM                  TSTEP     14
      IF(DELT(1).EQ.0.0) GO TO 1002                                       TSTEP     15
      N1=0                                                                TSTEP     16
      DO 20 J=1,NS                                                        TSTEP     17
      IF(J.EQ.1) GO TO 21                                                 TSTEP     18
      TP(J)=(ET(J)-ET(J-1))/DELT(J)                                       TSTEP     19
      GO TO 22                                                            TSTEP     20
   21 TP(J)=(ET(J)-STRTIM)/DELT(J)+1                                      TSTEP     21
   22 NTP(J)=TP(J)+0.1                                                    TSTEP     22
      N1=N1+NTP(J)                                                        TSTEP     23
   20 CONTINUE                                                            TSTEP     24
      NPNT=N1                                                             TSTEP     25
      WRITE(1,*) NTEST,N1,N2,JACK                                         TSTEP     26
      NT(1)=1                                                             TSTEP     27
      DO 30 JP=2,MS                                                       TSTEP     28
      NT(JP)=NTP(JP-1)+NT(JP-1)                                           TSTEP     29
   30 CONTINUE                                                            TSTEP     30
      T(1)=STRTIM                                                         TSTEP     31
      DO 100 I=1,NS                                                       TSTEP     32
      M1=NT(I)                                                            TSTEP     33
      M2=NT(I+1)-1                                                        TSTEP     34
      IF (M1 .EQ. 1) M1=2                                                 TSTEP     35
      DO 200 J=M1,M2                                                      TSTEP     36
      T(J)=T(J-1)+DELT(I)                                                 TSTEP     37
  200 CONTINUE                                                            TSTEP     38
  100 CONTINUE                                                            TSTEP     39
      WRITE(1,*) (T(N), N=1,NPNT)                                         TSTEP     40
      WRITE(6,401)                                                        TSTEP     41
  401 FORMAT(1H1//)                                                       TSTEP     42
      WRITE(6,1000) NTEST,NPNT,N2,NS                                      TSTEP     43
 1000 FORMAT(1H1//,                                                       TSTEP     44
     16X,*C-E/EPRI TWO-PHASE PUMP PERFORMANCE PROGRAM - TRANSIENT TEST N  TSTEP     45
     20, *,I4///,                                                         TSTEP     46
     36X,*TOTAL NUMBER OF DATA POINTS TO BE PROCESSED=*,I4///,            TSTEP     47
     46X,*PRINTOUT FREQUENCY FOR REDUCED DATA= *,I3///,                   TSTEP     48
     56X,*NUMBER OF TIME PERIODS CONSIDERED= *,I3///)                     TSTEP     49
      WRITE(6,300)(DELT(I),I=1,NS)                                        TSTEP     50
  300 FORMAT(6X,*TIME STEP SIZES FOR TIME PERIODS (SECONDS) = *,10F10.4/  TSTEP     51
     A//)                                                                 TSTEP     52
      WRITE(6,301)(ET(I),I=1,NS)                                          TSTEP     53
  301 FORMAT(6X,*END TIMES OF TIME PERIODS (SECONDS) = *,10F10.4///)      TSTEP     54
      WRITE(6,302)(NTP(I),I=1,NS)                                         TSTEP     55
  302 FORMAT(6X,*NUMBER OF DATA POINTS IN VARIOUS TIME PERIODS = *,10I4/  TSTEP     56
     A//)                                                                 TSTEP     57
      WRITE(6,303)(T(I),I=1,NPNT)                                         TSTEP     58
```

```
                303  FORMAT(6X,*TIME VALUES AT WHICH DATA IS TO BE PROCESSED (SECONDS)  TSTEP      59
                    A*/(2X,10F7.2))                                                     TSTEP      60
     60              GO TO 1001                                                         TSTEP      61
                1002 STOP 15                                                            TSTEP      62
                     END                                                                TSTEP      63
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
50	I	72 CD 50	TOTAL RECORD LENGTH IS GREATER THAN 137 CHARACTERS. IT MAY EXCEED THE I/O DEVICE CAPACITY.
53	I	65 CD 53	TOTAL RECORD LENGTH IS GREATER THAN 137 CHARACTERS. IT MAY EXCEED THE I/O DEVICE CAPACITY.

SYMBOLIC REFERENCE MAP (R=2)

ENTRY	POINTS	DEF LINE	REFERENCES
70	TSTEP	1	

VARIABLES	SN	TYPE	RELOCATION							
1252	DELT	REAL	ARRAY	REFS	2	14	18	20	36	49	
				DEFINED	13						
1311	ET	REAL	ARRAY	REFS	2	2*18	20	52	DEFINED	13	
421	I	INTEGER		REFS	2*13	32	33	36	49	52	54
				57	DEFINED	2*13	31	49	52	54	57
424	J	INTEGER		REFS	17	4*18	3*20	2*21	22	2*36	
				DEFINED	16	35					
416	JACK	INTEGER		REFS	25	DEFINED	7				
426	JP	INTEGER		REFS	3*28	DEFINED	27				
420	MS	INTEGER		REFS	27	DEFINED	9				
427	M1	INTEGER		REFS	34	35	DEFINED	32	34		
430	M2	INTEGER		REFS	35	DEFINED	33				
431	N	INTEGER		REFS	39	DEFINED	39				
425	NPNT	INTEGER		REFS	39	42	57	DEFINED	24		
417	NS	INTEGER		REFS	9	2*13	16	31	42	49	52
				54	DEFINED	7					
1264	NT	INTEGER	ARRAY	REFS	2	28	32	33	DEFINED	26	28
414	NTEST	INTEGER		REFS	8	25	42	DEFINED	7		
1277	NTP	INTEGER	ARRAY	REFS	2	22	28	54	DEFINED	21	
423	N1	INTEGER		REFS	22	24	25	DEFINED	15	22	
415	N2	INTEGER		REFS	25	42	DEFINED	7			
422	STRTIM	REAL		REFS	20	30	DEFINED	13			
432	T	REAL	ARRAY	REFS	2	36	39	57	DEFINED	30	36
1323	TP	REAL	ARRAY	REFS	2	21	DEFINED	18	20		

FILE	NAMES	MODE							
0	INPUT								
20	OUTPUT								
40	TAPE1	FREE	WRITES	25	39	MOTION	3		
0	TAPE5	FREE	READS	7	13				
20	TAPE6	FMT	WRITES	40	42	49	52	54	57

STATEMENT LABELS			DEF LINE	REFERENCES	
0	20		23	16	
121	21		20	17	
124	22		21	19	
0	30		29	27	
0	100		38	31	
0	200		37	35	
336	300	FMT	50	49	
352	301	FMT	53	52	
365	302	FMT	55	54	
401	303	FMT	58	57	
270	401	FMT	41	40	
301	1000	FMT	43	42	
73	1001		7	60	
234	1002		61	8	14

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES
115	20		J	16 23	14B	OPT
141	30		JP	27 29	3B	INSTACK
150	100	*	I	31 38	22B	NOT INNER
163	200		J	35 37	3B	INSTACK

STATISTICS

PROGRAM LENGTH	12568	686
BUFFER LENGTH	61B	49

Appendix 4.2F

ASME STEAM PROPERTIES PROGRAM LISTING

```
      SUBROUTINE SATUR (P,T,VF,HF,SF,VG,HG,SG,K)                        SATUR      2
C     THIS ROUTINE CALCULATES THE SATURATION PROPERTIES GIVEN EITHER     SATUR      3
C     SATURATION PRESSURE (K=1) OR TEMPERATURE (K=2) OR BOTH (K=3).     SATUR      4
C                                                                       SATUR      5
C                                                                       SATUR      6
      GO TO (10,20,30),K                                                SATUR      7
C     DETERMINE SAT. TEMP.                                              SATUR      8
   10 T = TSL(P)                                                        SATUR      9
      GO TO 30                                                          SATUR     10
C     DETERMINE SAT. PRESSURE.                                          SATUR     11
   20 T1 = T                                                            SATUR     12
      P = PSL(T1)                                                       SATUR     13
C     CHECK LOCATION OF POINT - S.R. 1 AND 2 OR S.R. 3 AND 4            SATUR     14
   30 IF(T .LE. 662.0) GO TO 40                                         SATUR     15
C     SUBREGION 3 AND 4 EQUATIONS WILL BE USED TO CALC. SAT. PROPERTIES. SATUR     16
      VF = VPTF3(P,T)                                                   SATUR     17
      HF=HVT3(VF,T)                                                     SATUR     18
      SF = S3E(DMY)                                                     SATUR     19
      VG = VPTG3(P,T)                                                   SATUR     20
      HG=HVT3(VG,T)                                                     SATUR     21
      SG = S3E(DMY)                                                     SATUR     22
      RETURN                                                            SATUR     23
C                                                                       SATUR     24
C     SUBREGION 1 AND 2 EQUATIONS WILL BE USED TO CALC. SAT. PROPERTIES. SATUR     25
   40 VF = VPT1(P,T)                                                    SATUR     26
      HF = H1E(DMY)                                                     SATUR     27
      SF = S1E(DMY)                                                     SATUR     28
      VG = VPT2(P,T)                                                    SATUR     29
      HG = H2E(DMY)                                                     SATUR     30
      SG = S2E(DMY)                                                     SATUR     31
      RETURN                                                            SATUR     32
      END                                                               SATUR     33
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

6 I AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS DEF LINE REFERENCES
3 SATUR 1 22 31

VARIABLES	SN	TYPE	RELOCATION						
133 DMY		REAL		REFS	18	21	26	27	29	30
0 HF		REAL	F.P.	DEFINED	1	17	26			
0 HG		REAL	F.P.	DEFINED	1	20	29			
0 K		INTEGER	F.P.	REFS	6	DEFINED	1			
0 P		REAL	F.P.	REFS	8	16	19	25	28	
				DEFINED	1	12				
0 SF		REAL	F.P.	DEFINED	1	18	27			

VARIABLES	SN	TYPE	RELOCATION								
0	SG	REAL	F.P.	DEFINED	1	21	30				
0	T	REAL	F.P.	REFS	11	14	16	17	19	20	25
				28	DEFINED	1	8				
132	T1	REAL		REFS	12	DEFINED	11				
0	VF	REAL	F.P.	REFS	17	DEFINED	1	16	25		
0	VG	REAL	F.P.	REFS	20	DEFINED	1	19	28		

EXTERNALS	TYPE	ARGS	REFERENCES	
HVT3	REAL	2	17	20
H1E	REAL	1	26	
H2E	REAL	1	29	
PSL	REAL	1	12	
S1E	REAL	1	27	
S2E	REAL	1	30	
S3E	REAL	1	18	21
TSL	REAL	1	8	
VPTF3	REAL	2	16	
VPTG3	REAL	2	19	
VPT1	REAL	2	25	
VPT2	REAL	2	28	

STATEMENT LABELS		DEF LINE	REFERENCES	
15	10	8	6	
22	20	11	6	
26	30	14	6	9
63	40	25	14	

STATISTICS

PROGRAM LENGTH	1348	92

```
      BLOCK DATA                                                        BLKDATA     2
C     BLOCK DATA ROUTINE FOR 1967 ASME STEAM TABLES ROUTINES.           BLKDATA     3
C     ROUTINES FURNISHED BY MESSRS. H.B. MCCLINTOCK AND G.J. SILVESTRI  BLKDATA     4
C                                                                       BLKDATA     5
C  CONSTL  COMMON CONSTANTS - BOUNDARY LINE L                           BLKDATA     6
C                                                                       BLKDATA     7
      COMMON/CONSTL/AL0,AL1,AL2,AL2T2                                   BLKDATA     8
C                                                                       BLKDATA     9
C                                                                       BLKDATA    10
C  CONST2  COMMON CONSTANTS - SUB REGION 2                              BLKDATA    11
      COMMON /CONST2/ BB00, BB01, BB02, BB03, BB04, BB05, BB11, BB12,   BLKDATA    12
     1    BB21, BB22, BB23, BB31, BB32, BB41, BB42, BB51, BB52, BB53,   BLKDATA    13
     2    BB61, BB62, BB71, BB72, BB81, BB82,  B00,  B61,  B71,  B81,   BLKDATA    14
     3     B82, BB90, BB91, BB92, BB93, BB94, BB95, BB96                BLKDATA    15
C                                                                       BLKDATA    16
C                                                                       BLKDATA    17
C  CONST3  COMMON CONSTANTS - SUB REGION 3                              BLKDATA    18
      COMMON /CONST3/ C00, C01, C02, C03, C04, C05, C06, C07, C08, C09, BLKDATA    19
     1C010,C011,C012, C11, C12, C13, C14, C15, C16, C17, C21, C22, C23, BLKDATA    20
     2 C24, C25, C26, C27, C28, C31, C32, C33, C34, C35, C36, C37, C38, BLKDATA    21
     3 C39,C310, C40, C41, C50, C60, C61, C62, C63, C64, C70, C71, C72, BLKDATA    22
     4 C73, C74, C75, C76, C77, C78, D30, D31, D32, D33, D34, D40, D41, BLKDATA    23
     5 D42, D43, D44, D50, D51, D52                                     BLKDATA    24
C                                                                       BLKDATA    25
C                                                                       BLKDATA    26
C  COMCON  COMMON CONSTANTS FOR ALL STEAM PROPERTIES                    BLKDATA    27
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, BLKDATA    28
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, BLKDATA    29
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, BLKDATA    30
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX        BLKDATA    31
C                                                                       BLKDATA    32
C                                                                       BLKDATA    33
C  CONST1  COMMON CONSTANTS - SUB REGION 1                              BLKDATA    34
      COMMON /CONST1/AA0, AA1, AA2, AA3, AA4, AA5, AA6, AA7, AA8, AA9,  BLKDATA    35
     1    AA10,AA11,AA12,AA13,AA14,AA15,AA16,AA17,AA18,AA19,AA20,AA21,  BLKDATA    36
     2    AA22,  A1,  A2,  A3,  A4,  A5,  A6,  A7,  A8,  A9, A10, A11,  BLKDATA    37
     3     A12                                                          BLKDATA    38
C                                                                       BLKDATA    39
      DATA  AA0, AA1/+6.824687741E+03,-5.422063673E+02                /, BLKDATA    40
     1 AA2, AA3, AA4/-2.096666205E+04,+3.941286787E+04,-6.733277739E+4/, BLKDATA    41
     2 AA5, AA6, AA7/+9.902381028E+04,-1.093911774E+05,+8.590841667E+4/, BLKDATA    42
     3 AA8, AA9,AA10/-4.511168742E+04,+1.418138926E+04,-2.017271113E+3/, BLKDATA    43
     4AA11,AA12,AA13/+7.982692717E+00,-2.616571843E-02,+1.522411790E-3/, BLKDATA    44
     5AA14,AA15,AA16/+2.284279054E-02,+2.421647003E+02,1.269716088E-10/, BLKDATA    45
     6AA17,AA18,AA19/+2.074838328E-07,+2.174020350E-08,+1.105710498E-9/, BLKDATA    46
     7AA20,AA21,AA22/+1.29344193+E+01,+1.308119072E-05,+6.047626338E-14/ BLKDATA    47
      DATA  A1,  A2/+8.438375405E-01,+5.362162162E-04                 /, BLKDATA    48
     1  A3, A4, A5 /+1.720000000E+00,+7.342278489E-02,+4.975858870E-02/, BLKDATA    49
     2  A6, A7, A8 /+6.537154300E-01,+1.150000000E-06,+1.510800000E-05/, BLKDATA    50
     3  A9,A10,A11 /+1.418800000E-01,+7.002753165E+00,+2.995284926E-04/, BLKDATA    51
     4 A12         /+2.040000000E-01 /                                  BLKDATA    52
C                                                                       BLKDATA    53
      DATA BB00,BB01/+1.683599274E+01,+2.856067796E+01                /, BLKDATA    54
     1BB02,BB03,BB04/-5.438923329E+01,+4.330662834E-01,-6.547711697E-1/, BLKDATA    55
     2BB05,BB11,BB12/+8.565182058E-02,+6.670375918E-02,+1.388983801E+0/, BLKDATA    56
     3BB21,BB22,BB23/+8.390104328E-02,+2.614670893E-02,-3.373439453E-2/, BLKDATA    57
     4BB31,BB32,BB41/+4.520918904E-01,+1.069036614E-01,-5.975336707E-1/, BLKDATA    58
```

```
     5BB42,BB51,BB52/-8.847535804E-02,+5.958051609E-01,-5.159303373E-1/, BLKDATA    59
     6BB53,BB61,BB62/+2.075021122E-01,+1.190610271E-01,-9.867174132E-2/, BLKDATA    60
60   78871,BB72,BB81/+1.683998803E-01,-5.809438001E-02,+6.552390126E-3/, BLKDATA    61
     8BB82,BB90,BB91/+5.710218649E-04,+1.936587558E+02,-1.388522425E+3/, BLKDATA    62
     9BB92,BB93,BB94/+4.126607219E+03,-6.508211677E+03,+5.745984054E+3/, BLKDATA    63
     ABB95,BB96, B00/-2.693088365E+03,+5.235718623E+02,+7.633333333E-1/, BLKDATA    64
     B B61, B71, B81/+4.006073948E-01,+8.636081627E-02,-8.532322921E-1/, BLKDATA    65
65   C B82          /+3.460208861E-01 /                                  BLKDATA    66
     C                                                                   BLKDATA    67
      DATA  C00, C01/-6.839900000E+00,-1.722604200E-02                /, BLKDATA    68
     1 C02, C03, C04/-7.771750390E+00,+4.204607520E+00,-2.768070380E+0/, BLKDATA    69
     2 C05, C06, C07/+2.104197070E+00,-1.146495880E+00,+2.231380850E-1/, BLKDATA    70
70   3 C08, C09,C010/+1.162503630E-01,-8.209005440E-02,+1.941292390E-2/, BLKDATA    71
     4C011,C012, C11/-1.694705760E-03,-4.311577033E+00,+7.086360850E-1/, BLKDATA    72
     5 C12, C13, C14/+1.236794550E+01,-1.203890040E+01,+5.404374220E+0/, BLKDATA    73
     6 C15, C16, C17/-9.938650430E-01,+6.275231820E-02,-7.747430160E+0/, BLKDATA    74
     7 C21, C22, C23/-4.298850920E+00,+4.314305380E+01,-1.416193130E+1/, BLKDATA    75
75   8 C24, C25, C26/+4.041724590E+00,+1.555463260E+00,-1.665689350E+0/, BLKDATA    76
     9 C27, C28, C31/+3.248811580E-01,+2.936553250E+01,+7.948418420E-6/, BLKDATA    77
     A C32, C33, C34/+8.888597470E+01,-8.361533800E+01,+3.586365170E+1/, BLKDATA    78
     B C35, C36, C37/+7.518959540E+00,-1.261606400E+01,+1.097174620E+0/, BLKDATA    79
     C C38, C39,C310/+2.121454920E+00,-5.465295660E-01,+8.328754130E+0/, BLKDATA    80
80   D C40, C41, C50/+2.759717760E-06,-5.090739850E-04,+2.106363320E+2/, BLKDATA    81
     E C60, C61, C62/+5.528935335E-02,-2.336365955E-01,+3.697071420E-1/, BLKDATA    82
     F C63, C64, C70/-2.596415470E-01,+6.828087013E-02,-2.571600553E+2/, BLKDATA    83
     G C71, C72, C73/-1.518783715E+02,+2.220723208E+01,-1.802039570E+2/, BLKDATA    84
     H C74, C75, C76/+2.357096220E+03,-1.462335698E+04,+4.542916630E+4/, BLKDATA    85
85   I C77, C78     /-7.053556432E+04,+4.381571428E+04 /                 BLKDATA    86
     C                                                                   BLKDATA    87
      DATA  D30, D31/-1.717616747E+00,+3.526389875E+00                /, BLKDATA    88
     1 D32, D33, D34/-2.690899373E+00,+9.070982605E-01,-1.138791156E-1/, BLKDATA    89
     2 D40, D41, D42/+1.301023613E+00,-2.642777743E+00,+1.996765362E+0/, BLKDATA    90
90   3 D43, D44, D50/-6.661557013E-01,+8.270860589E-02,+3.426663535E-4/, BLKDATA    91
     4 D51, D52     /-1.236521258E-03,+1.155018309E-03 /                 BLKDATA    92
     C                                                                   BLKDATA    93
      DATA ALPHA0,ALPHA1/0.,0./                                          BLKDATA    94
      DATA  PCA, VCA/+3.208234740E+03,+5.077852870E-02 /, TCA/1165.14 /, BLKDATA    95
95   1 PV010,   PVOT/+3.014634510E+01,+2.587358190E-02 /, TZA/ 459.67 /, BLKDATA    96
     2   AII,     P1/+4.260321140E+00,+2.398216830E+03 /,  T1/ 662.0  /, BLKDATA    97
     3    TC,  PMIN,  PMAX /   705.47 ,     0.0  , 16000.0   /,         BLKDATA    98
     4 PSMAX, P3MIN, V3MIN /  3208.3  ,  2002.78 ,     0.0207/,         BLKDATA    99
     5 V3MAX,  TMIN,  TMAX /     0.143,    25.0  ,  1600.0   /,         BLKDATA   100
100  6 TSMAX, T1MAX, T2MIN /   705.5  ,   682.0  ,  -200.0   /,         BLKDATA   101
     7 T3MIN, T3MAX, HMIN  /   636.0  ,  1124.45, -1.0       /,         BLKDATA   102
     8  HMAX, HSMAX,H4MAX  /+1860.0,     1205.0,  +906.1    /,         BLKDATA   103
     9  SMIN,  SMAX, S3MIN /    -0.1  ,     3.0  ,     0.804 /,         BLKDATA   104
     A S4MAX               /     1.065                      /         BLKDATA   105
105  C                                                                   BLKDATA   106
      DATA AL0/+1.574373327E+1/,  AL1/-3.417061978E+1/,                  BLKDATA   107
     1     AL2/+1.931380707E+1/,AL2T2/+3.86276141E+1/                    BLKDATA   108
      END                                                                BLKDATA   109
```

SYMBOLIC REFERENCE MAP (R=2)

VARIABLES	SN	TYPE	RELOCATION				
0	AA0	REAL	CONST1	REFS	34	DEFINED	39
1	AA1	REAL	CONST1	REFS	34	DEFINED	39
12	AA10	REAL	CONST1	REFS	34	DEFINED	39
13	AA11	REAL	CONST1	REFS	34	DEFINED	39
14	AA12	REAL	CONST1	REFS	34	DEFINED	39
15	AA13	REAL	CONST1	REFS	34	DEFINED	39
16	AA14	REAL	CONST1	REFS	34	DEFINED	39
17	AA15	REAL	CONST1	REFS	34	DEFINED	39
20	AA16	REAL	CONST1	REFS	34	DEFINED	39
21	AA17	REAL	CONST1	REFS	34	DEFINED	39
22	AA18	REAL	CONST1	REFS	34	DEFINED	39
23	AA19	REAL	CONST1	REFS	34	DEFINED	39
2	AA2	REAL	CONST1	REFS	34	DEFINED	39
24	AA20	REAL	CONST1	REFS	34	DEFINED	39
25	AA21	REAL	CONST1	REFS	34	DEFINED	39
26	AA22	REAL	CONST1	REFS	34	DEFINED	39
3	AA3	REAL	CONST1	REFS	34	DEFINED	39
4	AA4	REAL	CONST1	REFS	34	DEFINED	39
5	AA5	REAL	CONST1	REFS	34	DEFINED	39
6	AA6	REAL	CONST1	REFS	34	DEFINED	39
7	AA7	REAL	CONST1	REFS	34	DEFINED	39
10	AA8	REAL	CONST1	REFS	34	DEFINED	39
11	AA9	REAL	CONST1	REFS	34	DEFINED	39
10	AI1	REAL	COMCON	REFS	27	DEFINED	94
0	ALPHA0	REAL	COMCON	REFS	27	DEFINED	93
1	ALPHA1	REAL	COMCON	REFS	27	DEFINED	93
0	AL0	REAL	CONSTL	REFS	7	DEFINED	106
1	AL1	REAL	CONSTL	REFS	7	DEFINED	106
2	AL2	REAL	CONSTL	REFS	7	DEFINED	106
3	AL2T2	REAL	CONSTL	REFS	7	DEFINED	106
27	A1	REAL	CONST1	REFS	34	DEFINED	47
40	A10	REAL	CONST1	REFS	34	DEFINED	47
41	A11	REAL	CONST1	REFS	34	DEFINED	47
42	A12	REAL	CONST1	REFS	34	DEFINED	47
30	A2	REAL	CONST1	REFS	34	DEFINED	47
31	A3	REAL	CONST1	REFS	34	DEFINED	47
32	A4	REAL	CONST1	REFS	34	DEFINED	47
33	A5	REAL	CONST1	REFS	34	DEFINED	47
34	A6	REAL	CONST1	REFS	34	DEFINED	47
35	A7	REAL	CONST1	REFS	34	DEFINED	47
36	A8	REAL	CONST1	REFS	34	DEFINED	47
37	A9	REAL	CONST1	REFS	34	DEFINED	47
0	BB00	REAL	CONST2	REFS	11	DEFINED	53
1	BB01	REAL	CONST2	REFS	11	DEFINED	53
2	BB02	REAL	CONST2	REFS	11	DEFINED	53
3	BB03	REAL	CONST2	REFS	11	DEFINED	53
4	BB04	REAL	CONST2	REFS	11	DEFINED	53
5	BB05	REAL	CONST2	REFS	11	DEFINED	53
6	BB11	REAL	CONST2	REFS	11	DEFINED	53
7	BB12	REAL	CONST2	REFS	11	DEFINED	53
10	BB21	REAL	CONST2	REFS	11	DEFINED	53
11	BB22	REAL	CONST2	REFS	11	DEFINED	53
12	BB23	REAL	CONST2	REFS	11	DEFINED	53
13	BB31	REAL	CONST2	REFS	11	DEFINED	53

VARIABLES	SN	TYPE	RELOCATION				
14	BB32	REAL	CONST2	REFS	11	DEFINED	53
15	BB41	REAL	CONST2	REFS	11	DEFINED	53
16	BB42	REAL	CONST2	REFS	11	DEFINED	53
17	BB51	REAL	CONST2	REFS	11	DEFINED	53
20	BB52	REAL	CONST2	REFS	11	DEFINED	53
21	BB53	REAL	CONST2	REFS	11	DEFINED	53
22	BB61	REAL	CONST2	REFS	11	DEFINED	53
23	BB62	REAL	CONST2	REFS	11	DEFINED	53
24	BB71	REAL	CONST2	REFS	11	DEFINED	53
25	BB72	REAL	CONST2	REFS	11	DEFINED	53
26	BB81	REAL	CONST2	REFS	11	DEFINED	53
27	BB82	REAL	CONST2	REFS	11	DEFINED	53
35	BB90	REAL	CONST2	REFS	11	DEFINED	53
36	BB91	REAL	CONST2	REFS	11	DEFINED	53
37	BB92	REAL	CONST2	REFS	11	DEFINED	53
40	BB93	REAL	CONST2	REFS	11	DEFINED	53
41	BB94	REAL	CONST2	REFS	11	DEFINED	53
42	BB95	REAL	CONST2	REFS	11	DEFINED	53
43	BB96	REAL	CONST2	REFS	11	DEFINED	53
30	B00	REAL	CONST2	REFS	11	DEFINED	53
31	B61	REAL	CONST2	REFS	11	DEFINED	53
32	B71	REAL	CONST2	REFS	11	DEFINED	53
33	B81	REAL	CONST2	REFS	11	DEFINED	53
34	B82	REAL	CONST2	REFS	11	DEFINED	53
0	C00	REAL	CONST3	REFS	18	DEFINED	67
1	C01	REAL	CONST3	REFS	18	DEFINED	67
12	C010	REAL	CONST3	REFS	18	DEFINED	67
13	C011	REAL	CONST3	REFS	18	DEFINED	67
14	C012	REAL	CONST3	REFS	18	DEFINED	67
2	C02	REAL	CONST3	REFS	18	DEFINED	67
3	C03	REAL	CONST3	REFS	18	DEFINED	67
4	C04	REAL	CONST3	REFS	18	DEFINED	67
5	C05	REAL	CONST3	REFS	18	DEFINED	67
6	C06	REAL	CONST3	REFS	18	DEFINED	67
7	C07	REAL	CONST3	REFS	18	DEFINED	67
10	C08	REAL	CONST3	REFS	18	DEFINED	67
11	C09	REAL	CONST3	REFS	18	DEFINED	67
15	C11	REAL	CONST3	REFS	18	DEFINED	67
16	C12	REAL	CONST3	REFS	18	DEFINED	67
17	C13	REAL	CONST3	REFS	18	DEFINED	67
20	C14	REAL	CONST3	REFS	18	DEFINED	67
21	C15	REAL	CONST3	REFS	18	DEFINED	67
22	C16	REAL	CONST3	REFS	18	DEFINED	67
23	C17	REAL	CONST3	REFS	18	DEFINED	67
24	C21	REAL	CONST3	REFS	18	DEFINED	67
25	C22	REAL	CONST3	REFS	18	DEFINED	67
26	C23	REAL	CONST3	REFS	18	DEFINED	67
27	C24	REAL	CONST3	REFS	18	DEFINED	67
30	C25	REAL	CONST3	REFS	18	DEFINED	67
31	C26	REAL	CONST3	REFS	18	DEFINED	67
32	C27	REAL	CONST3	REFS	18	DEFINED	67
33	C28	REAL	CONST3	REFS	18	DEFINED	67
34	C31	REAL	CONST3	REFS	18	DEFINED	67
45	C310	REAL	CONST3	REFS	18	DEFINED	67
35	C32	REAL	CONST3	REFS	18	DEFINED	67
36	C33	REAL	CONST3	REFS	18	DEFINED	67
37	C34	REAL	CONST3	REFS	18	DEFINED	67

VARIABLES	SN	TYPE	RELOCATION				
40	C35	REAL	CONST3	REFS	18	DEFINED	67
41	C36	REAL	CONST3	REFS	18	DEFINED	67
42	C37	REAL	CONST3	REFS	18	DEFINED	67
43	C38	REAL	CONST3	REFS	18	DEFINED	67
44	C39	REAL	CONST3	REFS	18	DEFINED	67
46	C40	REAL	CONST3	REFS	18	DEFINED	67
47	C41	REAL	CONST3	REFS	18	DEFINED	67
50	C50	REAL	CONST3	REFS	18	DEFINED	67
51	C60	REAL	CONST3	REFS	18	DEFINED	67
52	C61	REAL	CONST3	REFS	18	DEFINED	67
53	C62	REAL	CONST3	REFS	18	DEFINED	67
54	C63	REAL	CONST3	REFS	18	DEFINED	67
55	C64	REAL	CONST3	REFS	18	DEFINED	67
56	C70	REAL	CONST3	REFS	18	DEFINED	67
57	C71	REAL	CONST3	REFS	18	DEFINED	67
60	C72	REAL	CONST3	REFS	18	DEFINED	67
61	C73	REAL	CONST3	REFS	18	DEFINED	67
62	C74	REAL	CONST3	REFS	18	DEFINED	67
63	C75	REAL	CONST3	REFS	18	DEFINED	67
64	C76	REAL	CONST3	REFS	18	DEFINED	67
65	C77	REAL	CONST3	REFS	18	DEFINED	67
66	C78	REAL	CONST3	REFS	18	DEFINED	67
67	D30	REAL	CONST3	REFS	18	DEFINED	87
70	D31	REAL	CONST3	REFS	18	DEFINED	87
71	D32	REAL	CONST3	REFS	18	DEFINED	87
72	D33	REAL	CONST3	REFS	18	DEFINED	87
73	D34	REAL	CONST3	REFS	18	DEFINED	87
74	D40	REAL	CONST3	REFS	18	DEFINED	87
75	D41	REAL	CONST3	REFS	18	DEFINED	87
76	D42	REAL	CONST3	REFS	18	DEFINED	87
77	D43	REAL	CONST3	REFS	18	DEFINED	87
100	D44	REAL	CONST3	REFS	18	DEFINED	87
101	D50	REAL	CONST3	REFS	18	DEFINED	87
102	D51	REAL	CONST3	REFS	18	DEFINED	87
103	D52	REAL	CONST3	REFS	18	DEFINED	87
32	HMAX	REAL	COMCON	REFS	27	DEFINED	94
31	HMIN	REAL	COMCON	REFS	27	DEFINED	94
33	HSMAX	REAL	COMCON	REFS	27	DEFINED	94
34	H4MAX	REAL	COMCON	REFS	27	DEFINED	94
2	PCA	REAL	COMCON	REFS	27	DEFINED	94
15	PMAX	REAL	COMCON	REFS	27	DEFINED	94
14	PMIN	REAL	COMCON	REFS	27	DEFINED	94
16	PSMAX	REAL	COMCON	REFS	27	DEFINED	94
7	PVOT	REAL	COMCON	REFS	27	DEFINED	94
6	PV010	REAL	COMCON	REFS	27	DEFINED	94
13	PI	REAL	COMCON	REFS	27	DEFINED	94
17	P3MIN	REAL	COMCON	REFS	27	DEFINED	94
36	SMAX	REAL	COMCON	REFS	27	DEFINED	94
35	SMIN	REAL	COMCON	REFS	27	DEFINED	94
37	S3MIN	REAL	COMCON	REFS	27	DEFINED	94
40	S4MAX	REAL	COMCON	REFS	27	DEFINED	94
12	TC	REAL	COMCON	REFS	27	DEFINED	94
4	TCA	REAL	COMCON	REFS	27	DEFINED	94
23	TMAX	REAL	COMCON	REFS	27	DEFINED	94
22	TMIN	REAL	COMCON	REFS	27	DEFINED	94
24	TSMAX	REAL	COMCON	REFS	27	DEFINED	94
5	TZA	REAL	COMCON	REFS	27	DEFINED	94

VARIABLES	SN	TYPE	RELOCATION					
	11	T1	REAL	COMCON	REFS	27	DEFINED	94
	25	T1MAX	REAL	COMCON	REFS	27	DEFINED	94
	26	T2MIN	REAL	COMCON	REFS	27	DEFINED	94
	30	T3MAX	REAL	COMCON	REFS	27	DEFINED	94
	27	T3MIN	REAL	COMCON	REFS	27	DEFINED	94
	3	VCA	REAL	COMCON	REFS	27	DEFINED	94
	21	V3MAX	REAL	COMCON	REFS	27	DEFINED	94
	20	V3MIN	REAL	COMCON	REFS	27	DEFINED	94

COMMON BLOCKS	LENGTH
CONSTL	4
CONST2	36
CONST3	68
COMCON	33
CONST1	35

STATISTICS

PROGRAM LENGTH	0B	0
SCM LABELED COMMON LENGTH	260B	176

```
      FUNCTION TSL(PIN)                                                 TSL         2
C  TSL    TSAT = F(P) SATURATION TEMPERATURE AS A FUNCTION OF PRESSURE.  TSL         3
C         ENTRIES = TSATP                                               TSL         4
C         CALLS = PSL, GRS, STER.                                       TSL         5
C                                                                       TSL         6
C                                                                       TSL         7
C                                                                       TSL         8
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, TSL         9
     1   PVOT,    A11,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN,  TSL        10
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,  TSL        11
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX          TSL        12
C                                                                       TSL        13
      COMMON /NUST/ DPDT                                                TSL        14
      DIMENSION B(12)                                                   TSL        15
      DATA  B / +1.52264682686E+0, -0.682309517937 , +0.164114951728  ,  TSL        16
     1          -2.02321648831E-3, -1.92391110748E-3,-5.74549418696E-4,  TSL        17
     2          +6.84115542402E-5, +3.36500068426E-5,-1.23422483951E-5,  TSL        18
     3          +1.48265501702E-6, -1.02116445578E-6,-4.09080904092E-6 /  TSL        19
C                                                                       TSL        20
      ENTRY TSATP                                                       TSL        21
      I=1                                                               TSL        22
      TOL=1.0E-4                                                        TSL        23
      IF(PIN.GT.2700.) TOL=1.0E-9                                       TSL        24
      IF (PIN.GT.3200.) TOL=1.0E-10                                     TSL        25
      F=1.                                                              TSL        26
      IF(PIN.GT.PCA) GO TO 30                                           TSL        27
      TSL=TC                                                            TSL        28
      IF(PIN.GE.3208.2347) GO TO 10                                     TSL        29
      I=-1                                                              TSL        30
      TX=1.                                                             TSL        31
      TY=(ALOG(3529.058235/PIN)**0.4-1.48047125)/(-1.089944005)         TSL        32
      Y=2.*TY                                                           TSL        33
      W=B(1)+TY*B(2)                                                    TSL        34
      DO5N=3,12                                                         TSL        35
      TZ=Y*TY-TX                                                        TSL        36
      W=W+TZ*B(N)                                                       TSL        37
      TX=TY                                                             TSL        38
      TY=TZ                                                             TSL        39
    5 CONTINUE                                                          TSL        40
      TSL=TCA/W-TZA                                                     TSL        41
   10 TY=.01                                                            TSL        42
      Y=1.                                                              TSL        43
      IF(TSL.GT.TC) TSL=TC                                              TSL        44
   15 PA=PSL1(TSL)                                                      TSL        45
      DP=PIN-PA                                                         TSL        46
      PR=DP/PIN                                                         TSL        47
      TSL=TSL+F*DP/DPDT                                                 TSL        48
      IF(ABS(PR)-TOL) 35,20,20                                          TSL        49
   20 IF(Y.GT.29.) GO TO 30                                             TSL        50
      Y=Y+1.                                                            TSL        51
      F=F*0.99                                                          TSL        52
      IF(TSL-TC) 15,25,25                                               TSL        53
   25 TY=0.9*TY                                                         TSL        54
      TSL=TSL-TY                                                        TSL        55
      GO TO 15                                                          TSL        56
   30 CALL STER(3HTSL,I,PIN,0)                                          TSL        57
   35 RETURN                                                            TSL        58
```

```
      C     END OF TSL                                                    TSL        59
            END                                                           TSL        60
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
4	TSATP	20	57
4	TSL	1	

VARIABLES

		SN	TYPE		RELOCATION							
10	AI1		REAL		COMCON	REFS	8					
0	ALPHA0		REAL		COMCON	REFS	8					
1	ALPHA1		REAL		COMCON	REFS	8					
164	B		REAL	ARRAY		REFS	14	2*33	36	DEFINED	15	
162	DP		REAL			REFS	46	47	DEFINED	45		
0	DPDT		REAL		NUST	REFS	13	47				
152	F		REAL			REFS	47	51	DEFINED	25	51	
32	HMAX		REAL		COMCON	REFS	8					
31	HMIN		REAL		COMCON	REFS	8					
33	HSMAX		REAL		COMCON	REFS	8					
34	H4MAX		REAL		COMCON	REFS	8					
150	I		INTEGER			REFS	56	DEFINED	21	29		
157	N		INTEGER			REFS	36	DEFINED	34			
161	PA		REAL			REFS	45	DEFINED	44			
2	PCA		REAL		COMCON	REFS	8	26				
0	PIN		REAL		F.P.	REFS	23	24	26	28	31	45 46
							56	DEFINED	1			
15	PMAX		REAL		COMCON	REFS	8					
14	PMIN		REAL		COMCON	REFS	8					
163	PR		REAL			REFS	48	DEFINED	46			
16	PSMAX		REAL		COMCON	REFS	8					
7	PVDT		REAL		COMCON	REFS	8					
6	PVD10		REAL		COMCON	REFS	8					
13	P1		REAL		COMCON	REFS	8					
17	P3MIN		REAL		COMCON	REFS	8					
36	SMAX		REAL		COMCON	REFS	8					
35	SMIN		REAL		COMCON	REFS	8					
37	S3MIN		REAL		COMCON	REFS	8					
40	S4MAX		REAL		COMCON	REFS	8					
12	TC		REAL		COMCON	REFS	8	27	2*43	52		
4	TCA		REAL		COMCON	REFS	8	40				
23	TMAX		REAL		COMCON	REFS	8					
22	TMIN		REAL		COMCON	REFS	8					
151	TOL		REAL			REFS	48	DEFINED	22	23	24	
147	TSL		REAL			REFS	43	44	47	52	54	
						DEFINED	27	40	43	47	54	
24	TSMAX		REAL		COMCON	REFS	8					
153	TX		REAL			REFS	35	DEFINED	30	37		
154	TY		REAL			REFS	32	33	35	37	53	54
						DEFINED	31	38	41	53		
160	TZ		REAL			REFS	36	38	DEFINED	35		
5	TZA		REAL		COMCON	REFS	8	40				
11	T1		REAL		COMCON	REFS	8					

```
VARIABLES      SN  TYPE            RELOCATION
   25  T1MAX      REAL                COMCON        REFS          8
   26  T2MIN      REAL                COMCON        REFS          8
   30  T3MAX      REAL                COMCON        REFS          8
   27  T3MIN      REAL                COMCON        REFS          8
    3  VCA        REAL                COMCON        REFS          8
   21  V3MAX      REAL                COMCON        REFS          8
   20  V3MIN      REAL                COMCON        REFS          8
  156  W          REAL                              REFS         36        40     DEFINED       33         36
  155  Y          REAL                              REFS         35        49          50     DEFINED       32         42         50

EXTERNALS           TYPE    ARGS       REFERENCES
       ALOG         REAL       1 LIBRARY     31
       PSL1         REAL       1             44
       STER                    4             56

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE  REFERENCES
       ABS          REAL       1  INTRIN                48

STATEMENT LABELS                 DEF LINE    REFERENCES
    0  5                            39          34
   57  10                           41          28
   65  15                           44          52          55
    0  20             INACTIVE      49          2*48
    0  25             INACTIVE      53          2*52
  111  30                           56          26          49
  114  35                           57          48

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   44  5         N            34 39        78      INSTACK

COMMON BLOCKS    LENGTH
       COMCON        33
       NUST           1

STATISTICS
  PROGRAM LENGTH                  202B      130
  SCM LABELED COMMON LENGTH        42B       34
```

```
      FUNCTION PSL(T)                                                    PSL        2
C  PSL    SATURATION PRESSURE AS A FUNCTION OF TEMPERATURE.              PSL        3
C        ENTRY = PSATT(DUMMY)                                           PSL        4
C                                                                       PSL        5
C                                                                       PSL        6
C                                                                       PSL        7
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, PSL        8
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, PSL        9
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, PSL       10
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         PSL       11
      COMMON /NUST/ DPDT                                                PSL       12
      DIMENSION AK(9)                                                   PSL       13
      DATA    AK    /-7.691234564,-26.08023696,-168.1706546,64.23285504, PSL       14
     1  -118.9646225, 4.167117320, 20.97506760,1.0E+9,6.0/               PSL       15
      DATA AK2T2,AK3T3/-5.21604739E+1,-5.04511964E+2/                   PSL       16
      DATA AK4T4,AK5T5/+2.56931420E+2,-5.94823113E+2/                   PSL       17
      DATA AK7T2,AK8T2/+4.19501352E+1,+2.0E+9/                          PSL       18
C                                                                       PSL       19
      ENTRY PSATT                                                       PSL       20
C                                                                       PSL       21
      J=1                                                               PSL       22
      GO TO 5                                                           PSL       23
C                                                                       PSL       24
      ENTRY PSL1                                                        PSL       25
C                                                                       PSL       26
      J=2                                                               PSL       27
    5 IF(T.GT.TC) GO TO 15                                              PSL       28
C     THETA = ((T-32.0)/1.8 + 273.15)/647.3                             PSL       29
      THETA=(T+TZA)/TCA                                                 PSL       30
      X = 1.0- THETA                                                    PSL       31
      Y=0.                                                              PSL       32
      DO 10 I=1,5                                                       PSL       33
      II=6-I                                                            PSL       34
   10 Y=(Y+AK(II))*X                                                    PSL       35
C     THE K FUNCTION (SATURATION LINE) PAGE 12 PAR. 5                   PSL       36
      DEN1=1.+X*(AK(6)+AK(7)*X)                                         PSL       37
      DEN2=AK(8)*X*X+AK(9)                                              PSL       38
      PSL=EXP(Y/THETA/DEN1-X/DEN2)*PCA                                  PSL       39
      IF(J.NE.2) GO TO 20                                               PSL       40
      DSDT=-(AK(1)+X*(AK2T2+X*(AK3T3+X*(AK4T4+AK5T5*X))))               PSL       41
      B=THETA*DEN1                                                      PSL       42
      DBDT=DEN1-THETA*(AK(6)+AK7T2*X)                                   PSL       43
      DBBDT=-AK8T2*X                                                    PSL       44
      DPDT=(PSL/1165.14)*(((B*DSDT-Y*DBDT)/(B*B))+((DEN2+X*DBBDT)/(DEN2* PSL       45
     1DEN2)))                                                           PSL       46
      GO TO 20                                                          PSL       47
   15 CALL STER(3HPSL,2,T,0)                                            PSL       48
   20 RETURN                                                            PSL       49
C     END OF PSL                                                        PSL       50
      END                                                               PSL       51
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	PSATT	19	
4	PSL	1	
11	PSL1	24	48

VARIABLES	SN	TYPE		RELOCATION							
10	AI1	REAL		COMCON	REFS	7					
146	AK	REAL	ARRAY		REFS	12	34	2*36	2*37	40	42
					DEFINED	13					
115	AK2T2	REAL			REFS	40	DEFINED	15			
116	AK3T3	REAL			REFS	40	DEFINED	15			
117	AK4T4	REAL			REFS	40	DEFINED	16			
120	AK5T5	REAL			REFS	40	DEFINED	16			
121	AK7T2	REAL			REFS	42	DEFINED	17			
122	AK8T2	REAL			REFS	43	DEFINED	17			
0	ALPHA0	REAL		COMCON	REFS	7					
1	ALPHA1	REAL		COMCON	REFS	7					
143	B	REAL			REFS	3*44	DEFINED	41			
145	DBBDT	REAL			REFS	44	DEFINED	43			
144	DBDT	REAL			REFS	44	DEFINED	42			
140	DEN1	REAL			REFS	38	41	42	DEFINED	36	
141	DEN2	REAL			REFS	38	3*44	DEFINED	37		
0	DPDT	REAL		NUST	REFS	11	DEFINED	44			
142	DSDT	REAL			REFS	44	DEFINED	40			
32	HMAX	REAL		COMCON	REFS	7					
31	HMIN	REAL		COMCON	REFS	7					
33	HSMAX	REAL		COMCON	REFS	7					
34	H4MAX	REAL		COMCON	REFS	7					
136	I	INTEGER			REFS	33	DEFINED	32			
137	II	INTEGER			REFS	34	DEFINED	33			
132	J	INTEGER			REFS	39	DEFINED	21	26		
2	PCA	REAL		COMCON	REFS	7	38				
15	PMAX	REAL		COMCON	REFS	7					
14	PMIN	REAL		COMCON	REFS	7					
131	PSL	REAL			REFS	44	DEFINED	38			
16	PSMAX	REAL		COMCON	REFS	7					
7	PVOT	REAL		COMCON	REFS	7					
6	PV010	REAL		COMCON	REFS	7					
13	P1	REAL		COMCON	REFS	7					
17	P3MIN	REAL		COMCON	REFS	7					
36	SMAX	REAL		COMCON	REFS	7					
35	SMIN	REAL		COMCON	REFS	7					
37	S3MIN	REAL		COMCON	REFS	7					
40	S4MAX	REAL		COMCON	REFS	7					
0	T	REAL		F.P.	REFS	27	29	47	DEFINED	1	
12	TC	REAL		COMCON	REFS	7	27				
4	TCA	REAL		COMCON	REFS	7	29				
133	THETA	REAL			REFS	30	38	41	42	DEFINED	29
23	TMAX	REAL		COMCON	REFS	7					
22	TMIN	REAL		COMCON	REFS	7					
24	TSMAX	REAL		COMCON	REFS	7					
5	TZA	REAL		COMCON	REFS	7	29				
11	T1	REAL		COMCON	REFS	7					
25	T1MAX	REAL		COMCON	REFS	7					
26	T2MIN	REAL		COMCON	REFS	7					
30	T3MAX	REAL		COMCON	REFS	7					
27	T3MIN	REAL		COMCON	REFS	7					
3	VCA	REAL		COMCON	REFS	7					

VARIABLES	SN	TYPE	RELOCATION							
21	V3MAX	REAL	COMCON	REFS	7					
20	V3MIN	REAL	COMCON	REFS	7					
134	X	REAL		REFS	34	2*36	2*37	38	4*40	42	43
				44	DEFINED	30					
135	Y	REAL		REFS	34	38	44	DEFINED	31	34	

EXTERNALS	TYPE	ARGS	REFERENCES
EXP	REAL	1 LIBRARY	38
STER		4	47

STATEMENT LABELS		DEF LINE	REFERENCES	
21	5	27	22	
0	10	34	32	
104	15	47	27	
107	20	48	39	46

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
34	10	I	32 34	58	INSTACK

COMMON BLOCKS	LENGTH
COMCON	33
NUST	1

STATISTICS

PROGRAM LENGTH	1618	113
SCM LABELED COMMON LENGTH	428	34

424014

```
      FUNCTION GRS   (X, NDX, Y, NDY, XV, N, NRANGE)                    GRS        2
C  GRS    INTERPOLATION SUBROUTINE                                      GRS        3
C                                                                       GRS        4
C                                                                       GRS        5
C     WHERE                                                             GRS        6
C     X = ARRAY OF POINTS ON ABSCISSA                                   GRS        7
C     NDX = INCREMENT BETWEEN POINTS IN THE X ARRAY                     GRS        8
C     Y = ARRAY OF POINTS ON ORDINATE                                   GRS        9
C     NDY = INCREMENT BETWEEN POINTS IN THE Y ARRAY                     GRS       10
C     XV = KNOWN VALUE OF X                                             GRS       11
C     N = NUMBER OF POINTS IN TABLE                                     GRS       12
C     NRANGE = EXTRAPOLATION INDICATOR                                  GRS       13
C                                                                       GRS       14
      DIMENSION X(NDX,3), Y(NDY,3), DX(3), DY(3), YP(2)                 GRS       15
      NRANGE = 0                                                        GRS       16
      IF(XV .LT. X(1,1)) NRANGE = -1                                    GRS       17
      IF(XV .GT. X(1,N)) NRANGE = +1                                    GRS       18
      DO 10 I = 1,N                                                     GRS       19
      IF(XV - X(1,I)) 20,70,10                                          GRS       20
   10 CONTINUE                                                          GRS       21
      I = N                                                             GRS       22
   20 IF(I .GT. 2) GO TO 30                                             GRS       23
      N1 = 3                                                            GRS       24
      N2 = 2                                                            GRS       25
      N3 = 1                                                            GRS       26
      NP = 3                                                            GRS       27
      GO TO 55                                                          GRS       28
   30 IF(I .LT. N) GO TO 40                                             GRS       29
      NP = 3                                                            GRS       30
      GO TO 50                                                          GRS       31
   40 NP = 4                                                            GRS       32
      N4 = I + 1                                                        GRS       33
   50 N1 = I - 2                                                        GRS       34
      N2 = I - 1                                                        GRS       35
      N3 = I                                                            GRS       36
   55 DX(1) =  X(1,N2) - X(1,N1)                                        GRS       37
      DY(1) =  Y(1,N2) - Y(1,N1)                                        GRS       38
      DX(2) =  X(1,N3) - X(1,N2)                                        GRS       39
      DY(2) =  Y(1,N3) - Y(1,N2)                                        GRS       40
      R = (XV - X(1,N2))/DX(2)                                          GRS       41
      YP(1) = (DY(1)*DX(2)**2 + DY(2)*DX(1)**2)/(DX(1)*(DX(1) + DX(2)))  GRS       42
      IF(NP .EQ. 4) GO TO 60                                            GRS       43
      GRS = Y(1,N2) + R*(YP(1) + R*(DY(2) - YP(1)))                     GRS       44
      GO TO 9999                                                        GRS       45
   60 DX(3) = X(1,N4) - X(1,N3)                                         GRS       46
      DY(3) = Y(1,N4) - Y(1,N3)                                         GRS       47
      YP(2) = (DY(2)*DX(3)**2 + DY(3)*DX(2)**2)/(DX(3)*(DX(2) + DX(3)))  GRS       48
      GRS = Y(1,N2) + R*(YP(1) + R*(3.*DY(2) - 2.*YP(1) - YP(2) +       GRS       49
     1 R*(YP(1) + YP(2) - 2.*DY(2))))                                   GRS       50
      GO TO 9999                                                        GRS       51
   70 GRS = Y(1,I)                                                      GRS       52
 9999 RETURN                                                            GRS       53
      END                                                               GRS       54
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	GRS	1	52

VARIABLES	SN	TYPE	RELOCATION									
174	DX	REAL	ARRAY		REFS	14	40	5*41	5*47	DEFINED	36	38
					45							
177	DY	REAL	ARRAY		REFS	14	2*41	43	2*47	2*48		
					DEFINED	37	39	46				
164	GRS	REAL			DEFINED	43	48	51				
165	I	INTEGER			REFS	19	22	28	32	33	34	35
					51	DEFINED	18	21				
0	N	INTEGER		F.P.	REFS	17	18	21	28	DEFINED	1	
0	NDX	INTEGER		F.P.	REFS	14	DEFINED	1				
0	NDY	INTEGER		F.P.	REFS	14	DEFINED	1				
171	NP	INTEGER			REFS	42	DEFINED	26	29	31		
0	NRANGE	INTEGER		F.P.	DEFINED	1	15	16	17			
166	N1	INTEGER			REFS	36	37	DEFINED	23	33		
167	N2	INTEGER			REFS	36	37	38	39	40	43	48
					DEFINED	24	34					
170	N3	INTEGER			REFS	38	39	45	46	DEFINED	25	35
172	N4	INTEGER			REFS	45	46	DEFINED	32			
173	R	REAL			REFS	2*43	3*48	DEFINED	48			
0	X	REAL	ARRAY	F.P.	REFS	14	16	17	19	2*36	2*38	40
					2*45	DEFINED	1					
0	XV	REAL		F.P.	REFS	16	17	19	48	DEFINED	1	
0	Y	REAL	ARRAY	F.P.	REFS	14	2*37	2*39	43	2*46	48	51
					DEFINED	1						
202	YP	REAL	ARRAY		REFS	14	2*43	5*48	DEFINED	41	47	

STATEMENT LABELS		DEF LINE	REFERENCES	
0	10	20	18	19
46	20	22	19	
54	30	28	22	
60	40	31	28	
63	50	33	30	
67	55	36	27	
123	60	45	42	
152	70	51	19	
156	9999	52	44	50

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	
36	10	* I	18 20	6B	INSTACK	EXITS

STATISTICS

PROGRAM LENGTH 222B 146

```
      SUBROUTINE H2OSCN (IOPT, XIND, PRESS, TEMP, ENTH, VOL, ENTR, TOL ) COR1   2
      JS = 1                                                             COR1   3
      IF(IOPT .GT. 3 ) GO TO 100                                         COR1   4
      KODE = 1                                                           COR1   5
      PA = PRESS                                                         COR1   6
      GO TO 101                                                          COR1   7
  100 KODE = 2                                                           COR1   8
      TA = TEMP                                                          COR1   9
  101 CALL SATUR( PA, TA, VF, HF, SF, VG, HG, SG, KODE )                 COR1  10
      GO TO ( 1,2,3,4,5,6 ),IOPT                                         COR1  11
    1 IF( XIND .GT. HF ) GO TO 14                                        COR1  12
      JQ = 1                                                             COR1  13
      T = TA - 10.                                                       COR1  14
      HI = HF                                                            COR1  15
   10 TI = TA                                                            COR1  16
      HLO = XIND * ( 1. - TOL )                                          COR1  17
      HHI = XIND * ( 1. + TOL )                                          COR1  18
      DO 7  I = 1,25                                                     COR1  19
      CALL SRSORT ( PRESS, T, V, H, S, ISAT, VG, HG, SG )                COR1  20
      IF ( H .GT. HLO .AND.H .LT. HHI ) GO TO 8                          COR1  21
      TX = T - ( TI - T ) / ( HI - H ) * ( H - XIND )                    COR1  22
      IF ( JQ .EQ. 2 ) GO TO 12                                          COR1  23
      IF ( TX .GT. TA )  TX = TA                                         COR1  24
      GO TO 13                                                           COR1  25
   12 IF ( TX .LT. TA ) TX = TA                                          COR1  26
   13 HI = H                                                             COR1  27
      TI = T                                                             COR1  28
    7 T  = TX                                                            COR1  29
  199 WRITE ( 6,9 ) IOPT, PRESS, XIND                                    COR1  30
    9 FORMAT(27H0FAIL TO CONVERGE - OPTION ,I2,14H - PRESSURE = ,F9.3,   COR1  31
     219H PSIA - ENTHALPY = ,F9.3,9H BTU/LBM  )                          COR1  32
      JS = 2                                                             COR1  33
      GO TO 200                                                          COR1  34
   14 IF ( XIND .LT. HG ) GO TO 11                                       COR1  35
      T = TA + 10.                                                       COR1  36
      HI = HG                                                            COR1  37
      JQ = 2                                                             COR1  38
      GO TO 10                                                           COR1  39
   11 TEMP = TA                                                          COR1  40
      ENTH = XIND                                                        COR1  41
      X = (XIND - HF ) / ( HG - HF )                                     COR1  42
      VOL = VF  + X * (VG - VF )                                         COR1  43
      ENTR = SF + X * (SG - SF )                                         COR1  44
      GO TO 200                                                          COR1  45
    8 TEMP = T                                                           COR1  46
   15 ENTH = H                                                           COR1  47
      VOL  = V                                                           COR1  48
      ENTR = S                                                           COR1  49
      GO TO 200                                                          COR1  50
    2 IF( XIND.GT.VF ) GO TO 24                                          COR1  51
      JQ = 1                                                             COR1  52
      T = TA - 10.                                                       COR1  53
      VI = VF                                                            COR1  54
   20 TI = TA                                                            COR1  55
      VLO = XIND * ( 1. - TOL )                                          COR1  56
      VHI = XIND * ( 1. + TOL )                                          COR1  57
      DO 27 I = 1,25                                                     COR1  58
```

```
      CALL SPSORT (PRESS,T,V,H,S,ISAT,VG,HG,SG )                        COR1      59
      IF ( V.GT. VLO .AND. V.LT. VHI ) GO TO 8                          COR1      60
60    TX = T -(TI-T) / (VI-V) * (V- XIND )                              COR1      61
      IF ( JQ.EQ.2) GO TO 22                                            COR1      62
      IF ( TX.GT.TA ) TX = TA                                           COR1      63
      GO TO 23                                                          COR1      64
   22 IF ( TX .LT. TA ) TX = TA                                         COR1      65
65    23 VI = V                                                         COR1      66
      TI = T                                                            COR1      67
   27 T = TX                                                            COR1      68
      GO TO 199                                                         COR1      69
   24 IF ( XIND .LT. VG ) GO TO 21                                      COR1      70
70    T= TA + 10.                                                       COR1      71
      VI = VG                                                           COR1      72
      JQ = 2                                                            COR1      73
      GO TO 20                                                          COR1      74
   21 TEMP = TA                                                         COR1      75
75    VOL = XIND                                                        COR1      76
      X = ( XIND - VF ) / ( VG -VF )                                    COR1      77
      ENTH = HF + X * (HG - HF )                                        COR1      78
      ENTR = SF + X * (SG - SF )                                        COR1      79
      GO TO 200                                                         COR1      80
80     3 IF( XIND.GT.SF ) GO TO 34                                      COR1      81
      JQ = 1                                                            COR1      82
      T = TA - 10.                                                      COR1      83
      SI = SF                                                           COR1      84
   30 TI = TA                                                           COR1      85
85    SLO = XIND * ( 1. - TOL )                                         COR1      86
      SHI = XIND * ( 1. + TOL )                                         COR1      87
      DO 37 I = 1,25                                                    COR1      88
      CALL SRSORT (PRESS,T,V,H,S,ISAT,VG,HG,SG )                        COR1      89
      IF ( S.GT. SLO .AND. S.LT. SHI ) GO TO 8                          COR1      90
90    TX= T -(TI-T) / (SI-S) * (S- XIND )                               COR1      91
      IF ( JQ.EQ.2) GO TO 32                                            COR1      92
      IF ( TX.GT.TA ) TX = TA                                           COR1      93
      GO TO 33                                                          COR1      94
   32 IF ( TX .LT. TA ) TX = TA                                         COR1      95
95    33 SI = S                                                         COR1      96
      TI = T                                                            COR1      97
   37 T  = TX                                                           COR1      98
      GO TO 199                                                         COR1      99
   34 IF ( XIND .LT. SG ) GO TO 31                                      COR1     100
100   T= TA + 10.                                                       COR1     101
      SI = SG                                                           COR1     102
      JQ = 2                                                            COR1     103
      GO TO 30                                                          COR1     104
   31 TEMP = TA                                                         COR1     105
105   ENTR= XIND                                                        COR1     106
      X = ( XIND - SF ) / ( SG -SF )                                    COR1     107
      ENTH = HF + X * (HG - HF )                                        COR1     108
      VOL  = VF + X * (VG - VF )                                        COR1     109
      GO TO 200                                                         COR1     110
110    4 IF ( XIND.GT.HF ) GO TO 44                                     COR1     111
      JQ = 1                                                            COR1     112
      P = PA + 100.                                                     COR1     113
      HI = HF                                                           COR1     114
   40 PI = PA                                                           COR1     115
```

```
      HLO = XIND * ( 1. - TOL )                                          COR1  116
      HHI = XIND * ( 1. + TOL )                                          COR1  117
      DO 47 I = 1,25                                                     COR1  118
      CALL SRSORT (P,TEMP,V,H,S,ISAT,VG,HG,SG )                          COR1  119
      IF ( H.GT. HLO .AND. H.LT. HHI ) GO TO 45                          COR1  120
      PX= P -(PI-P) / (HI-H) * (H- XIND )                                COR1  121
      IF ( JQ.EQ.2) GO TO 42                                             COR1  122
      IF ( PX.LT.PA ) PX = PA* ( 1. + .05/ I )                           COR1  123
      GO TO 43                                                           COR1  124
   42 IF ( PX .GT. PA ) PX = PA * ( 1. - .05 / I )                       COR1  125
   43 HI = H                                                             COR1  126
      PI = P                                                             COR1  127
   47 P  = PX                                                            COR1  128
      GO TO 199                                                          COR1  129
   44 IF ( XIND .LT. HG ) GO TO 41                                       COR1  130
      P= PA - 50.                                                        COR1  131
      HI = HG                                                            COR1  132
      JQ = 2                                                             COR1  133
      GO TO 40                                                           COR1  134
   41 PRESS= PA                                                          COR1  135
      ENTH= XIND                                                         COR1  136
      X = ( XIND - HF ) / ( HG -HF )                                     COR1  137
      VOL  = VF + X * (VG - VF )                                         COR1  138
      ENTR = SF + X * (SG - SF )                                         COR1  139
      GO TO 200                                                          COR1  140
   45 PRESS = P                                                          COR1  141
      GO TO 15                                                           COR1  142
    5 IF ( XIND.GT.VF ) GO TO 54                                         COR1  143
      JQ = 1                                                             COR1  144
      P = PA + 100.                                                      COR1  145
      VI = VF                                                            COR1  146
   50 PI = PA                                                            COR1  147
      VLO = XIND * ( 1. - TOL )                                          COR1  148
      VHI = XIND * ( 1. + TOL )                                          COR1  149
      DO 57 I = 1,25                                                     COR1  150
      CALL SRSORT (P,TEMP,V,H,S,ISAT,VG,HG,SG )                          COR1  151
      IF ( V.GT. VLO .AND. V.LT. VHI ) GO TO 45                          COR1  152
      PX= P -(PI-P) / (VI-V) * (V- XIND )                                COR1  153
      IF ( JQ.EQ.2) GO TO 52                                             COR1  154
      IF ( PX.LT.PA ) PX = PA * ( 1. + .05 / I )                         COR1  155
      GO TO 53                                                           COR1  156
   52 IF ( PX .GT. PA ) PX = PA * ( 1. - .05 / I )                       COR1  157
   53 VI = V                                                             COR1  158
      PI = P                                                             COR1  159
   57 P  = PX                                                            COR1  160
      GO TO 199                                                          COR1  161
   54 IF ( XIND .LT. VG ) GO TO 51                                       COR1  162
      P= PA - 50.                                                        COR1  163
      VI = VG                                                            COR1  164
      JQ = 2                                                             COR1  165
      GO TO 50                                                           COR1  166
   51 PRESS= PA                                                          COR1  167
      VOL = XIND                                                         COR1  168
      X = ( XIND - VF ) / ( VG -VF )                                     COR1  169
      ENTH = HF + X * (HG - HF )                                         COR1  170
      ENTR = SF + X * (SG - SF )                                         COR1  171
      GO TO 200                                                          COR1  172
```

```
          6 IF( XIND.GT.SF ) GO TO 64                                  COR1     173
            JQ = 1                                                     COR1     174
            P = PA + 100.                                              COR1     175
            SI = SF                                                    COR1     176
         60 PI = PA                                                    COR1     177
            SLO = XIND * ( 1. - TOL )                                  COR1     178
            SHI = XIND * ( 1. + TOL )                                  COR1     179
            DO 67 I = 1,25                                             COR1     180
            CALL SRSORT (P,TEMP,V,H,S,ISAT,VG,HG,SG )                  COR1     181
            IF ( S.GT. SLO .AND. S.LT. SHI ) GO TO 45                  COR1     182
            PX= P -(PI-P) / (SI-S) * (S- XIND )                        COR1     183
            IF ( JQ.EQ.2) GO TO 62                                     COR1     184
            IF ( PX.LT.PA ) PX = PA * ( 1. + .05 / I )                 COR1     185
            GO TO 63                                                   COR1     186
         62 IF ( PX .GT. PA ) PX = PA * ( 1. - .05 / I )               COR1     187
         63 SI = S                                                     COR1     188
            PI = P                                                     COR1     189
         67 P  = PX                                                    COR1     190
            GO TO 199                                                  COR1     191
         64 IF ( XIND .LT. SG ) GO TO 61                               COR1     192
            P= PA - 50.                                                COR1     193
            SI = SG                                                    COR1     194
            JQ = 2                                                     COR1     195
            GO TO 60                                                   COR1     196
         61 PRESS= PA                                                  COR1     197
            ENTR= XIND                                                 COR1     198
            X = ( XIND - SF ) / ( SG -SF )                             COR1     199
            VOL  = VF + X * (VG - VF )                                 COR1     200
            ENTH = HF + X * (HG - HF )                                 COR1     201
            GO TO 200                                                  COR1     202
        200 IF ( JS .GT. 1 ) STOP                                      COR1     203
            RETURN                                                     COR1     204
            END                                                        COR1     205
```

SYMBOLIC REFERENCE MAP (R=2)

```
ENTRY POINTS     DEF LINE      REFERENCES
   3 H2OSCN         1           203

VARIABLES      SN  TYPE            RELOCATION
   0  ENTH         REAL                 F.P.    DEFINED        1       40       46       77      107      135      169
                                                    200
   0  ENTR         REAL                 F.P.    DEFINED        1       43       48       78      105      138      170
                                                    197
1016  H            REAL                            REFS       19     2*20     2*21       26       46       58       88
                                                    118    2*119    2*120      125      150      180
1001  HF           REAL                            REFS        9       11       14     2*41     2*77    2*107      110
                                                    113    2*136    2*169    2*200
1004  HG           REAL                            REFS        9       19       34       36       41       58       77
                                                     88      107      118      129      131      136      150      169
                                                    180      200
1013  HHI          REAL                            REFS       20      119  DEFINED       17      116
1010  HI           REAL                            REFS       21      120  DEFINED       14       26       36      113
```

VARIABLES	SN	TYPE	RELOCATION								
				125	131						
1012	HLO	REAL		REFS	20	119	DEFINED	16	115		
1014	I	INTEGER		REFS	122	124	154	156	184	186	
				DEFINED	18	57	87	117	149	179	
0	IOPT	INTEGER	F.P.	REFS	3	10	29	DEFINED	1		
1020	ISAT	INTEGER		REFS	19	58	88	118	150	180	
1006	JQ	INTEGER		REFS	22	61	91	121	153	183	
				DEFINED	12	37	51	72	81	102	111
				132	143	164	173	194			
774	JS	INTEGER		REFS	202	DEFINED	2	32			
775	KODE	INTEGER		REFS	9	DEFINED	4	7			
1031	P	REAL		REFS	118	2*120	126	140	150	2*152	158
				180	2*182	188	DEFINED	112	127	130	144
				159	162	174	189	192			
776	PA	REAL		REFS	9	112	114	2*122	2*124	130	134
				144	146	2*154	2*156	162	166	174	176
				2*184	2*186	192	196	DEFINED	5		
1032	PI	REAL		REFS	120	152	182	DEFINED	114	126	146
				158	176	188					
0	PRESS	REAL	F.P.	REFS	5	19	29	58	88		
				DEFINED	1	134	140	166	196		
1033	PX	REAL		REFS	122	124	127	154	156	159	184
				186	189	DEFINED	120	122	124	152	154
				156	182	184	186				
1017	S	REAL		REFS	19	48	58	88	2*89	2*90	95
				118	150	180	2*181	2*182	187		
1002	SF	REAL		REFS	9	2*43	2*78	80	83	2*106	2*138
				2*170	172	175	2*198				
1005	SG	REAL		REFS	9	19	43	58	78	88	99
				101	106	118	138	150	170	180	191
				193	198						
1030	SHI	REAL		REFS	89	181	DEFINED	86	178		
1026	SI	REAL		REFS	90	182	DEFINED	83	95	101	175
				187	193						
1027	SLO	REAL		REFS	89	181	DEFINED	85	177		
1007	T	REAL		REFS	19	2*21	27	45	58	2*60	66
				88	2*90	96	DEFINED	13	28	35	52
				67	70	82	97	100			
777	TA	REAL		REFS	9	13	15	2*23	2*25	35	39
				52	54	2*62	2*64	70	74	82	84
				2*92	2*94	100	104	DEFINED	8		
0	TEMP	REAL	F.P.	REFS	8	118	150	180	DEFINED	1	39
				45	74	104					
1011	TI	REAL		REFS	21	60	90	DEFINED	15	27	54
				66	84	96					
0	TOL	REAL	F.P.	REFS	16	17	55	56	85	86	115
				116	147	148	177	178	DEFINED	1	
1021	TX	REAL		REFS	23	25	28	62	64	67	92
				94	97	DEFINED	21	23	25	60	62
				64	90	92	94				
1015	V	REAL		REFS	19	47	58	2*59	2*60	65	88
				118	150	2*151	2*152	157	180		
1000	VF	REAL		REFS	9	2*42	50	53	2*76	2*108	2*137
				142	145	2*168	2*199				
1003	VG	REAL		REFS	9	19	42	58	69	71	76
				88	108	118	137	150	161	163	168
				180	199						

VARIABLES	SN	TYPE	RELOCATION								
1025	VHI	REAL		REFS	59	151	DEFINED	56	148		
1023	VI	REAL		REFS	60	152	DEFINED	53	65	71	145
				157	163						
1024	VLO	REAL		REFS	59	151	DEFINED	55	147		
0	VOL	REAL	F.P.	DEFINED	1	42	47	75	108	137	167
				199							
1022	X	REAL		REFS	42	43	77	78	107	108	137
				138	169	170	199	200	DEFINED	41	76
				106	136	168	198				
0	XIND	REAL	F.P.	REFS	11	16	17	21	29	34	40
				41	50	55	56	60	69	75	76
				80	85	86	90	99	105	106	110
				115	116	120	129	135	136	142	147
				148	152	161	167	168	172	177	178
				182	191	197	198	DEFINED	1		

FILE NAMES	MODE		
TAPE6	FMT	WRITES	29

EXTERNALS	TYPE	ARGS	REFERENCES					
SATUR		9	9					
SRSORT		9	19	58	88	118	150	180

STATEMENT LABELS			DEF LINE	REFERENCES		
44	1		11	10		
157	2		50	10		
257	3		80	10		
357	4		110	10		
467	5		142	10		
575	6		172	10		
0	7		28	18		
150	8		45	20	59	89
753	9	FMT	30	29		
53	10		15	38		
132	11		39	34		
104	12		25	22		
107	13		26	24		
122	14		34	11		
152	15		46	141		
166	20		54	73		
241	21		74	69		
217	22		64	61		
222	23		65	63		
231	24		69	50		
0	27		67	57		
266	30		84	103		
341	31		104	99		
317	32		94	91		
322	33		95	93		
331	34		99	80		
0	37		97	87		
366	40		114	133		
447	41		134	129		
422	42		124	121		
430	43		125	123		
437	44		129	110		
465	45		140	119	151	181

STATEMENT LABELS		DEF LINE	REFERENCES								
0	47	127	117								
476	50	146	165								
557	51	166	161								
532	52	156	153								
540	53	157	155								
547	54	161	142								
0	57	159	149								
604	60	176	195								
665	61	196	191								
640	62	186	183								
646	63	187	185								
655	64	191	172								
0	67	189	179								
24	100	7	3								
27	101	9	6								
116	199	29	68	98	128	160	190				
702	200	202	33	44	49	79	109	139	171	201	

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES		
62	7	*	I	18 28	34B		EXT REFS	EXITS
175	27	*	I	57 67	34B		EXT REFS	EXITS
275	37	*	I	87 97	34B		EXT REFS	EXITS
375	47	*	I	117 127	42B		EXT REFS	EXITS
505	57	*	I	149 159	42B		EXT REFS	EXITS
613	67	*	I	179 189	42B		EXT REFS	EXITS

STATISTICS

PROGRAM LENGTH	1065B	565

```
      SUBROUTINE SRSORT (P, T, V, H, S, ISAT, VG, HG, SG)                SRSORT     2
C     THIS ROUTINE RECIEVES A TEMPERATURE AND PRESSURE AND DETERMINES    SRSORT     3
C     WHICH SUBREGION (1,2,3,OR 4) THIS POINT LIES IN.  IT THEN          SRSORT     4
C     CALCULATES SPECIFIC VOLUME (V), ENTHALPY (H), AND ENTROPY (S) FOR  SRSORT     5
C     THIS POINT.  IF THE POINT IS AT SATURATION, SWITCH ISAT IS SET TO  SRSORT     6
C     A VALUE OF 2 AND VF, HF, AND SF ARE RETURNED IN V, H, AND S AND    SRSORT     7
C     THE VAPOR SIDE PROPERTIES ARE RETURNED AS VG, HG, AND SG.          SRSORT     8
C                                                                        SRSORT     9
C                                                                        SRSORT    10
      ISAT = 1                                                           SRSORT    11
C     CHECK IF POINT LIES ABOVE THE SATURATION DOME, IF SO GO TO S.R. 2  SRSORT    12
      IF(T .GT. 705.47) GO TO 10                                         SRSORT    13
C     DETERMINE THE SATURATION TEMPERATURE.                              SRSORT    14
      T1 = T                                                             SRSORT    15
      PSAT = PSL(T1)                                                     SRSORT    16
C     IF AT SATURATION, GO TO CALC. SAT. PROPERTIES.                     SRSORT    17
      IF(P .EQ. PSAT) GO TO 60                                           SRSORT    18
C     IF T IS BELOW 662. F THEN POINT MUST BE IN S.R. 1 OR 2.            SRSORT    19
      IF(T .LE. 662.0) GO TO 30                                          SRSORT    20
C     CHECK IF IN SUBREGION 4.                                           SRSORT    21
      IF(P .GT. PSAT) GO TO 52                                           SRSORT    22
C     THE FOLLOWING IS FOR SUBREGIONS 2 OR 3.                            SRSORT    23
   10 P23 = P23T(T)                                                      SRSORT    24
      IF(P .GT. P23) GO TO 50                                            SRSORT    25
C     THE FOLLOWING IS FOR SUBREGION 2 ONLY.                             SRSORT    26
   20 V = VPT2(P,T)                                                      SRSORT    27
      H = H2E(DMY)                                                       SRSORT    28
      S = S2E(DMY)                                                       SRSORT    29
      RETURN                                                             SRSORT    30
C     THE FOLLOWING CHECKS FOR SUBREGION 1 OR 2.                         SRSORT    31
   30 IF(T .LT. 25.0) GO TO 70                                           SRSORT    32
      IF(P .LT. PSAT) GO TO 20                                           SRSORT    33
C     THE FOLLOWING IS FOR SUBREGION 1 ONLY.                             SRSORT    34
   40 V = VPT1(P,T)                                                      SRSORT    35
      H = H1E (DMY)                                                      SRSORT    36
      S = S1E (DMY)                                                      SRSORT    37
      RETURN                                                             SRSORT    38
C     THE FOLLOWING IS FOR SUBREGIONS 3 AND 4.                           SRSORT    39
   50 V = VPT3D(P,T)                                                     SRSORT    40
   51 H=HVT3(V,T)                                                        SRSORT    41
      S = S3E(DMY)                                                       SRSORT    42
      RETURN                                                             SRSORT    43
   52 V = VPT3L(P,T)                                                     SRSORT    44
      GO TO 51                                                           SRSORT    45
C     THE FOLLOWING IS FOR SATURATION PROPERTIES.                        SRSORT    46
   60 ISAT = 2                                                           SRSORT    47
      K = 3                                                              SRSORT    48
      CALL SATUR (P,T,V,H,S,VG,HG,SG,K)                                  SRSORT    49
      RETURN                                                             SRSORT    50
C     THE FOLLOWING IS FOR INDICATING ERRORS.                            SRSORT    51
   70 ISAT = 3                                                           SRSORT    52
      RETURN                                                             SRSORT    53
      END                                                                SRSORT    54
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES				
3	SRSORT	1	29	37	42	49	52

VARIABLES	SN	TYPE	RELOCATION									
164	DMY	REAL			REFS	27	28	35	36	41		
0	H	REAL		F.P.	REFS	48	DEFINED	1	27	35	40	
0	HG	REAL		F.P.	REFS	48	DEFINED	1				
0	ISAT	INTEGER		F.P.	DEFINED	1	10	46	51			
165	K	INTEGER			REFS	48	DEFINED	47				
0	P	REAL		F.P.	REFS	17	21	24	26	32	34	39
						43	48	DEFINED	1			
162	PSAT	REAL			REFS	17	21	32	DEFINED	15		
163	P23	REAL			REFS	24	DEFINED	23				
0	S	REAL		F.P.	REFS	48	DEFINED	1	28	36	41	
0	SG	REAL		F.P.	REFS	48	DEFINED	1				
0	T	REAL		F.P.	REFS	12	14	19	23	26	31	34
						39	40	43	48	DEFINED	1	
161	T1	REAL			REFS	15	DEFINED	14				
0	V	REAL		F.P.	REFS	40	48	DEFINED	1	26	34	39
						43						
0	V6	REAL		F.P.	REFS	48	DEFINED	1				

EXTERNALS	TYPE	ARGS	REFERENCES
HVT3	REAL	2	40
H1E	REAL	1	35
H2E	REAL	1	27
PSL	REAL	1	15
P23T	REAL	1	23
SATUR		9	48
S1E	REAL	1	36
S2E	REAL	1	28
S3E	REAL	1	41
VPT1	REAL	2	34
VPT2	REAL	2	26
VPT3D	REAL	2	39
VPT3L	REAL	2	43

STATEMENT LABELS			DEF LINE	REFERENCES
22	10		23	12
30	20		26	32
44	30		31	19
0	40	INACTIVE	34	
64	50		39	24
71	51		40	44
102	52		43	21
110	60		46	17
130	70		51	31

STATISTICS

PROGRAM LENGTH	166B	118

```
      SUBROUTINE STER(NAME, I, A, B)                                    STER      2
C  STEP  ROUTINE FOR PRINTING ERROR MESSAGES ASSOCIATED                 STER      3
C        WITH THE STEAM TABLES                                          STER      4
C                                                                       STER      5
C                                                                       STER      6
C     NAME IS THE BCD NAME OF THE CALLING ROUTINE.                      STER      7
C     I POSITIVE PRINTS -OUT OF RANGE-                                  STER      8
C     I NEGATIVE PRINTS -NON CONVERGENT-                                STER      9
C     IF I IS ONE DIGIT ITS CORRESPONDING ARGUMENT A IS PRINTED.        STER     10
C     IF I IS TWO DIGITS ITS TWO CORR. ARGUMENTS A AND B ARE PRINTED.   STER     11
      REAL MA(5)                                                        STER     12
      REAL MP                                                           STER     13
      REAL NAME                                                         STER     14
      DIMENSION M(10)                                                   STER     15
      DATA M/4H OUT,4H OF ,4HRANG,4HE IN,4H    ,4HNON ,4HCONV,4HERGE,   STER     16
     1 4HNT I, 4HN    /                                                 STER     17
      DATA MA/6HPRESS=,6HTEMP =,6HENTH =,5HVOL =,6HENTR =/              STER     18
      IM = 1                                                            STER     19
      IF(I.LT.0) IM=6                                                   STER     20
      I2 = IABS(I)                                                      STER     21
      I1 = I2/10                                                        STER     22
      I2 = I2 - I1 * 10                                                 STER     23
      MP = MA(I2)                                                       STER     24
      IF(I1.GT. 0) MP=MA(I1)                                            STER     25
      WRITE(6,8) M(IM), M(IM+1), M(IM+2),M(IM+3),M(IM+4), NAME, MP, A   STER     26
      IF(I1 .EQ. 0) GO TO 4                                             STER     27
      WRITE(6,9) MA(I2), B                                              STER     28
    4 STOP                                                              STER     29
    8 FORMAT(1X, 4A4,A1,A6,2X,A6, E13.6)                                STER     30
    9 FORMAT(27X, A6, F13.6)                                            STER     31
      END                                                               STER     32
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
3	STER	1	

VARIABLES

		SN	TYPE		RELOCATION								
0	A		REAL		F.P.	REFS	25	DEFINED	1				
0	B		REAL		F.P.	REFS	27	DEFINED	1				
0	I		INTEGER		F.P.	REFS	19	20	DEFINED	1			
74	IM		INTEGER			REFS	5*25	DEFINED	18	19			
76	I1		INTEGER			REFS	22	2*24	26	DEFINED	21		
75	I2		INTEGER			REFS	21	22	23	27	DEFINED	20	22
104	M		INTEGER	ARRAY		REFS	14	5*25	DEFINED	15			
77	MA		REAL	ARRAY		REFS	11	23	24	27	DEFINED	17	
73	MP		REAL			REFS	12	25	DEFINED	23	24		
0	NAME		REAL		F.P.	REFS	13	25	DEFINED	1			

FILE NAMES

	MODE			
TAPE6	FMT	WRITES	25	27

424026

INLINE FUNCTIONS	TYPE	ARGS		DEF LINE	REFERENCES
IABS	INTEGER	1	INTRIN		20

STATEMENT LABELS			DEF LINE	REFERENCES
42	4		28	26
63	8	FMT	29	25
67	9	FMT	30	27

STATISTICS

PROGRAM LENGTH	116B	78

```
      FUNCTION HPT1(P,T)                                                HPT1    2
C  HPT1  ENTHALPY - SUBREGION 1  H = F(P,T)  A 2ND LEVEL SUBROUTINE     HPT1    3
C       ENTRY = H1E(DUMMY)                                               HPT1    4
C       CALLS COMT1(P,T)                                                 HPT1    5
C                                                                        HPT1    6
C                                                                        HPT1    7
C                                                                        HPT1    8
C                                                                        HPT1    9
      COMMON /CONST1/AA0, AA1, AA2, AA3, AA4, AA5, AA6, AA7, AA8, AA9,   HPT1   10
     1    AA10,AA11,AA12,AA13,AA14,AA15,AA16,AA17,AA18,AA19,AA20,AA21,   HPT1   11
     2    AA22,  A1,  A2,  A3,  A4,  A5,  A6,  A7,  A8,  A9, A10, A11,   HPT1   12
     3     A12                                                           HPT1   13
C                                                                        HPT1   14
C                                                                        HPT1   15
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010,  HPT1   16
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN,  HPT1   17
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,  HPT1   18
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX          HPT1   19
C                                                                        HPT1   20
C                                                                        HPT1   21
      COMMON /STM1/ THETA,  TH2,  TH4,  TH6,  TH7, TH10, TH11, TH16,    HPT1   22
     1   TH17, TH18, TH19, TH20, TH21, BETA,BETA2,BETA3,BETA4, Y,YP,     HPT1   23
     2  Z, ZP,  UA9, UA10,   U8,  UB2,   UC,  U3T,  UD4,   UP           HPT1   24
C                                                                        HPT1   25
C                                                                        HPT1   26
      DATA   A3M1,  A9T17 / +7.200000000E-1, +2.411960000E00 /           HPT1   27
      DATA  AA4T2,  AA5T3 / -1.346655548E+5, +2.970714308E+5 /           HPT1   28
      DATA  AA6T4,  AA7T5 / -4.375647096E+5, +4.295420834E+5 /           HPT1   29
      DATA  AA8T6,  AA9T7 / -2.706701245E+5, +9.926972482E+4 /           HPT1   30
      DATA AA10T8, AA2221 / -1.613816890E+4, +1.270001531E-12/           HPT1   31
C                                                                        HPT1   32
C                                                                        HPT1   33
      CALL COMT1 (P,T)                                                   HPT1   34
C                                                                        HPT1   35
      ENTRY H1E                                                          HPT1   36
C                                                                        HPT1   37
C     THIS ENTRY TO BE USED ONLY IF COMT1 WAS LAST CALLED WITH THE       HPT1   38
C     VALUES OF P AND T THAT ARE TO BE ASSUMED HERE.                     HPT1   39
C                                                                        HPT1   40
 1000 H5 =BETA3*(AA21*A12 + AA2221*BETA/TH20)                            HPT1   41
      H4 = AA20*TH18*(A9T17 + 19.0*TH2)*UP                               HPT1   42
      H3 = (12.0 *TH11 + A8)*U3T                                         HPT1   43
      H2 = (AA12 - AA14*TH2 + AA15*(9.0*THETA + A6)*UA9                  HPT1   44
     1 + AA16*(20.*TH19 + A7)/UB2)*BETA                                  HPT1   45
      H1 = AA11*(Z*(17.0*(Z/29.0 - Y/12.0) + 5.0*THETA*YP/12.0) +        HPT1   46
     1 A4*THETA - A3M1*THETA*Y*YP)*ZP                                    HPT1   47
      H0 = AA0*THETA + AA1 - TH2*(AA3 + THETA*(AA4T2 + THETA*(AA5T3 +    HPT1   48
     1 THETA*(AA6T4 + THETA*(AA7T5 + THETA*(AA8T6 + THETA*(AA9T7 +       HPT1   49
     2 THETA*AA1078))))))                                                HPT1   50
C                                                                        HPT1   51
C     CONSTANT ADDED TO GIVE EXACT VALUE AT TRIPLE POINT.                HPT1   52
C                                                                        HPT1   53
      HPT1 = (H0 + H1 + H2 - H3 + H4 + H5 + ALPHA0)*PV010                HPT1   54
 2000 RETURN                                                             HPT1   55
      END                                                                HPT1   56
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	HPT1	1	
14	H1E	35	54

VARIABLES	SN	TYPE	RELOCATION				
0	AA0	REAL	CONST1	REFS	9	47	
1	AA1	REAL	CONST1	REFS	9	47	
12	AA10	REAL	CONST1	REFS	9		
143	AA10T8	REAL		REFS	47	DEFINED	30
13	AA11	REAL	CONST1	REFS	9	45	
14	AA12	REAL	CONST1	REFS	9	43	
15	AA13	REAL	CONST1	REFS	9		
16	AA14	REAL	CONST1	REFS	9	43	
17	AA15	REAL	CONST1	REFS	9	43	
20	AA16	REAL	CONST1	REFS	9	43	
21	AA17	REAL	CONST1	REFS	9		
22	AA18	REAL	CONST1	REFS	9		
23	AA19	REAL	CONST1	REFS	9		
2	AA2	REAL	CONST1	REFS	9		
24	AA20	REAL	CONST1	REFS	9	41	
25	AA21	REAL	CONST1	REFS	9	40	
26	AA22	REAL	CONST1	REFS	9		
144	AA2221	REAL		REFS	40	DEFINED	30
3	AA3	REAL	CONST1	REFS	9	47	
4	AA4	REAL	CONST1	REFS	9		
135	AA4T2	REAL		REFS	47	DEFINED	27
5	AA5	REAL	CONST1	REFS	9		
136	AA5T3	REAL		REFS	47	DEFINED	27
6	AA6	REAL	CONST1	REFS	9		
137	AA6T4	REAL		REFS	47	DEFINED	28
7	AA7	REAL	CONST1	REFS	9		
140	AA7T5	REAL		REFS	47	DEFINED	28
10	AA8	REAL	CONST1	REFS	9		
141	AA8T6	REAL		REFS	47	DEFINED	29
11	AA9	REAL	CONST1	REFS	9		
142	AA9T7	REAL		REFS	47	DEFINED	29
10	AI1	REAL	COMCON	REFS	15		
0	ALPHA0	REAL	COMCON	REFS	15	53	
1	ALPHA1	REAL	COMCON	REFS	15		
27	A1	REAL	CONST1	REFS	9		
40	A10	REAL	CONST1	REFS	9		
41	A11	REAL	CONST1	REFS	9		
42	A12	REAL	CONST1	REFS	9	40	
30	A2	REAL	CONST1	REFS	9		
31	A3	REAL	CONST1	REFS	9		
133	A3M1	REAL		REFS	45	DEFINED	26
32	A4	REAL	CONST1	REFS	9	45	
33	A5	REAL	CONST1	REFS	9		
34	A6	REAL	CONST1	REFS	9	43	
35	A7	REAL	CONST1	REFS	9	43	
36	A8	REAL	CONST1	REFS	9	42	
37	A9	REAL	CONST1	REFS	9		
134	A9T17	REAL		REFS	41	DEFINED	26
15	BETA	REAL	STM1	REFS	21	40	43
16	BETA2	REAL	STM1	REFS	21		

VARIABLES	SN	TYPE	RELOCATION					
17	BETA3	REAL	STM1	REFS	21	40		
20	BETA4	REAL	STM1	REFS	21			
32	HMAX	REAL	COMCON	REFS	15			
31	HMIN	REAL	COMCON	REFS	15			
157	HPT1	REAL		DEFINED	53			
33	HSMAX	REAL	COMCON	REFS	15			
165	H0	REAL		REFS	53	DEFINED	47	
164	H1	REAL		REFS	53	DEFINED	45	
163	H2	REAL		REFS	53	DEFINED	43	
162	H3	REAL		REFS	53	DEFINED	42	
161	H4	REAL		REFS	53	DEFINED	41	
34	H4MAX	REAL	COMCON	REFS	15			
160	H5	REAL		REFS	53	DEFINED	40	
0	P	REAL	F.P.	REFS	33	DEFINED	1	
2	PCA	REAL	COMCON	REFS	15			
15	PMAX	REAL	COMCON	REFS	15			
14	PMIN	REAL	COMCON	REFS	15			
16	PSMAX	REAL	COMCON	REFS	15			
7	PVOT	REAL	COMCON	REFS	15			
6	PV010	REAL	COMCON	REFS	15	53		
13	P1	REAL	COMCON	REFS	15			
17	P3MIN	REAL	COMCON	REFS	15			
36	SMAX	REAL	COMCON	REFS	15			
35	SMIN	REAL	COMCON	REFS	15			
37	S3MIN	REAL	COMCON	REFS	15			
40	S4MAX	REAL	COMCON	REFS	15			
8	T	REAL	F.P.	REFS	33	DEFINED	1	
12	TC	REAL	COMCON	REFS	15			
4	TCA	REAL	COMCON	REFS	15			
0	THETA	REAL	STM1	REFS	21	43	3*45	8*47
5	TH10	REAL	STM1	REFS	21			
6	TH11	REAL	STM1	REFS	21	42		
7	TH16	REAL	STM1	REFS	21			
10	TH17	REAL	STM1	REFS	21			
11	TH18	REAL	STM1	REFS	21	41		
12	TH19	REAL	STM1	REFS	21	43		
1	TH2	REAL	STM1	REFS	21	41	43	47
13	TH20	REAL	STM1	REFS	21	40		
14	TH21	REAL	STM1	REFS	21			
2	TH4	REAL	STM1	REFS	21			
3	TH6	REAL	STM1	REFS	21			
4	TH7	REAL	STM1	REFS	21			
23	TMAX	REAL	COMCON	REFS	15			
22	TMIN	REAL	COMCON	REFS	15			
24	TSMAX	REAL	COMCON	REFS	15			
5	TZA	REAL	COMCON	REFS	15			
11	T1	REAL	COMCON	REFS	15			
25	T1MAX	REAL	COMCON	REFS	15			
26	T2MIN	REAL	COMCON	REFS	15			
30	T3MAX	REAL	COMCON	REFS	15			
27	T3MIN	REAL	COMCON	REFS	15			
26	UA10	REAL	STM1	REFS	21			
25	UA9	REAL	STM1	REFS	21	43		
27	UB	REAL	STM1	REFS	21			
30	UB2	REAL	STM1	REFS	21	43		
31	UC	REAL	STM1	REFS	21			
33	UD4	REAL	STM1	REFS	21			

VARIABLES	SN	TYPE	RELOCATION			
34	UP	REAL	STM1	REFS	21	41
32	U3T	REAL	STM1	REFS	21	42
3	VCA	REAL	COMCON	REFS	15	
21	V3MAX	REAL	COMCON	REFS	15	
20	V3MIN	REAL	COMCON	REFS	15	
21	Y	REAL	STM1	REFS	21	2*45
22	YP	REAL	STM1	REFS	21	2*45
23	Z	REAL	STM1	REFS	21	2*45
24	ZP	REAL	STM1	REFS	21	45

EXTERNALS	TYPE	ARGS	REFERENCES
COMT1		2	33

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	40	
0 2000	INACTIVE	54	

COMMON BLOCKS	LENGTH
CONST1	35
COMCON	33
STM1	29

STATISTICS

PROGRAM LENGTH	166B	118
SCM LABELED COMMON LENGTH	141B	97

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      FUNCTION HPT2(P,T)                                                HPT2    2
C  HPT2   ENTHALPY - SUB REGION 2    H = F(P,T)   A 2ND LEVEL ROUTINE   HPT2    3
C         ENTRY = H2E                                                   HPT2    4
C         CALLS = COMT2                                                 HPT2    5
C                                                                       HPT2    6
C                                                                       HPT2    7
C                                                                       HPT2    8
      COMMON /CONST2/ BB00, BB01, BB02, BB03, BB04, BB05, BB11, BB12,   HPT2    9
     1    BB21, BB22, BB23, BB31, BB32, BB41, BB42, BB51, BB52, BB53,   HPT2   10
     2    BB61, BB62, BB71, BB72, BB81, BB82,  B00,  B61,  B71,  B81,   HPT2   11
     3     B82, B890, B891, B892, B893, B894, B895, B896                HPT2   12
C                                                                       HPT2   13
C                                                                       HPT2   14
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010,HPT2   15
     1   PVDT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN,HPT2   16
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,HPT2   17
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX        HPT2   18
C                                                                       HPT2   19
C                                                                       HPT2   20
      COMMON /STM2/ THM1  ,THETA ,TH2   ,TH3   ,TH4   ,X1    ,X2    ,  HPT2   21
     1 X3   ,X4    ,X6    ,X8    ,X10   ,X11   ,X12   ,X13   ,X14   ,  HPT2   22
     2 X17  ,X18   ,X19   ,X24   ,X25   ,X27   ,X28   ,X32   ,BETA  ,  HPT2   23
     3 BETA2,BETA3 ,BET44 ,BETA5 ,BETA6 ,BETA7 ,D4    ,T4    ,D3    ,  HPT2   24
     4 T3   ,D2    ,T2    ,BETAL ,B08L  ,B08LP ,FB    ,BB61F ,BB71F ,  HPT2   25
     5 BB81F                                                            HPT2   26
C                                                                       HPT2   27
      DATA    BB04T2 / -1.309542339E+0 /, BB05T3 / +2.569554617E-1 /,   HPT2   28
     1        B00T2  / +1.526666667E+0 /,  B00T3 / +2.290000000E+0 /,   HPT2   29
     2        B00T4  / +3.053333333E+0 /,  B00T5 / +3.816666667E+0 /,   HPT2   30
     3        B00T6  / +4.580000000E+0 /                                HPT2   31
C                                                                       HPT2   32
C                                                                       HPT2   33
      CALL COMT2 (P,T)                                                  HPT2   34
C                                                                       HPT2   35
      ENTRY H2E                                                         HPT2   36
C                                                                       HPT2   37
C     THIS ENTRY CAN BE USED ONLY IF COMT2 WAS LAST CALLED WITH THE     HPT2   38
C     VALUES OF P AND T THAT ARE TO BE ASSUMED HERE.                    HPT2   39
C                                                                       HPT2   40
 1000 BOTH = B00*THETA                                                  HPT2   41
      H0 = BB00*THETA + BB01 - TH2*(BB03 + THETA*(BB04T2 + BB05T3*THETA)HPT2   42
     1 )                                                                HPT2   43
      H1 = BETA*(BB11*X13*(1.0D0 + 13.0D0*BOTH) + BB12*X3*(1.0D0        HPT2   44
     1 + 3.0*BOTH) + BETA*(BB21*X18*(1.0 + 18.0*BOTH) + BB22*X2*(1.0    HPT2   45
     2 + 2.0*BOTH) + BB23*X1*(1.0 + BOTH) + BETA*(BB31*X18*(1.0         HPT2   46
     3 + 18.0*BOTH) + BB32*X10*(1.0 + 10.0*BOTH) + BETA*(BB41*X25*(1.0  HPT2   47
     4 + 25.0*BOTH) + BB42*X14*(1.0 + 14.0*BOTH) + BETA*(BB51*X32*(1.0  HPT2   48
     5 + 32.0*BOTH) + BB52*X28*(1.0 + 28.0*BOTH) + BB53*X24*(1.0        HPT2   49
     6 + 24.0*BOTH))))))                                                HPT2   50
      H2A = 1.0 - BOTH*T2                                               HPT2   51
      H2 = X11*(BB61F*(H2A + 12.0*BOTH) + BB62*(H2A + 11.0*BOTH))/D2    HPT2   52
      H3A = 1.0 - BOTH*T3                                               HPT2   53
      H3 = X18*(BB71F*(H3A + 24.0*BOTH) + BB72*(H3A + 18.0*BOTH))/D3    HPT2   54
      H4A = 1.0 - BOTH*T4                                               HPT2   55
      H4 = X14*(BB81F*(H4A + 24.0*BOTH) + BB82*(H4A + 14.0*BOTH))/D4    HPT2   56
      H9 = BETA*B08LP*((1.0 + THETA*FB)*B890                            HPT2   57
     1 + X1*((1.0 + THETA*(FB + B00  ))*B891                            HPT2   58
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                     2 + X1*((1.0 + THETA*(FB + B00T2))*BB92                          HPT2       59
                     3 + X1*((1.0 + THETA*(FB + B00T3))*BB93                          HPT2       60
     60              4 + X1*((1.0 + THETA*(FB + B00T4))*BB94                          HPT2       61
                     5 + X1*((1.0 + THETA*(FB + B00T5))*BB95                          HPT2       62
                     6 + X1*((1.0 + THETA*(FB + B00T6))*BB96))))))                    HPT2       63
                      HPT2 = (H0 - H1 - H2 - H3 - H4 + H9 + ALPHA0)*PV010             HPT2       64
                2000 RETURN                                                           HPT2       65
     65               END                                                             HPT2       66
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	HPT2	1	
14	H2E	35	64

VARIABLES	SN	TYPE	RELOCATION				
10	AI1	REAL	COMCON	REFS	14		
0	ALPHA0	REAL	COMCON	REFS	14	63	
1	ALPHA1	REAL	COMCON	REFS	14		
0	BB00	REAL	CONST2	REFS	8	41	
1	BB01	REAL	CONST2	REFS	8	41	
2	BB02	REAL	CONST2	REFS	8		
3	BB03	REAL	CONST2	REFS	8	41	
4	BB04	REAL	CONST2	REFS	8		
275	BB04T2	REAL		REFS	41	DEFINED	27
5	BB05	REAL	CONST2	REFS	8		
276	BB05T3	REAL		REFS	41	DEFINED	27
6	BB11	REAL	CONST2	REFS	8	43	
7	BB12	REAL	CONST2	REFS	8	43	
10	BB21	REAL	CONST2	REFS	8	43	
11	BB22	REAL	CONST2	REFS	8	43	
12	BB23	REAL	CONST2	REFS	8	43	
13	BB31	REAL	CONST2	REFS	8	43	
14	BB32	REAL	CONST2	REFS	8	43	
15	BB41	REAL	CONST2	REFS	8	43	
16	BB42	REAL	CONST2	REFS	8	43	
17	BB51	REAL	CONST2	REFS	8	43	
20	BB52	REAL	CONST2	REFS	8	43	
21	BB53	REAL	CONST2	REFS	8	43	
22	BB61	REAL	CONST2	REFS	8		
51	BB61F	REAL	STM2	REFS	20	51	
23	BB62	REAL	CONST2	REFS	8	51	
24	BB71	REAL	CONST2	REFS	8		
52	BB71F	REAL	STM2	REFS	20	53	
25	BB72	REAL	CONST2	REFS	8	53	
26	BB81	REAL	CONST2	REFS	8		
53	BB81F	REAL	STM2	REFS	20	55	
27	BB82	REAL	CONST2	REFS	8	55	
35	BB90	REAL	CONST2	REFS	8	56	
36	BB91	REAL	CONST2	REFS	8	56	
37	BB92	REAL	CONST2	REFS	8	56	
40	BB93	REAL	CONST2	REFS	8	56	
41	BB94	REAL	CONST2	REFS	8	56	

VARIABLES	SN	TYPE	RELOCATION								
42	BB95	REAL	CONST2	REFS	8	56					
43	BB96	REAL	CONST2	REFS	8	56					
30	BETA	REAL	STM2	REFS	20	5*43	56				
45	BETAL	REAL	STM2	REFS	20						
31	BETA2	REAL	STM2	REFS	20						
32	BETA3	REAL	STM2	REFS	20						
33	BETA4	REAL	STM2	REFS	20						
34	BETA5	REAL	STM2	REFS	20						
35	BETA6	REAL	STM2	REFS	20						
36	BETA7	REAL	STM2	REFS	20						
46	BOBL	REAL	STM2	REFS	20						
47	BOBLP	REAL	STM2	REFS	20	56					
325	BOTH	REAL		REFS	12*43	50	2*51	52	2*53	54	2*55
				DEFINED	40						
30	B00	REAL	CONST2	REFS	8	40	56				
277	B00T2	REAL		REFS	56	DEFINED	27				
300	B00T3	REAL		REFS	56	DEFINED	27				
301	B00T4	REAL		REFS	56	DEFINED	27				
302	B00T5	REAL		REFS	56	DEFINED	27				
303	B00T6	REAL		REFS	56	DEFINED	27				
31	B61	REAL	CONST2	REFS	8						
32	B71	REAL	CONST2	REFS	8						
33	B81	REAL	CONST2	REFS	8						
34	B82	REAL	CONST2	REFS	8						
43	D2	REAL	STM2	REFS	20	51					
41	D3	REAL	STM2	REFS	20	53					
37	D4	REAL	STM2	REFS	20	55					
50	F8	REAL	STM2	REFS	20	7*56					
32	HMAX	REAL	COMCON	REFS	14						
31	HMIN	REAL	COMCON	REFS	14						
324	HPT2	REAL		DEFINED	63						
33	HSMAX	REAL	COMCON	REFS	14						
326	H0	REAL		REFS	63	DEFINED	41				
327	H1	REAL		REFS	63	DEFINED	43				
331	H2	REAL		REFS	63	DEFINED	51				
330	H2A	REAL		REFS	2*51	DEFINED	50				
333	H3	REAL		REFS	63	DEFINED	53				
332	H3A	REAL		REFS	2*53	DEFINED	52				
335	H4	REAL		REFS	63	DEFINED	55				
334	H4A	REAL		REFS	2*55	DEFINED	54				
34	H4MAX	REAL	COMCON	REFS	14						
336	H9	REAL		REFS	63	DEFINED	56				
0	P	REAL	F.P.	REFS	33	DEFINED	1				
2	PCA	REAL	COMCON	REFS	14						
15	PMAX	REAL	COMCON	REFS	14						
14	PMIN	REAL	COMCON	REFS	14						
16	PSMAX	REAL	COMCON	REFS	14						
7	PVOT	REAL	COMCON	REFS	14						
6	PV010	REAL	COMCON	REFS	14	63					
13	P1	REAL	COMCON	REFS	14						
17	P3MIN	REAL	COMCON	REFS	14						
36	SMAX	REAL	COMCON	REFS	14						
35	SMIN	REAL	COMCON	REFS	14						
37	S3MIN	REAL	COMCON	REFS	14						
40	S4MAX	REAL	COMCON	REFS	14						
0	T	REAL	F.P.	REFS	33	DEFINED	1				
12	TC	REAL	COMCON	REFS	14						

VARIABLES	SN	TYPE	RELOCATION					
	4	TCA	REAL	COMCON	REFS	14		
	1	THETA	REAL	STM2	REFS	20	40	3*41 7*56
	0	THM1	REAL	STM2	REFS	20		
	2	TH2	REAL	STM2	REFS	20	41	
	3	TH3	REAL	STM2	REFS	20		
	4	TH4	REAL	STM2	REFS	20		
	23	TMAX	REAL	COMCON	REFS	14		
	22	TMIN	REAL	COMCON	REFS	14		
	24	TSMAX	REAL	COMCON	REFS	14		
	5	TZA	REAL	COMCON	REFS	14		
	11	T1	REAL	COMCON	REFS	14		
	25	T1MAX	REAL	COMCON	REFS	14		
	44	T2	REAL	STM2	REFS	20	50	
	26	T2MIN	REAL	COMCON	REFS	14		
	42	T3	REAL	STM2	REFS	20	52	
	30	T3MAX	REAL	COMCON	REFS	14		
	27	T3MIN	REAL	COMCON	REFS	14		
	40	T4	REAL	STM2	REFS	20	54	
	3	VCA	REAL	COMCON	REFS	14		
	21	V3MAX	REAL	COMCON	REFS	14		
	20	V3MIN	REAL	COMCON	REFS	14		
	5	X1	REAL	STM2	REFS	20	43	6*56
	13	X10	REAL	STM2	REFS	20	43	
	14	X11	REAL	STM2	REFS	20	51	
	15	X12	REAL	STM2	REFS	20		
	16	X13	REAL	STM2	REFS	20	43	
	17	X14	REAL	STM2	REFS	20	43	55
	20	X17	REAL	STM2	REFS	20		
	21	X18	REAL	STM2	REFS	20	2*43	53
	22	X19	REAL	STM2	REFS	20		
	6	X2	REAL	STM2	REFS	20	43	
	23	X24	REAL	STM2	REFS	20	43	
	24	X25	REAL	STM2	REFS	20	43	
	25	X27	REAL	STM2	REFS	20		
	26	X28	REAL	STM2	REFS	20	43	
	7	X3	REAL	STM2	REFS	20	43	
	27	X32	REAL	STM2	REFS	20	43	
	10	X4	REAL	STM2	REFS	20		
	11	X6	REAL	STM2	REFS	20		
	12	X8	REAL	STM2	REFS	20		

EXTERNALS	TYPE	ARGS	REFERENCES
COMT2		2	33

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	40	
0 2000	INACTIVE	64	

COMMON BLOCKS	LENGTH
CONST2	36
COMCON	33
STM2	44

STATISTICS

PROGRAM LENGTH	337B	223
SCM LABELED COMMON LENGTH	161B	113

```
      FUNCTION HVT3(V,T)                                                HVT3    2
C  HVT3  ENTHALPY - SUB REGION 3  H = F(V,T)  A 2ND LEVEL ROUTINE       HVT3    3
C       ENTRY = H3E(DUMMY)                                               HVT3    4
C                                                                        HVT3    5
C                                                                        HVT3    6
C                                                                        HVT3    7
C                                                                        HVT3    8
      COMMON /CONST3/ C00, C01, C02, C03, C04, C05, C06, C07, C08, C09,  HVT3    9
     1C010,C011,C012, C11, C12, C13, C14, C15, C16, C17, C21, C22, C23,  HVT3   10
     2 C24, C25, C26, C27, C28, C31, C32, C33, C34, C35, C36, C37, C38,  HVT3   11
     3 C39,C310, C40, C41, C50, C60, C61, C62, C63, C64, C70, C71, C72,  HVT3   12
     4 C73, C74, C75, C76, C77, C78, D30, D31, D32, D33, D34, D40, D41,  HVT3   13
     5 D42, D43, D44, D50, D51, D52                                      HVT3   14
C                                                                        HVT3   15
C                                                                        HVT3   16
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PVD10,  HVT3   17
     1   PVDT,    A11,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN,  HVT3   18
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,  HVT3   19
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX          HVT3   20
C                                                                        HVT3   21
C                                                                        HVT3   22
      COMMON /STM3/  THETA ,THL1  ,THLOG ,THM1  ,THM22 ,THM23 ,EX     ,  HVT3   23
     1 EXM1  ,EXM2  ,EXM5  ,EXM6  ,EXLOG ,X5DTH2,X6DTH2,DMTH1 ,D3SV  ,   HVT3   24
     2 VD3SV ,D4SV  ,VD4SV ,D5SV  ,VD5SV ,Y      ,Y2     ,Y3     ,Y30 ,Y31  HVT3   25
C                                                                        HVT3   26
C                                                                        HVT3   27
      DATA  C02T2, C03T3 / -1.554350078E+1, +1.261382256E+1 /            HVT3   28
      DATA  C04T4, C05T5 / -1.107228152E+1, +1.052098535E+1 /            HVT3   29
      DATA  C06T6, C07T7 / -6.878975280E+0, +1.561966595E+0 /            HVT3   30
      DATA  C08T8, C09T9 / +9.300029040E-1, -7.388104896E-1 /            HVT3   31
      DATA C01010, C01111/ +1.941292390E-1, -1.864176336E-2 /            HVT3   32
      DATA  C13T2, C14T3 / -2.487780088E+1, +1.621312266E+1 /            HVT3   33
      DATA  C15T4, C16T5 / -3.975460172E+0, +3.137615910E-1 /            HVT3   34
      DATA  C21T2, C24T2 / -8.597701840E+0, +8.083449180E+0 /            HVT3   35
      DATA  C25T3, C26T4 / +4.666389780E+0, -6.662757400E+0 /            HVT3   36
      DATA  C27T5, C28T2 / +1.624405790E+0, +5.873106500E+1 /            HVT3   37
      DATA  C31T3, C35T2 / +2.384525526E-5, +1.503791908E+1 /            HVT3   38
      DATA  C36T3, C37T4 / -3.784819200E+1, +4.388698480E+0 /            HVT3   39
      DATA  C38T5, C39T6 / +1.060727460E+1, -3.279177396E+0 /            HVT3   40
      DATA C310T2, C40T23/ +1.665750826E+1, +6.347350848E-5 /            HVT3   41
      DATA C40T24, C41T28/ +6.623322624E-5, -1.425407158E-2 /            HVT3   42
      DATA C41T29, C60T3 / -1.476314557E-2, +1.658680600E-1 /            HVT3   43
      DATA  C61T2, C72T2 / -4.672731910E-1, +4.441446416E+1 /            HVT3   44
      DATA  C73T3, C74T4 / -5.406118710E+2, +9.428384880E+3 /            HVT3   45
      DATA  C75T5, C76T6 / -7.311678490E+4, +2.725749978E+5 /            HVT3   46
      DATA  C77T7, C78T8 / -4.937489502E+5, +3.505257142E+5 /            HVT3   47
      DATA    CTA,   CTB / -2.528322967E+0, +5.435179489E+1 /            HVT3   48
      DATA C12M17        / +3.435853127E+0 /                             HVT3   49
C                                                                        HVT3   50
      CALL COMT3(V,T)                                                    HVT3   51
C                                                                        HVT3   52
      ENTRY H3E                                                          HVT3   53
C                                                                        HVT3   54
C     THIS ENTRY CAN BE USED ONLY IF COMT3 WAS LAST CALLED WITH THE      HVT3   55
C     VALUES OF V AND T THAT ARE TO BE ASSUMED HERE.                     HVT3   56
C                                                                        HVT3   57
 1000 H0 = CTA - C50 - C11*EX + EXM1*(C02T2 + EXM1*(C03T3 + EXM1*(C04T4+ HVT3   58
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                      1 EXM1*(C05T5 + EXM1*(C06T6 + EXM1*(C07T7 + EXM1*(C08T8 +          HVT3       59
                      2 EXM1*(C09T9 + EXM1*(C01010 + EXM1*C01111)))))))) - EXM1*(C12 +   HVT3       60
     60               3 EXM1*(C13 + EXM1*(C14 + EXM1*(C15 + EXM1*C16)))) + C12M17*EXLOG  HVT3       61
                       H1 = -C17 - C50 - EX*(C11 + C21T2) + EXM1*(C12 + EXM1*(C13T2 +    HVT3       62
                      1 EXM1*(C14T3 + EXM1*(C15T4 + EXM1*C16T5)))) - 2.0*EXM1*(C22 +     HVT3       63
                      2 EXM1*(C23 + EXM1*(C24 + EXM1*(C25 + EXM1*(C26 + EXM1*C27))))) -  HVT3       64
                      3 C28T2*EXLOG                                                      HVT3       65
     65               H2 = -C28 - EX*(C21T2 + C31T3) + EXM2*(C23 + EXM1*(C24T2           HVT3       66
                      1 + EXM1*(C25T3 + EXM1*(C26T4 + EXM1*C27T5)))) - 3.0*EXM1*(C32     HVT3       67
                      2 + EXM1*(C33 + EXM1*(C34 + EXM1*(C35 + EXM1*(C36 + EXM1*(C37      HVT3       68
                      3 + EXM1*(C38 + EXM1*C39)))))) - CTB*EXLOG                         HVT3       69
                       H3 = -C310 - C31T3*EX + EXM1*(-C32 + EXM2*(C34 + EXM1*(C35T2      HVT3       70
     70               1 + EXM1*(C36T3 + EXM1*(C37T4 + EXM1*(C38T5 + EXM1*C39T6))))))     HVT3       71
                      2 - C310T2*EXLOG                                                   HVT3       72
                       H4 = (C40T23 + C41T28*EXM5 - (C40T24 + C41T29*EXM5)*THM1)*THM22   HVT3       73
                       H6 = -X60TH2*(C60T3 + THM1*(C61T2 + THM1*(C62+THM1*(-C64*THM1)))) HVT3       74
                       H7 = C70 + THL1*(C71 + C71*THETA + THL1*(C72 + C72T2*THETA         HVT3       75
     75               1 + THL1*(C73 + C73T3*THETA + THL1*(C74 + C74T4*THETA              HVT3       76
                      2 + THL1*(C75 + C75T5*THETA + THL1*(C76 + C76T6*THETA              HVT3       77
                      3 + THL1*(C77 + C77T7*THETA + THL1*(C78 + C78T8*THETA)))))))       HVT3       78
                       H8 = 0.0                                                          HVT3       79
                       IF(THETA .GE. 1.0 .OR. EX .GE. 1.0) GO TO 1500                    HVT3       80
     80                FTH3 = 3.0/OMTH1                                                  HVT3       81
                       H8A = (D30*(-2.0*Y + FTH3) + EXM1*(D31*(-Y + FTH3) + EXM1*(D32*   HVT3       82
                      1 FTH3 + EXM1*(D33*(Y + FTH3)+EXM1*(D34*(2.0*Y + FTH3)))))) *Y2    HVT3       83
                       FTH4 = 4.0/OMTH1                                                  HVT3       84
                       H8B = (D40*(-3.0*Y + FTH4) + EXM1*(D41*(-2.0*Y + FTH4)            HVT3       85
     85               1 + EXM1*(D42*(-Y + FTH4) + EXM1*(D43*FTH4 + EXM1*(D44*(Y          HVT3       86
                      2 + FTH4))))))*Y3                                                  HVT3       87
                       FTH32 = 32.0/OMTH1                                                HVT3       88
                       H8C = Y31*(D50*(31.0*Y - FTH32) + EX*(D51*(32.0*Y - FTH32)        HVT3       89
                      1 + EX*D52*(33.0*Y - FTH32)))                                      HVT3       90
     90                H8 = H8A + H8B - H8C                                              HVT3       91
                 1500 HVT3 = (H0 + THL1*(H1 + THL1*(H2 + THL1*H3)) + H4 + H6 - H7 + H8  HVT3       92
                     1 + ALPHA0)*PV010                                                   HVT3       93
                 2000 RETURN                                                           HVT3       94
                      END                                                              HVT3       95
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	HVT3	1	
14	H3E	52	93

VARIABLES	SN	TYPE	RELOCATION				
10	AI1	REAL	COMCON	REFS	16		
0	ALPHA0	REAL	COMCON	REFS	16	91	
1	ALPHA1	REAL	COMCON	REFS	16		
451	CTA	REAL		REFS	57	DEFINED	47
452	CTB	REAL		REFS	65	DEFINED	47
0	C00	REAL	CONST3	REFS	8		
1	C01	REAL	CONST3	REFS	8		
12	C010	REAL	CONST3	REFS	8		

VARIABLES	SN	TYPE	RELOCATION						
411	C01010	REAL		REFS	57	DEFINED	31		
13	C011	REAL	CONST3	REFS	8				
412	C01111	REAL		REFS	57	DEFINED	31		
14	C012	REAL	CONST3	REFS	8				
2	C02	REAL	CONST3	REFS	8				
401	C02T2	REAL		REFS	57	DEFINED	27		
3	C03	REAL	CONST3	REFS	8				
402	C03T3	REAL		REFS	57	DEFINED	27		
4	C04	REAL	CONST3	REFS	8				
403	C04T4	REAL		REFS	57	DEFINED	28		
5	C05	REAL	CONST3	REFS	8				
404	C05T5	REAL		REFS	57	DEFINED	28		
6	C06	REAL	CONST3	REFS	8				
405	C06T6	REAL		REFS	57	DEFINED	29		
7	C07	REAL	CONST3	REFS	8				
406	C07T7	REAL		REFS	57	DEFINED	29		
10	C08	REAL	CONST3	REFS	8				
407	C08T8	REAL		REFS	57	DEFINED	30		
11	C09	REAL	CONST3	REFS	8				
410	C09T9	REAL		REFS	57	DEFINED	30		
15	C11	REAL	CONST3	REFS	8	57	61		
16	C12	REAL	CONST3	REFS	8	57	61		
453	C12M17	REAL		REFS	57	DEFINED	48		
17	C13	REAL	CONST3	REFS	8	57			
413	C13T2	REAL		REFS	61	DEFINED	32		
20	C14	REAL	CONST3	REFS	8	57			
414	C14T3	REAL		REFS	61	DEFINED	32		
21	C15	REAL	CONST3	REFS	8	57			
415	C15T4	REAL		REFS	61	DEFINED	33		
22	C16	REAL	CONST3	REFS	8	57			
416	C16T5	REAL		REFS	61	DEFINED	33		
23	C17	REAL	CONST3	REFS	8	61			
24	C21	REAL	CONST3	REFS	8				
417	C21T2	REAL		REFS	61	65	DEFINED	34	
25	C22	REAL	CONST3	REFS	8	61			
26	C23	REAL	CONST3	REFS	8	61	65		
27	C24	REAL	CONST3	REFS	8	61			
420	C24T2	REAL		REFS	65	DEFINED	34		
30	C25	REAL	CONST3	REFS	8	61			
421	C25T3	REAL		REFS	65	DEFINED	35		
31	C26	REAL	CONST3	REFS	8	61			
422	C26T4	REAL		REFS	65	DEFINED	35		
32	C27	REAL	CONST3	REFS	8	61			
423	C27T5	REAL		REFS	65	DEFINED	36		
33	C28	REAL	CONST3	REFS	8	65			
424	C28T2	REAL		REFS	61	DEFINED	36		
34	C31	REAL	CONST3	REFS	8				
425	C31T3	REAL		REFS	65	69	DEFINED	37	
45	C310	REAL	CONST3	REFS	8	69			
433	C310T2	REAL		REFS	69	DEFINED	40		
35	C32	REAL	CONST3	REFS	8	65	69		
36	C33	REAL	CONST3	REFS	8	65			
37	C34	REAL	CONST3	REFS	8	65	69		
40	C35	REAL	CONST3	REFS	8	65			
426	C35T2	REAL		REFS	69	DEFINED	37		
41	C36	REAL	CONST3	REFS	8	65			
427	C36T3	REAL		REFS	69	DEFINED	38		

VARIABLES	SN	TYPE	RELOCATION								
42	C37	REAL	CONST3	REFS	8	65					
430	C37T4	REAL		REFS	69	DEFINED	38				
43	C38	REAL	CONST3	REFS	8	65					
431	C38T5	REAL		REFS	69	DEFINED	39				
44	C39	REAL	CONST3	REFS	8	65					
432	C39T6	REAL		REFS	69	DEFINED	39				
46	C40	REAL	CONST3	REFS	8						
434	C40T23	REAL		REFS	72	DEFINED	40				
435	C40T24	REAL		REFS	72	DEFINED	41				
47	C41	REAL	CONST3	REFS	8						
436	C41T28	REAL		REFS	72	DEFINED	41				
437	C41T29	REAL		REFS	72	DEFINED	42				
50	C50	REAL	CONST3	REFS	8	57	61				
51	C60	REAL	CONST3	REFS	8						
440	C60T3	REAL		REFS	73	DEFINED	42				
52	C61	REAL	CONST3	REFS	8						
441	C61T2	REAL		REFS	73	DEFINED	43				
53	C62	REAL	CONST3	REFS	8	73					
54	C63	REAL	CONST3	REFS	8						
55	C64	REAL	CONST3	REFS	8	73					
56	C70	REAL	CONST3	REFS	8	74					
57	C71	REAL	CONST3	REFS	8	2*74					
60	C72	REAL	CONST3	REFS	8	74					
442	C72T2	REAL		REFS	74	DEFINED	43				
61	C73	REAL	CONST3	REFS	8	74					
443	C73T3	REAL		REFS	74	DEFINED	44				
62	C74	REAL	CONST3	REFS	8	74					
444	C74T4	REAL		REFS	74	DEFINED	44				
63	C75	REAL	CONST3	REFS	8	74					
445	C75T5	REAL		REFS	74	DEFINED	45				
64	C76	REAL	CONST3	REFS	8	74					
446	C76T6	REAL		REFS	74	DEFINED	45				
65	C77	REAL	CONST3	REFS	8	74					
447	C77T7	REAL		REFS	74	DEFINED	46				
66	C78	REAL	CONST3	REFS	8	74					
450	C78T8	REAL		REFS	74	DEFINED	46				
17	D3SV	REAL	STM3	REFS	22						
67	D30	REAL	CONST3	REFS	8	81					
70	D31	REAL	CONST3	REFS	8	81					
71	D32	REAL	CONST3	REFS	8	81					
72	D33	REAL	CONST3	REFS	8	81					
73	D34	REAL	CONST3	REFS	8	81					
21	D4SV	REAL	STM3	REFS	22						
74	D40	REAL	CONST3	REFS	8	84					
75	D41	REAL	CONST3	REFS	8	84					
76	D42	REAL	CONST3	REFS	8	84					
77	D43	REAL	CONST3	REFS	8	84					
100	D44	REAL	CONST3	REFS	8	84					
23	D5SV	REAL	STM3	REFS	22						
101	D50	REAL	CONST3	REFS	8	88					
102	D51	REAL	CONST3	REFS	8	88					
103	D52	REAL	CONST3	REFS	8	88					
6	EX	REAL	STM3	REFS	22	57	61	65	69	79	2*88
13	EXLOG	REAL	STM3	REFS	22	57	61	65	69		
7	EXM1	REAL	STM3	REFS	22	15*57	11*61	12*65	6*69	4*81	4*84
10	EXM2	REAL	STM3	REFS	22	65	69				
11	EXM5	REAL	STM3	REFS	22	2*72					

VARIABLES	SN	TYPE	RELOCATION						
12	EXM6	REAL	STM3	REFS	22				
475	FTH3	REAL		REFS	5*81	DEFINED	80		
501	FTH32	REAL		REFS	3*88	DEFINED	87		
477	FTH4	REAL		REFS	5*84	DEFINED	83		
32	HMAX	REAL	COMCON	REFS	16				
31	HMIN	REAL	COMCON	REFS	16				
33	HSMAX	REAL	COMCON	REFS	16				
464	HVT3	REAL		DEFINED	91				
465	H0	REAL		REFS	91	DEFINED	57		
466	H1	REAL		REFS	91	DEFINED	61		
467	H2	REAL		REFS	91	DEFINED	65		
470	H3	REAL		REFS	91	DEFINED	69		
471	H4	REAL		REFS	91	DEFINED	72		
34	H4MAX	REAL	COMCON	REFS	16				
472	H6	REAL		REFS	91	DEFINED	73		
473	H7	REAL		REFS	91	DEFINED	74		
474	H8	REAL		REFS	91	DEFINED	78	90	
476	H8A	REAL		REFS	90	DEFINED	81		
500	H8B	REAL		REFS	90	DEFINED	84		
502	H8C	REAL		REFS	90	DEFINED	88		
16	OMTH1	REAL	STM3	REFS	22	80	83	87	
2	PCA	REAL	COMCON	REFS	16				
15	PMAX	REAL	COMCON	REFS	16				
14	PMIN	REAL	COMCON	REFS	16				
16	PSMAX	REAL	COMCON	REFS	16				
7	PVDT	REAL	COMCON	REFS	16				
6	PV010	REAL	COMCON	REFS	16	91			
13	P1	REAL	COMCON	REFS	16				
17	P3MIN	REAL	COMCON	REFS	16				
36	SMAX	REAL	COMCON	REFS	16				
35	SMIN	REAL	COMCON	REFS	16				
37	S3MIN	REAL	COMCON	REFS	16				
40	S4MAX	REAL	COMCON	REFS	16				
0	T	REAL	F.P.	REFS	50	DEFINED	1		
12	TC	REAL	COMCON	REFS	16				
4	TCA	REAL	COMCON	REFS	16				
0	THETA	REAL	STM3	REFS	22	8*74	79		
2	THLOG	REAL	STM3	REFS	22				
1	THL1	REAL	STM3	REFS	22	8*74	3*91		
3	THM1	REAL	STM3	REFS	22	72	4*73		
4	THM22	REAL	STM3	REFS	22	72			
5	THM23	REAL	STM3	REFS	22				
23	TMAX	REAL	COMCON	REFS	16				
22	TMIN	REAL	COMCON	REFS	16				
24	TSMAX	REAL	COMCON	REFS	16				
5	TZA	REAL	COMCON	REFS	16				
11	T1	REAL	COMCON	REFS	16				
25	T1MAX	REAL	COMCON	REFS	16				
26	T2MIN	REAL	COMCON	REFS	16				
30	T3MAX	REAL	COMCON	REFS	16				
27	T3MIN	REAL	COMCON	REFS	16				
0	V	REAL	F.P.	REFS	50	DEFINED	1		
3	VCA	REAL	COMCON	REFS	16				
20	VD3SV	REAL	STM3	REFS	22				
22	VD4SV	REAL	STM3	REFS	22				
24	VD5SV	REAL	STM3	REFS	22				
21	V3MAX	REAL	COMCON	REFS	16				

```
VARIABLES      SN  TYPE            RELOCATION
    20  V3MIN      REAL                COMCON        REFS        16
    14  X50TH2     REAL                STM3          REFS        22
    15  X60TH2     REAL                STM3          REFS        22        73
    25  Y          REAL                STM3          REFS        22      4*81      4*84      3*88
    26  Y2         REAL                STM3          REFS        22        81
    27  Y3         REAL                STM3          REFS        22        84
    30  Y30        REAL                STM3          REFS        22
    31  Y31        REAL                STM3          REFS        22        88

EXTERNALS           TYPE    ARGS        REFERENCES
        COMT3                  2             50

STATEMENT LABELS                DEF LINE    REFERENCES
     0  1000        INACTIVE       57
   347  1500                       91          79
     0  2000        INACTIVE       93

COMMON BLOCKS    LENGTH
        CONST3       68
        COMCON       33
        STM3         26

STATISTICS
  PROGRAM LENGTH                  503B       323
  SCM LABELED COMMON LENGTH       177B       127
```

```
      FUNCTION P23T(TIN)                                                P23T       2
C  P23T   BOUNDARY BETWEEN REGIONS 2 AND 3                             P23T       3
C        A 1ST LEVEL SUBROUTINE                                        P23T       4
C                                                                      P23T       5
C                                                                      P23T       6
C                                                                      P23T       7
C                                                                      P23T       8
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, P23T       9
     1   PVDT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, P23T      10
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, P23T      11
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX        P23T      12
C                                                                      P23T      13
      COMMON /CONSTL/ AL0, AL1, AL2, AL2T2                             P23T      14
C                                                                      P23T      15
      T = TIN                                                          P23T      16
      IF(T .LT. TMIN .OR. T .GT. TMAX) CALL STER(5H P23T, 2, T)        P23T      17
 1000 THETA = (T + TZA)/TCA                                            P23T      18
      P23T = (AL0 + THETA*(AL1 + THETA*AL2))*PCA                       P23T      19
 2000 RETURN                                                           P23T      20
      END                                                              P23T      21
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
4	P23T	1	19

VARIABLES

		SN	TYPE	RELOCATION					
18	AI1		REAL	COMCON	REFS	8			
0	ALPHA0		REAL	COMCON	REFS	8			
1	ALPHA1		REAL	COMCON	REFS	8			
0	AL0		REAL	CONSTL	REFS	13	18		
1	AL1		REAL	CONSTL	REFS	13	18		
2	AL2		REAL	CONSTL	REFS	13	18		
3	AL2T2		REAL	CONSTL	REFS	13			
32	HMAX		REAL	COMCON	REFS	8			
31	HMIN		REAL	COMCON	REFS	8			
33	HSMAX		REAL	COMCON	REFS	8			
34	H4MAX		REAL	COMCON	REFS	8			
2	PCA		REAL	COMCON	REFS	8	18		
15	PMAX		REAL	COMCON	REFS	8			
14	PMIN		REAL	COMCON	REFS	8			
16	PSMAX		REAL	COMCON	REFS	8			
7	PVDT		REAL	COMCON	REFS	8			
6	PV010		REAL	COMCON	REFS	8			
13	P1		REAL	COMCON	REFS	8			
32	P23T		REAL		DEFINED	18			
17	P3MIN		REAL	COMCON	REFS	8			
36	SMAX		REAL	COMCON	REFS	8			
35	SMIN		REAL	COMCON	REFS	8			
37	S3MIN		REAL	COMCON	REFS	8			
40	S4MAX		REAL	COMCON	REFS	8			
33	T		REAL		REFS	3*16	17	DEFINED	15
12	TC		REAL	COMCON	REFS	8			

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VARIABLES	SN	TYPE	RELOCATION					
TCA	4	REAL	COMCON	REFS	8	17		
THETA	34	REAL		REFS	2*18	DEFINED	17	
TIN	0	REAL	F.P.	REFS	15	DEFINED	1	
TMAX	23	REAL	COMCON	REFS	8	16		
TMIN	22	REAL	COMCON	REFS	8	16		
TSMAX	24	REAL	COMCON	REFS	8			
TZA	5	REAL	COMCON	REFS	8	17		
T1	11	REAL	COMCON	REFS	8			
T1MAX	25	REAL	COMCON	REFS	8			
T2MIN	26	REAL	COMCON	REFS	8			
T3MAX	30	REAL	COMCON	REFS	8			
T3MIN	27	REAL	COMCON	REFS	8			
VCA	3	REAL	COMCON	REFS	8			
V3MAX	21	REAL	COMCON	REFS	8			
V3MIN	20	REAL	COMCON	REFS	8			

EXTERNALS	TYPE	ARGS	REFERENCES
STER		3	16

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	17	
0 2000	INACTIVE	19	

COMMON BLOCKS	LENGTH
COMCON	33
CONSTL	4

STATISTICS

PROGRAM LENGTH	378	31
SCM LABELED COMMON LENGTH	458	37

```
      FUNCTION PVT3(V,T)                                                PVT3    2
C  PVT3   PRESSURE - SUBREGION 3   A 2ND LEVEL SUBROUTINE               PVT3    3
C        WITH ENTRY P3E                                                 PVT3    4
C        USING COMT3(V,T)                                               PVT3    5
C                                                                       PVT3    6
C                                                                       PVT3    7
C                                                                       PVT3    8
C                                                                       PVT3    9
      COMMON /CONST3/ C00, C01, C02, C03, C04, C05, C06, C07, C08, C09, PVT3   10
     1C010,C011,C012, C11, C12, C13, C14, C15, C16, C17, C21, C22, C23, PVT3   11
     2 C24, C25, C26, C27, C28, C31, C32, C33, C34, C35, C36, C37, C38, PVT3   12
     3 C39,C310, C40, C41, C50, C60, C61, C62, C63, C64, C70, C71, C72, PVT3   13
     4 C73, C74, C75, C76, C77, C78, D30, D31, D32, D33, D34, D40, D41, PVT3   14
     5 D42, D43, D44, D50, D51, D52                                     PVT3   15
C                                                                       PVT3   16
C                                                                       PVT3   17
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, PVT3   18
     1   PVOT,    A11,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, PVT3   19
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, PVT3   20
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         PVT3   21
C                                                                       PVT3   22
C                                                                       PVT3   23
      COMMON /STM3/  THETA ,THL1  ,THLOG ,THM1  ,THM22 ,THM23 ,EX    ,  PVT3   24
     1 EXM1  ,EXM2  ,EXM5  ,EXM6  ,EXLOG ,X50TH2,X60TH2,OMTH1 ,D3SV  ,  PVT3   25
     2 VD3SV ,D4SV  ,VD4SV ,D5SV  ,VD5SV ,Y     ,Y2    ,Y3    ,Y30 ,Y31  PVT3   26
C                                                                       PVT3   27
      DATA    C03T2 / +8.409215040E+0 /,  C04T3 / -8.304211140E+0 /,    PVT3   28
     1        C05T4 / +8.416788280E+0 /,  C06T5 / -5.732479400E+0 /,    PVT3   29
     2        C07T6 / +1.338828510E+0 /,  C08T7 / +8.137525410E-1 /,    PVT3   30
     3        C09T8 / -6.567204352E-1 /, C010T9 / +1.747163151E-1 /,    PVT3   31
     4       C01110 / -1.694705760E-2 /,  C13T2 / -2.407780080E+1 /,    PVT3   32
     5        C14T3 / +1.621312266E+1 /,  C15T4 / -3.975460172E+0 /,    PVT3   33
     6        C16T5 / +3.137615910E-1 /,  C23T2 / -2.832386260E+1 /,    PVT3   34
     7        C24T3 / +1.212517377E+1 /,  C25T4 / +6.221853040E+0 /,    PVT3   35
     8        C26T5 / -8.328446750E+0 /,  C27T6 / +1.949286948E+0 /,    PVT3   36
     9        C33T2 / -1.672306760E+2 /,  C34T3 / +1.075909551E+2 /,    PVT3   37
     A        C35T4 / +3.007583816E+1 /,  C36T5 / -6.308032000E+1 /,    PVT3   38
     B        C37T6 / +6.583047720E+0 /,  C38T7 / +1.485018444E+1 /,    PVT3   39
     C        C39T8 / -4.372236528E+0 /,  C41T5 / -2.545369925E-3 /     PVT3   40
C                                                                       PVT3   41
      CALL COMT3(V,T)                                                   PVT3   42
C                                                                       PVT3   43
      ENTRY P3E                                                         PVT3   44
C                                                                       PVT3   45
C     THIS ENTRY TO BE USED ONLY IF COMT3 WAS LAST CALLED WITH THE      PVT3   46
C     VALUES OF V AND T THAT ARE TO BE ASSUMED HERE.                    PVT3   47
C                                                                       PVT3   48
 1000 P0 = C01 - EXM2*(C02 + EXM1*(C03T2 + EXM1*(C04T3 + EXM1*(C05T4    PVT3   49
     1 + EXM1*(C06T5 + EXM1*(C07T6 + EXM1*(C08T7 + EXM1*(C09T8          PVT3   50
     2 + EXM1*(C010T9 + EXM1*C01110)))))))) + C012*EXM1                 PVT3   51
      PA = C11 - EXM2*(C12 + EXM1*(C13T2 + EXM1*(C14T3 + EXM1*(C15T4    PVT3   52
     1 + EXM1*C16T5)))) + C17*EXM1                                      PVT3   53
      P2 = C21 - EXM2*(C22 + EXM1*(C23T2 + EXM1*(C24T3 + EXM1*(C25T4    PVT3   54
     1 + EXM1*(C26T5 + EXM1*C27T6))))) + C28*EXM1                       PVT3   55
      P3 = C31 - EXM2*(C32 + EXM1*(C33T2 + EXM1*(C34T3 + EXM1*(C35T4    PVT3   56
     1 + EXM1*(C36T5 + EXM1*(C37T6 + EXM1*(C38T7 + EXM1*C39T8)))))))   PVT3   57
     2 + C310*EXM1                                                      PVT3   58
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                P4 = C41T5*EXM6*THM23                                                PVT3       59
                P6 = 6.0*X50TH2*(C60 + THM1*(C61 + THM1*(C62 + THM1*(C63             PVT3       60
   60          1 + THM1*C64)))                                                       PVT3       61
                P7 = 0.0                                                             PVT3       62
                IF(THETA .GE. 1.0 .OR. EX .GE. 1.0) GO TO 1500                       PVT3       63
                P7A = Y3*(VD3SV + Y*VD4SV)                                           PVT3       64
                P7B = Y*Y31*VD5SV                                                    PVT3       65
   65           P7 = P7A - P7B                                                       PVT3       66
             1500 PVT3 = (-P0 + THL1*(-PA - THL1*(P2 + P3*THL1) + P4) - P6 + P7)*PCA PVT3       67
             2000 RETURN                                                             PVT3       68
                  END                                                                PVT3       69
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	PVT3	1	
14	P3E	43	67

VARIABLES	SN	TYPE	RELOCATION				
10	A11	REAL	COMCON	REFS	17		
0	ALPHA0	REAL	COMCON	REFS	17		
1	ALPHA1	REAL	COMCON	REFS	17		
0	C00	REAL	CONST3	REFS	9		
1	C01	REAL	CONST3	REFS	9	48	
12	C010	REAL	CONST3	REFS	9		
205	C010T9	REAL		REFS	48	DEFINED	27
13	C011	REAL	CONST3	REFS	9		
206	C01110	REAL		REFS	48	DEFINED	27
14	C012	REAL	CONST3	REFS	9	48	
2	C02	REAL	CONST3	REFS	9	48	
3	C03	REAL	CONST3	REFS	9		
176	C03T2	REAL		REFS	48	DEFINED	27
4	C04	REAL	CONST3	REFS	9		
177	C04T3	REAL		REFS	48	DEFINED	27
5	C05	REAL	CONST3	REFS	9		
200	C05T4	REAL		REFS	48	DEFINED	27
6	C06	REAL	CONST3	REFS	9		
201	C06T5	REAL		REFS	48	DEFINED	27
7	C07	REAL	CONST3	REFS	9		
202	C07T6	REAL		REFS	48	DEFINED	27
10	C08	REAL	CONST3	REFS	9		
203	C08T7	REAL		REFS	48	DEFINED	27
11	C09	REAL	CONST3	REFS	9		
204	C09T8	REAL		REFS	48	DEFINED	27
15	C11	REAL	CONST3	REFS	9	51	
16	C12	REAL	CONST3	REFS	9	51	
17	C13	REAL	CONST3	REFS	9		
207	C13T2	REAL		REFS	51	DEFINED	27
20	C14	REAL	CONST3	REFS	9		
210	C14T3	REAL		REFS	51	DEFINED	27
21	C15	REAL	CONST3	REFS	9		
211	C15T4	REAL		REFS	51	DEFINED	27
22	C16	REAL	CONST3	REFS	9		

VARIABLES		SN	TYPE	RELOCATION					
212	C16T5		REAL		REFS	51	DEFINED	27	
23	C17		REAL	CONST3	REFS	9	51		
24	C21		REAL	CONST3	REFS	9	53		
25	C22		REAL	CONST3	REFS	9	53		
26	C23		REAL	CONST3	REFS	9			
213	C23T2		REAL		REFS	53	DEFINED	27	
27	C24		REAL	CONST3	REFS	9			
214	C24T3		REAL		REFS	53	DEFINED	27	
30	C25		REAL	CONST3	REFS	9			
215	C25T4		REAL		REFS	53	DEFINED	27	
31	C26		REAL	CONST3	REFS	9			
216	C26T5		REAL		REFS	53	DEFINED	27	
32	C27		REAL	CONST3	REFS	9			
217	C27T6		REAL		REFS	53	DEFINED	27	
33	C28		REAL	CONST3	REFS	9	53		
34	C31		REAL	CONST3	REFS	9	55		
45	C310		REAL	CONST3	REFS	9	55		
35	C32		REAL	CONST3	REFS	9	55		
36	C33		REAL	CONST3	REFS	9			
220	C33T2		REAL		REFS	55	DEFINED	27	
37	C34		REAL	CONST3	REFS	9			
221	C34T3		REAL		REFS	55	DEFINED	27	
40	C35		REAL	CONST3	REFS	9			
222	C35T4		REAL		REFS	55	DEFINED	27	
41	C36		REAL	CONST3	REFS	9			
223	C36T5		REAL		REFS	55	DEFINED	27	
42	C37		REAL	CONST3	REFS	9			
224	C37T6		REAL		REFS	55	DEFINED	27	
43	C38		REAL	CONST3	REFS	9			
225	C38T7		REAL		REFS	55	DEFINED	27	
44	C39		REAL	CONST3	REFS	9			
226	C39T8		REAL		REFS	55	DEFINED	27	
46	C40		REAL	CONST3	REFS	9			
47	C41		REAL	CONST3	REFS	9			
227	C41T5		REAL		REFS	58	DEFINED	27	
50	C50		REAL	CONST3	REFS	9			
51	C60		REAL	CONST3	REFS	9	59		
52	C61		REAL	CONST3	REFS	9	59		
53	C62		REAL	CONST3	REFS	9	59		
54	C63		REAL	CONST3	REFS	9	59		
55	C64		REAL	CONST3	REFS	9	59		
56	C70		REAL	CONST3	REFS	9			
57	C71		REAL	CONST3	REFS	9			
60	C72		REAL	CONST3	REFS	9			
61	C73		REAL	CONST3	REFS	9			
62	C74		REAL	CONST3	REFS	9			
63	C75		REAL	CONST3	REFS	9			
64	C76		REAL	CONST3	REFS	9			
65	C77		REAL	CONST3	REFS	9			
66	C78		REAL	CONST3	REFS	9			
17	D35V		REAL	STM3	REFS	23			
67	D30		REAL	CONST3	REFS	9			
70	D31		REAL	CONST3	REFS	9			
71	D32		REAL	CONST3	REFS	9			
72	D33		REAL	CONST3	REFS	9			
73	D34		REAL	CONST3	REFS	9			
21	D4SV		REAL	STM3	REFS	23			

VARIABLES	SN	TYPE	RELOCATION						
74	D40	REAL	CONST3	REFS	9				
75	D41	REAL	CONST3	REFS	9				
76	D42	REAL	CONST3	REFS	9				
77	D43	REAL	CONST3	REFS	9				
100	D44	REAL	CONST3	REFS	9				
23	D5SV	REAL	STM3	REFS	23				
101	D50	REAL	CONST3	REFS	9				
102	D51	REAL	CONST3	REFS	9				
103	D52	REAL	CONST3	REFS	9				
6	EX	REAL	STM3	REFS	23	62			
13	EXLOG	REAL	STM3	REFS	23				
7	EXM1	REAL	STM3	REFS	23	10*48	5*51	6*53	8*55
10	EXM2	REAL	STM3	REFS	23	48	51	53	55
11	EXM5	REAL	STM3	REFS	23				
12	EXM6	REAL	STM3	REFS	23	58			
32	HMAX	REAL	COMCON	REFS	17				
31	HMIN	REAL	COMCON	REFS	17				
33	HSMAX	REAL	COMCON	REFS	17				
34	H4MAX	REAL	COMCON	REFS	17				
16	OMTH1	REAL	STM3	REFS	23				
235	PA	REAL		REFS	66	DEFINED	51		
2	PCA	REAL	COMCON	REFS	17	66			
15	PMAX	REAL	COMCON	REFS	17				
14	PMIN	REAL	COMCON	REFS	17				
16	PSMAX	REAL	COMCON	REFS	17				
7	PVOT	REAL	COMCON	REFS	17				
233	PVT3	REAL		DEFINED	66				
6	PV010	REAL	COMCON	REFS	17				
234	P0	REAL		REFS	66	DEFINED	48		
13	P1	REAL	COMCON	REFS	17				
236	P2	REAL		REFS	66	DEFINED	53		
237	P3	REAL		REFS	66	DEFINED	55		
17	P3MIN	REAL	COMCON	REFS	17				
240	P4	REAL		REFS	66	DEFINED	58		
241	P6	REAL		REFS	66	DEFINED	59		
242	P7	REAL		REFS	66	DEFINED	61	65	
243	P7A	REAL		REFS	65	DEFINED	63		
244	P7B	REAL		REFS	65	DEFINED	64		
36	SMAX	REAL	COMCON	REFS	17				
35	SMIN	REAL	COMCON	REFS	17				
37	S3MIN	REAL	COMCON	REFS	17				
40	S4MAX	REAL	COMCON	REFS	17				
0	T	REAL	F.P.	REFS	41	DEFINED	1		
12	TC	REAL	COMCON	REFS	17				
4	TCA	REAL	COMCON	REFS	17				
0	THETA	REAL	STM3	REFS	23	62			
2	THLOG	REAL	STM3	REFS	23				
1	THL1	REAL	STM3	REFS	23	3*66			
3	THM1	REAL	STM3	REFS	23	4*59			
4	THM22	REAL	STM3	REFS	23				
5	THM23	REAL	STM3	REFS	23	58			
23	TMAX	REAL	COMCON	REFS	17				
22	TMIN	REAL	COMCON	REFS	17				
24	TSMAX	REAL	COMCON	REFS	17				
5	TZA	REAL	COMCON	REFS	17				
11	T1	REAL	COMCON	REFS	17				
25	T1MAX	REAL	COMCON	REFS	17				

VARIABLES	SN	TYPE	RELOCATION				
26	T2MIN	REAL	COMCON	REFS	17		
30	T3MAX	REAL	COMCON	REFS	17		
27	T3MIN	REAL	COMCON	REFS	17		
0	V	REAL	F.P.	REFS	41	DEFINED	1
3	VCA	REAL	COMCON	REFS	17		
20	VD3SV	REAL	STM3	REFS	23	63	
22	VD4SV	REAL	STM3	REFS	23	63	
24	VD5SV	REAL	STM3	REFS	23	64	
21	V3MAX	REAL	COMCON	REFS	17		
20	V3MIN	REAL	COMCON	REFS	17		
14	X50TH2	REAL	STM3	REFS	23	59	
15	X60TH2	REAL	STM3	REFS	23		
25	Y	REAL	STM3	REFS	23	63	64
26	Y2	REAL	STM3	REFS	23		
27	Y3	REAL	STM3	REFS	23	63	
30	Y30	REAL	STM3	REFS	23		
31	Y31	REAL	STM3	REFS	23	64	

EXTERNALS	TYPE	ARGS	REFERENCES
COMT3		2	41

STATEMENT LABELS			DEF LINE	REFERENCES
0	1000	INACTIVE	48	
154	1500		66	62
0	2000	INACTIVE	67	

COMMON BLOCKS	LENGTH
CONST3	68
COMCON	33
STM3	26

STATISTICS

PROGRAM LENGTH	245B	165
SCM LABELED COMMON LENGTH	177B	127

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```
      FUNCTION SVT3(V,T)                                                SVT3     2
C  SVT3   ENTROPY - SUB REGION 3   A 2ND LEVEL SUBROUTINE  S = F(V,T)   SVT3     3
C        ENTRIES = S3E                                                  SVT3     4
C        CALLS COMT3,                                                   SVT3     5
C                                                                       SVT3     6
C                                                                       SVT3     7
C                                                                       SVT3     8
C                                                                       SVT3     9
      COMMON /CONST3/ C00, C01, C02, C03, C04, C05, C06, C07, C08, C09, SVT3    10
     1C010,C011,C012, C11, C12, C13, C14, C15, C16, C17, C21, C22, C23, SVT3    11
     2 C24, C25, C26, C27, C28, C31, C32, C33, C34, C35, C36, C37, C38, SVT3    12
     3 C39,C310, C40, C41, C50, C60, C61, C62, C63, C64, C70, C71, C72, SVT3    13
     4 C73, C74, C75, C76, C77, C78, D30, D31, D32, D33, D34, D40, D41, SVT3    14
     5 D42, D43, D44, D50, D51, D52                                     SVT3    15
C                                                                       SVT3    16
C                                                                       SVT3    17
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, SVT3    18
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, SVT3    19
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, SVT3    20
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         SVT3    21
C                                                                       SVT3    22
C                                                                       SVT3    23
      COMMON /STM3/  THETA ,THL1  ,THLOG ,THM1  ,THM22 ,THM23 ,EX    ,  SVT3    24
     1 EXM1  ,EXM2  ,EXM5  ,EXM6  ,EXLOG ,X50TH2,X60TH2,OMTH1 ,D3SV  ,  SVT3    25
     2 VD3SV ,D4SV  ,VD4SV ,D5SV  ,VD5SV ,Y     ,Y2    ,Y3    ,Y30 ,Y31 SVT3    26
C                                                                       SVT3    27
      DATA    C60T2 / +1.105787067E-1 /,  C61T3 / -7.009097865E-1 /,    SVT3    28
     1        C62T4 / +1.478828568E+0 /,  C63T5 / -1.298207735E+0 /,    SVT3    29
     2        C64T6 / +4.096852208E-1 /,  C71T2 / -3.037567430E+2 /,    SVT3    30
     3        C72T3 / +6.662169624E+1 /,  C73T4 / -7.208158280E+2 /,    SVT3    31
     4        C74T5 / +1.178548110E+4 /,  C75T6 / -8.774014188E+4 /,    SVT3    32
     5        C76T7 / +3.180041641E+5 /,  C77T8 / -5.642845147E+5 /,    SVT3    33
     6        C78T9 / +3.943414285E+5 /                                SVT3    34
C                                                                       SVT3    35
      CALL COMT3(V,T)                                                   SVT3    36
C                                                                       SVT3    37
      ENTRY S3E                                                         SVT3    38
C                                                                       SVT3    39
C     THIS ENTRY TO BE USED ONLY IF COMT3 WAS LAST CALLED WITH THE      SVT3    40
C     VALUES OF V AND T THAT ARE TO BE ASSUMED HERE.                    SVT3    41
C                                                                       SVT3    42
 1000 S1 = C11*EX + EXM1*(C12 + EXM1*(C13 +EXM1*(C14 + EXM1*(C15        SVT3    43
     1 + EXM1*C16)))) + C17*EXLOG + C50                                 SVT3    44
      S2 = 2.0*(C21*EX + EXM1*(C22 + EXM1*(C23 + EXM1*(C24              SVT3    45
     1 + EXM1*(C25 + EXM1*(C26 + C27*EXM1))))) + C28*EXLOG)             SVT3    46
      S3 = 3.0*(C31*EX + EXM1*(C32 + EXM1*(C33 + EXM1*(C34 + EXM1*(C35  SVT3    47
     1 + EXM1*(C36 + EXM1*(C37 + EXM1*(C38 + C39*EXM1)))))))+C310*EXLOG) SVT3    48
      S4 = (C40 + C41*EXM5)*(22.0 - 23.0*THM1)*THM23 - C50* THLOG       SVT3    49
      S6 = (X60TH2/THETA)*(C60T2_+ THM1*(C61T3 + THM1*(C62T4            SVT3    50
     1 + THM1*(C63T5 + THM1*C64T6))))                                   SVT3    51
      S7 = C70 + THL1*(C71T2 + THL1*(C72T3 + THL1*(C73T4 + THL1*(C74T5  SVT3    52
     + + THL1*(C75T6 + THL1*(C76T7 + THL1*(C77T8 + THL1*C78T9)))))))    SVT3    53
      SB = 0.0                                                          SVT3    54
      IF(THETA .GE. 1.0 .OR. EX .GE. 1.0) GO TO 1500                    SVT3    55
      S8A = Y2*(3.0D0*D3SV + 4.0D0*Y*D4SV)                              SVT3    56
      S8B = 32.0D0*Y31*D5SV                                             SVT3    57
      SB = (S8A + S8B)/OMTH1                                            SVT3    58
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                1500 SVT3 = (-S1 - THL1*(S2 + S3*THL1) + S4 + S6 - S7 + S8-ALPHA1)*PVOT SVT3       59
                2000 RETURN                                                             SVT3       60
     60             END                                                                 SVT3       61
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	SVT3	1	
14	S3E	37	59

VARIABLES	SN	TYPE	RELOCATION			
10	AI1	REAL	COMCON	REFS	17	
0	ALPHA0	REAL	COMCON	REFS	17	
1	ALPHA1	REAL	COMCON	REFS	17	58
0	C00	REAL	CONST3	REFS	9	
1	C01	REAL	CONST3	REFS	9	
12	C010	REAL	CONST3	REFS	9	
13	C011	REAL	CONST3	REFS	9	
14	C012	REAL	CONST3	REFS	9	
2	C02	REAL	CONST3	REFS	9	
3	C03	REAL	CONST3	REFS	9	
4	C04	REAL	CONST3	REFS	9	
5	C05	REAL	CONST3	REFS	9	
6	C06	REAL	CONST3	REFS	9	
7	C07	REAL	CONST3	REFS	9	
10	C08	REAL	CONST3	REFS	9	
11	C09	REAL	CONST3	REFS	9	
15	C11	REAL	CONST3	REFS	9	42
16	C12	REAL	CONST3	REFS	9	42
17	C13	REAL	CONST3	REFS	9	42
20	C14	REAL	CONST3	REFS	9	42
21	C15	REAL	CONST3	REFS	9	42
22	C16	REAL	CONST3	REFS	9	42
23	C17	REAL	CONST3	REFS	9	42
24	C21	REAL	CONST3	REFS	9	44
25	C22	REAL	CONST3	REFS	9	44
26	C23	REAL	CONST3	REFS	9	44
27	C24	REAL	CONST3	REFS	9	44
30	C25	REAL	CONST3	REFS	9	44
31	C26	REAL	CONST3	REFS	9	44
32	C27	REAL	CONST3	REFS	9	44
33	C28	REAL	CONST3	REFS	9	44
34	C31	REAL	CONST3	REFS	9	46
45	C310	REAL	CONST3	REFS	9	46
35	C32	REAL	CONST3	REFS	9	46
36	C33	REAL	CONST3	REFS	9	46
37	C34	REAL	CONST3	REFS	9	46
40	C35	REAL	CONST3	REFS	9	46
41	C36	REAL	CONST3	REFS	9	46
42	C37	REAL	CONST3	REFS	9	46
43	C38	REAL	CONST3	REFS	9	46
44	C39	REAL	CONST3	REFS	9	46
46	C40	REAL	CONST3	REFS	9	48

VARIABLES	SN	TYPE	RELOCATION						
47	C41	REAL	CONST3	REFS	9	48			
50	C50	REAL	CONST3	REFS	9	42	48		
51	C60	REAL	CONST3	REFS	9				
212	C60T2	REAL		REFS	49	DEFINED	27		
52	C61	REAL	CONST3	REFS	9				
213	C61T3	REAL		REFS	49	DEFINED	27		
53	C62	REAL	CONST3	REFS	9				
214	C62T4	REAL		REFS	49	DEFINED	27		
54	C63	REAL	CONST3	REFS	9				
215	C63T5	REAL		REFS	49	DEFINED	27		
55	C64	REAL	CONST3	REFS	9				
216	C64T6	REAL		REFS	49	DEFINED	27		
56	C70	REAL	CONST3	REFS	9	51			
57	C71	REAL	CONST3	REFS	9				
217	C71T2	REAL		REFS	51	DEFINED	27		
60	C72	REAL	CONST3	REFS	9				
220	C72T3	REAL		REFS	51	DEFINED	27		
61	C73	REAL	CONST3	REFS	9				
221	C73T4	REAL		REFS	51	DEFINED	27		
62	C74	REAL	CONST3	REFS	9				
222	C74T5	REAL		REFS	51	DEFINED	27		
63	C75	REAL	CONST3	REFS	9				
223	C75T6	REAL		REFS	51	DEFINED	27		
64	C76	REAL	CONST3	REFS	9				
224	C76T7	REAL		REFS	51	DEFINED	27		
65	C77	REAL	CONST3	REFS	9				
225	C77T8	REAL		REFS	51	DEFINED	27		
66	C78	REAL	CONST3	REFS	9				
226	C78T9	REAL		REFS	51	DEFINED	27		
17	D3SV	REAL	STM3	REFS	23	55			
67	D30	REAL	CONST3	REFS	9				
70	D31	REAL	CONST3	REFS	9				
71	D32	REAL	CONST3	REFS	9				
72	D33	REAL	CONST3	REFS	9				
73	D34	REAL	CONST3	REFS	9				
21	D4SV	REAL	STM3	REFS	23	55			
74	D40	REAL	CONST3	REFS	9				
75	D41	REAL	CONST3	REFS	9				
76	D42	REAL	CONST3	REFS	9				
77	D43	REAL	CONST3	REFS	9				
100	D44	REAL	CONST3	REFS	9				
23	D5SV	REAL	STM3	REFS	23	56			
101	D50	REAL	CONST3	REFS	9				
102	D51	REAL	CONST3	REFS	9				
103	D52	REAL	CONST3	REFS	9				
6	EX	REAL	STM3	REFS	23	42	44	46	54
13	EXLOG	REAL	STM3	REFS	23	42	44	46	
7	EXM1	REAL	STM3	REFS	23	5*42	6*44	8*46	
10	EXM2	REAL	STM3	REFS	23				
11	EXM5	REAL	STM3	REFS	23	48			
12	EXM6	REAL	STM3	REFS	23				
32	HMAX	REAL	COMCON	REFS	17				
31	HMIN	REAL	COMCON	REFS	17				
33	HSMAX	REAL	COMCON	REFS	17				
34	H4MAX	REAL	COMCON	REFS	17				
16	OMTH1	REAL	STM3	REFS	23	57			
2	PCA	REAL	COMCON	REFS	17				

VARIABLES	SN	TYPE	RELOCATION					
15	PMAX	REAL	COMCON	REFS	17			
14	PMIN	REAL	COMCON	REFS	17			
16	PSMAX	REAL	COMCON	REFS	17			
7	PVOT	REAL	COMCON	REFS	17	56		
6	PV010	REAL	COMCON	REFS	17			
13	PI	REAL	COMCON	REFS	17			
17	P3MIN	REAL	COMCON	REFS	17			
36	SMAX	REAL	COMCON	REFS	17			
35	SMIN	REAL	COMCON	REFS	17			
243	SVT3	REAL		DEFINED	58			
244	S1	REAL		REFS	58	DEFINED	42	
245	S2	REAL		REFS	58	DEFINED	44	
246	S3	REAL		REFS	58	DEFINED	46	
37	S3MIN	REAL	COMCON	REFS	17			
247	S4	REAL		REFS	58	DEFINED	48	
40	S4MAX	REAL	COMCON	REFS	17			
250	S6	REAL		REFS	58	DEFINED	49	
251	S7	REAL		REFS	58	DEFINED	51	
252	S8	REAL		REFS	58	DEFINED	53	57
253	S8A	REAL		REFS	57	DEFINED	55	
254	S8B	REAL		REFS	57	DEFINED	56	
0	T	REAL	F.P.	REFS	35	DEFINED	1	
12	TC	REAL	COMCON	REFS	17			
4	TCA	REAL	COMCON	REFS	17			
8	THETA	REAL	STM3	REFS	23	49	54	
2	THL06	REAL	STM3	REFS	23	48		
1	THL1	REAL	STM3	REFS	23	8*51	2*58	
3	THM1	REAL	STM3	REFS	23	48	4*49	
4	THM22	REAL	STM3	REFS	23			
5	THM23	REAL	STM3	REFS	23	48		
23	TMAX	REAL	COMCON	REFS	17			
22	TMIN	REAL	COMCON	REFS	17			
24	TSMAX	REAL	COMCON	REFS	17			
5	TZA	REAL	COMCON	REFS	17			
11	T1	REAL	COMCON	REFS	17			
25	T1MAX	REAL	COMCON	REFS	17			
26	T2MIN	REAL	COMCON	REFS	17			
30	T3MAX	REAL	COMCON	REFS	17			
27	T3MIN	REAL	COMCON	REFS	17			
0	V	REAL	F.P.	REFS	35	DEFINED	1	
3	VCA	REAL	COMCON	REFS	17			
20	VD3SV	REAL	STM3	REFS	23			
22	VD4SV	REAL	STM3	REFS	23			
24	VD5SV	REAL	STM3	REFS	23			
21	V3MAX	REAL	COMCON	REFS	17			
20	V3MIN	REAL	COMCON	REFS	17			
14	X50TH2	REAL	STM3	REFS	23			
15	X60TH2	REAL	STM3	REFS	23	49		
25	Y	REAL	STM3	REFS	23	55		
26	Y2	REAL	STM3	REFS	23	55		
27	Y3	REAL	STM3	REFS	23			
30	Y30	REAL	STM3	REFS	23			
31	Y31	REAL	STM3	REFS	23	56		

EXTERNALS	TYPE	ARGS	REFERENCES
COMT3		2	35

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STATEMENT LABELS			DEF LINE	REFERENCES
0	1000	INACTIVE	42	
171	1500		58	54
0	2000	INACTIVE	59	

COMMON BLOCKS	LENGTH
CONST3	68
COMCON	33
STM3	26

STATISTICS		
PROGRAM LENGTH	2558	173
SCM LABELED COMMON LENGTH	177B	127

```
      FUNCTION SPT1(P,T)                                                COR1  207
C  SPT1   S = F(P,T)     ENTROPY - SUBREGION 1    A 2ND LEVEL ROUTINE   COR1  208
C        ENTRY = S1E(DUMMY)                                              COR1  209
C                                                                        COR1  210
C                                                                        COR1  211
C                                                                        COR1  212
      COMMON /CONST1/AA0, AA1, AA2, AA3, AA4, AA5, AA6, AA7, AA8, AA9,  COR1  213
     1    AA10,AA11,AA12,AA13,AA14,AA15,AA16,AA17,AA18,AA19,AA20,AA21,  COR1  214
     2    AA22,  A1,  A2,  A3,  A4,  A5,  A6,  A7,  A8,  A9, A10, A11,  COR1  215
     3     A12                                                           COR1  216
C                                                                        COR1  217
C                                                                        COR1  218
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, COR1  219
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, COR1  220
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, COR1  221
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         COR1  222
C                                                                        COR1  223
C                                                                        COR1  224
      COMMON /STM1/ THETA,  TH2,  TH4,  TH6,  TH7, TH10, TH11, TH16,    COR1  225
     1   TH17, TH18, TH19, TH20, TH21, BETA,BETA2,BETA3,BETA4, Y,YP,    COR1  226
     2  Z, ZP,  UA9, UA10,   UB,  UB2,   UC,  U3T,  UD4,   UP           COR1  227
C                                                                        COR1  228
      DATA A3M1  , A9T18  / +7.200000000E-1, +2.553840000E+0  /          COR1  229
      DATA AA3T2 , AA4T3  / +7.882573574E+4, -2.019983322E+5  /          COR1  230
      DATA AA5T4 , AA6T5  / +3.960952411E+5, -5.469558870E+5  /          COR1  231
      DATA AA7T6 , AA8T7  / +5.154505000E+5, -3.157818119E+5  /          COR1  232
      DATA AA9T8 , AA10T9 / +1.134511141E+5, -1.815544002E+4  /          COR1  233
      DATA AA14T2, AA1510 / +4.568558108E-2, +2.421647003E+3  /          COR1  234
      DATA AA1619, AA2220 / +2.412460567E-9, +1.209525268E-12 /          COR1  235
C                                                                        COR1  236
      CALL COMT1 (P,T)                                                   COR1  237
C                                                                        COR1  238
      ENTRY S1E                                                          COR1  239
C                                                                        COR1  240
C     THIS ENTRY TO BE USED ONLY IF COMT1 WAS LAST CALLED WITH THE       COR1  241
C     VALUES OF P AND T THAT ARE TO BE ASSUMED HERE.                     COR1  242
C                                                                        COR1  243
 1000 S5 = BETA3*(AA21 + AA2220*BETA/TH21)                               COR1  244
      S4 = AA20*TH17*(A9T18 + 20.0*TH2)*UP                               COR1  245
      S3 = 11.0*TH10*U3T                                                 COR1  246
      S2 = (-AA13 - AA14T2*THETA + AA1510*UA9 + AA1619*TH18/UB2)*BETA    COR1  247
      S1 = AA11*((5.0*Z/12.0 - A3M1*Y)*YP + A4)*ZP                       COR1  248
      S0 = AA0* ALOG(THETA) - (AA2 + THETA*(AA3T2 + THETA*(AA4T3         COR1  249
     1 + THETA*(AA5T4 + THETA*(AA6T5 + THETA*(AA7T6 + THETA*(AA8T7      COR1  250
     2 + THETA*(AA9T8 + THETA*AA10T9)))))))                              COR1  251
C                                                                        COR1  252
C     CONSTANT ADDED TO GIVE EXACT VALUE AT TRIPLE POINT.                COR1  253
C                                                                        COR1  254
      SPT = S0 + S1 + S2 - S3 + S4 + S5                                  COR1  255
      SPT1 = (SPT - ALPHA1)*PVOT                                         COR1  256
 2000 RETURN                                                             COR1  257
      END                                                                COR1  258
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY	POINTS	DEF LINE	REFERENCES
4	SPT1	1	
14	S1E	33	51

VARIABLES	SN	TYPE	RELOCATION				
0	AA0	REAL	CONST1	REFS	7	43	
1	AA1	REAL	CONST1	REFS	7		
12	AA10	REAL	CONST1	REFS	7		
133	AA10T9	REAL		REFS	43	DEFINED	27
13	AA11	REAL	CONST1	REFS	7	42	
14	AA12	REAL	CONST1	REFS	7		
15	AA13	REAL	CONST1	REFS	7	41	
16	AA14	REAL	CONST1	REFS	7		
134	AA14T2	REAL		REFS	41	DEFINED	28
17	AA15	REAL	CONST1	REFS	7		
135	AA1510	REAL		REFS	41	DEFINED	28
20	AA16	REAL	CONST1	REFS	7		
136	AA1619	REAL		REFS	41	DEFINED	29
21	AA17	REAL	CONST1	REFS	7		
22	AA18	REAL	CONST1	REFS	7		
23	AA19	REAL	CONST1	REFS	7		
2	AA2	REAL	CONST1	REFS	7	43	
24	AA20	REAL	CONST1	REFS	7	39	
25	AA21	REAL	CONST1	REFS	7	38	
26	AA22	REAL	CONST1	REFS	7		
137	AA2220	REAL		REFS	38	DEFINED	29
3	AA3	REAL	CONST1	REFS	7		
124	AA3T2	REAL		REFS	43	DEFINED	24
4	AA4	REAL	CONST1	REFS	7		
125	AA4T3	REAL		REFS	43	DEFINED	24
5	AA5	REAL	CONST1	REFS	7		
126	AA5T4	REAL		REFS	43	DEFINED	25
6	AA6	REAL	CONST1	REFS	7		
127	AA6T5	REAL		REFS	43	DEFINED	25
7	AA7	REAL	CONST1	REFS	7		
130	AA7T6	REAL		REFS	43	DEFINED	26
10	AA8	REAL	CONST1	REFS	7		
131	AA8T7	REAL		REFS	43	DEFINED	26
11	AA9	REAL	CONST1	REFS	7		
132	AA9T8	REAL		REFS	43	DEFINED	27
10	AI1	REAL	COMCON	REFS	13		
0	ALPHA0	REAL	COMCON	REFS	13		
1	ALPHA1	REAL	COMCON	REFS	13	50	
27	A1	REAL	CONST1	REFS	7		
40	A10	REAL	CONST1	REFS	7		
41	A11	REAL	CONST1	REFS	7		
42	A12	REAL	CONST1	REFS	7		
30	A2	REAL	CONST1	REFS	7		
31	A3	REAL	CONST1	REFS	7		
122	A3M1	REAL		REFS	42	DEFINED	23
32	A4	REAL	CONST1	REFS	7	42	
33	A5	REAL	CONST1	REFS	7		
34	A6	REAL	CONST1	REFS	7		
35	A7	REAL	CONST1	REFS	7		
36	A8	REAL	CONST1	REFS	7		

VARIABLES	SN	TYPE	RELOCATION				
37	A9	REAL	CONST1	REFS	7		
123	A9T18	REAL		REFS	39	DEFINED	23
15	BETA	REAL	STM1	REFS	19	38	41
16	BETA2	REAL	STM1	REFS	19		
17	BETA3	REAL	STM1	REFS	19	38	
20	BETA4	REAL	STM1	REFS	19		
32	HMAX	REAL	COMCON	REFS	13		
31	HMIN	REAL	COMCON	REFS	13		
33	HSMAX	REAL	COMCON	REFS	13		
34	H4MAX	REAL	COMCON	REFS	13		
0	P	REAL	F.P.	REFS	31	DEFINED	1
2	PCA	REAL	COMCON	REFS	13		
15	PMAX	REAL	COMCON	REFS	13		
14	PMIN	REAL	COMCON	REFS	13		
16	PSMAX	REAL	COMCON	REFS	13		
7	PVOT	REAL	COMCON	REFS	13	50	
6	PV010	REAL	COMCON	REFS	13		
13	P1	REAL	COMCON	REFS	13		
17	P3MIN	REAL	COMCON	REFS	13		
36	SMAX	REAL	COMCON	REFS	13		
35	SMIN	REAL	COMCON	REFS	13		
155	SPT	REAL		REFS	50	DEFINED	49
146	SPT1	REAL		DEFINED	50		
154	S0	REAL		REFS	49	DEFINED	43
153	S1	REAL		REFS	49	DEFINED	42
152	S2	REAL		REFS	49	DEFINED	41
151	S3	REAL		REFS	49	DEFINED	40
37	S3MIN	REAL	COMCON	REFS	13		
150	S4	REAL		REFS	49	DEFINED	39
40	S4MAX	REAL	COMCON	REFS	13		
147	S5	REAL		REFS	49	DEFINED	38
0	T	REAL	F.P.	REFS	31	DEFINED	1
12	TC	REAL	COMCON	REFS	13		
4	TCA	REAL	COMCON	REFS	13		
0	THETA	REAL	STM1	REFS	19	41	9*43
5	TH10	REAL	STM1	REFS	19	40	
6	TH11	REAL	STM1	REFS	19		
7	TH16	REAL	STM1	REFS	19		
10	TH17	REAL	STM1	REFS	19	39	
11	TH18	REAL	STM1	REFS	19	41	
12	TH19	REAL	STM1	REFS	19		
1	TH2	REAL	STM1	REFS	19	39	
13	TH20	REAL	STM1	REFS	19		
14	TH21	REAL	STM1	REFS	19	38	
2	TH4	REAL	STM1	REFS	19		
3	TH6	REAL	STM1	REFS	19		
4	TH7	REAL	STM1	REFS	19		
23	TMAX	REAL	COMCON	REFS	13		
22	TMIN	REAL	COMCON	REFS	13		
24	TSMAX	REAL	COMCON	REFS	13		
5	TZA	REAL	COMCON	REFS	13		
11	T1	REAL	COMCON	REFS	13		
25	T1MAX	REAL	COMCON	REFS	13		
26	T2MIN	REAL	COMCON	REFS	13		
30	T3MAX	REAL	COMCON	REFS	13		
27	T3MIN	REAL	COMCON	REFS	13		
26	UA10	REAL	STM1	REFS	19		

VARIABLES	SN	TYPE	RELOCATION			
25	UA9	REAL	STM1	REFS	19	41
27	UB	REAL	STM1	REFS	19	
30	UB2	REAL	STM1	REFS	19	41
31	UC	REAL	STM1	REFS	19	
33	UD4	REAL	STM1	REFS	19	
34	UP	REAL	STM1	REFS	19	39
32	U3T	REAL	STM1	REFS	19	40
3	VCA	REAL	COMCON	REFS	13	
21	V3MAX	REAL	COMCON	REFS	13	
20	V3MIN	REAL	COMCON	REFS	13	
21	Y	REAL	STM1	REFS	19	42
22	YP	REAL	STM1	REFS	19	42
23	Z	REAL	STM1	REFS	19	42
24	ZP	REAL	STM1	REFS	19	42

EXTERNALS	TYPE	ARGS	REFERENCES
ALOG	REAL	1 LIBRARY	43
COMT1		2	31

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	38	
0 2000	INACTIVE	51	

COMMON BLOCKS	LENGTH
CONST1	35
COMCON	33
STM1	29

STATISTICS

PROGRAM LENGTH	156B	110
SCM LABELED COMMON LENGTH	141B	97

```
      FUNCTION SPT2(P,T)                                                SPT2     2
C     SPT2   ENTROPY = F(P,T) SUB REGION 2          A 2ND LEVEL SUBROUTINE SPT2     3
C            ENTRIES = S2E                                              SPT2     4
C            CALLS = COMT2                                              SPT2     5
C                                                                       SPT2     6
C                                                                       SPT2     7
C                                                                       SPT2     8
      COMMON /CONST2/ BB00, BB01, BB02, BB03, BB04, BB05, BB11, BB12,   SPT2     9
     1    BB21, BB22, BB23, BB31, BB32, BB41, BB42, BB51, BB52, BB53,   SPT2    10
     2    BB61, BB62, BB71, BB72, BB81, BB82,  B00,  B61,  B71,  B81,   SPT2    11
     3     BB2, BB90, BB91, BB92, BB93, BB94, BB95, BB96                SPT2    12
C                                                                       SPT2    13
C                                                                       SPT2    14
C                                                                       SPT2    15
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, SPT2    16
     1   PVOT,    A11,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, SPT2    17
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, SPT2    18
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         SPT2    19
C                                                                       SPT2    20
C                                                                       SPT2    21
C                                                                       SPT2    22
      COMMON /STM2/ THM1  ,THETA ,TH2   ,TH3   ,TH4   ,X1    ,X2    ,  SPT2    23
     1 X3    ,X4    ,X6    ,X8    ,X10   ,X11   ,X12   ,X13   ,X14   ,  SPT2    24
     2 X17   ,X18   ,X19   ,X24   ,X25   ,X27   ,X28   ,X32   ,BETA  ,  SPT2    25
     3 BETA2,BETA3 ,BETA4 ,BETA5 ,BETA6 ,BETA7 ,D4    ,T4    ,D3    ,  SPT2    26
     4 T3    ,D2    ,T2    ,BFTAL ,BOBL  ,BOBLP ,FB    ,BB61F ,BB71F ,  SPT2    27
     5 BB81F                                                            SPT2    28
C                                                                       SPT2    29
      DATA    BB03T2 / +8.661325668E-1 /, BB04T3 / -1.964313509E+0 /,   SPT2    30
     1        BB05T4 / +3.426072823E-1 /, BB1113 / +8.671488693E-1 /,   SPT2    31
     2        BB12T3 / +4.166951403E+0 /, BB2118 / +1.510218779E+0 /,   SPT2    32
     3        BB22T2 / +5.229341786E-2 /, BB3118 / +8.137654027E+0 /,   SPT2    33
     4        BB3210 / +1.069036614E+0 /, BB4125 / -1.493834177E+1 /,   SPT2    34
     5        BB4214 / -1.238655012E+0 /, BB5132 / +1.906576515E+1 /,   SPT2    35
     6        BB5228 / -1.444604944E+1 /, BB5324 / +4.980050693E+0 /,   SPT2    36
     7        B00T2  / +1.526666667E+0 /, B00T3  / +2.290000000E+0 /,   SPT2    37
     8        B00T4  / +3.053333333E+0 /, B00T5  / +3.816666667E+0 /,   SPT2    38
     9        B00T6  / +4.580000000E+0 /                                SPT2    39
C                                                                       SPT2    40
      CALL COMT2 (P,T)                                                  SPT2    41
C                                                                       SPT2    42
      ENTRY S2E                                                         SPT2    43
C                                                                       SPT2    44
C     THIS ENTRY CAN BE USED ONLY IF COMT2 WAS LAST CALLED WITH THE     SPT2    45
C     VALUES OF P AND T THAT ARE TO BE ASSUMED HERE.                    SPT2    46
C                                                                       SPT2    47
 1000 S0 = BB00*ALOG(THETA) - A11*ALOG(BETA) - BB02                     SPT2    48
     1 - THETA*(BB03T2 + THETA*(BB04T3 + THETA*BB05T4))                 SPT2    49
      S1 = BETA*(X3*(BB1113*X10 + BB12T3)                               SPT2    50
     1 + BETA*(X1 *(BB2118*X17 + BB22T2*X1 + BB23)                      SPT2    51
     2 + BETA*(X10*(BB3118*X8  + BB3210)                                SPT2    52
     3 + BETA*(X14*(BB4125*X11 + BB4214)                                SPT2    53
     4 + BETA*(X24*(BB5132*X8  + BB5228*X4 + BB5324))))))              SPT2    54
      S2 = X11*(BB61F*(12.0 - T2) + BB62*(11.0 - T2))/D2                SPT2    55
      S3 = X18*(BB71F*(24.0 - T3) + BB72*(18.0 - T3))/D3                SPT2    56
      S4 = X14*(BB81F*(24.0 - T4) + BB82*(14.0 - T4))/D4                SPT2    57
      S9 = BETA*BOBLP*(FB*BB90 + X1*((FB + B00)*BB91                    SPT2    58
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                1 + X1*((FB + B00T2)*BB92 + X1*((FB + B00T3)*BB93                    SPT2       59
                2 + X1*((FB + B00T4)*BB94 + X1*((FB + B00T5)*BB95                    SPT2       60
     60         3 + X1*((FB + B00T6)*BB96)))))))                                     SPT2       61
                 SPT2 = (S0 - B00*(S1 + S2 + S3 + S4) + S9 - ALPHA1)*PVOT          SPT2       62
           2000 RETURN                                                             SPT2       63
                END                                                                SPT2       64
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
4	SPT2	1	
14	S2E	42	62

VARIABLES

	SN	TYPE	RELOCATION				
10	AI1	REAL	COMCON	REFS	15	47	
0	ALPHA0	REAL	COMCON	REFS	15		
1	ALPHA1	REAL	COMCON	REFS	15	61	
0	BB00	REAL	CONST2	REFS	8	47	
1	BB01	REAL	CONST2	REFS	8		
2	BB02	REAL	CONST2	REFS	8	47	
3	BB03	REAL	CONST2	REFS	8		
160	BB03T2	REAL		REFS	47	DEFINED	29
4	BB04	REAL	CONST2	REFS	8		
161	BB04T3	REAL		REFS	47	DEFINED	29
5	BB05	REAL	CONST2	REFS	8		
162	BB05T4	REAL		REFS	47	DEFINED	29
6	BB11	REAL	CONST2	REFS	8		
163	BB1113	REAL		REFS	49	DEFINED	29
7	BB12	REAL	CONST2	REFS	8		
164	BB12T3	REAL		REFS	49	DEFINED	29
10	BB21	REAL	CONST2	REFS	8		
165	BB2118	REAL		REFS	49	DEFINED	29
11	BB22	REAL	CONST2	REFS	8		
166	BB22T2	REAL		REFS	49	DEFINED	29
12	BB23	REAL	CONST2	REFS	8	49	
13	BB31	REAL	CONST2	REFS	8		
167	BB3118	REAL		REFS	49	DEFINED	29
14	BB32	REAL	CONST2	REFS	8		
170	BB3210	REAL		REFS	49	DEFINED	29
15	BB41	REAL	CONST2	REFS	8		
171	BB4125	REAL		REFS	49	DEFINED	29
16	BB42	REAL	CONST2	REFS	8		
172	BB4214	REAL		REFS	49	DEFINED	29
17	BB51	REAL	CONST2	REFS	8		
173	BB5132	REAL		REFS	49	DEFINED	29
20	BB52	REAL	CONST2	REFS	8		
174	BB5228	REAL		REFS	49	DEFINED	29
21	BB53	REAL	CONST2	REFS	8		
175	BB5324	REAL		REFS	49	DEFINED	29
22	BB61	REAL	CONST2	REFS	8		
51	BB61F	REAL	STM2	REFS	22	54	
23	BB62	REAL	CONST2	REFS	8	54	
24	BB71	REAL	CONST2	REFS	8		

VARIABLES	SN	TYPE	RELOCATION					
52	BB71F	REAL	STM2	REFS	22	55		
25	BB72	REAL	CONST2	REFS	8	55		
26	BB81	REAL	CONST2	REFS	8			
53	BB81F	REAL	STM2	REFS	22	56		
27	BB82	REAL	CONST2	REFS	8	56		
35	BB90	REAL	CONST2	REFS	8	57		
36	BB91	REAL	CONST2	REFS	8	57		
37	BB92	REAL	CONST2	REFS	8	57		
40	BB93	REAL	CONST2	REFS	8	57		
41	BB94	REAL	CONST2	REFS	8	57		
42	BB95	REAL	CONST2	REFS	8	57		
43	BB96	REAL	CONST2	REFS	8	57		
30	BETA	REAL	STM2	REFS	22	47	5*49	57
45	BETAL	REAL	STM2	REFS	22			
31	BETA2	REAL	STM2	REFS	22			
32	BETA3	REAL	STM2	REFS	22			
33	BETA4	REAL	STM2	REFS	22			
34	BETA5	REAL	STM2	REFS	22			
35	BETA6	REAL	STM2	REFS	22			
36	BETA7	REAL	STM2	REFS	22			
46	BOBL	REAL	STM2	REFS	22			
47	BOBLP	REAL	STM2	REFS	22	57		
30	B00	REAL	CONST2	REFS	8	57	61	
176	B00T2	REAL		REFS	57	DEFINED	29	
177	B00T3	REAL		REFS	57	DEFINED	29	
200	B00T4	REAL		REFS	57	DEFINED	29	
201	B00T5	REAL		REFS	57	DEFINED	29	
202	B00T6	REAL		REFS	57	DEFINED	29	
31	B61	REAL	CONST2	REFS	8			
32	B71	REAL	CONST2	REFS	8			
33	BB1	REAL	CONST2	REFS	8			
34	BB2	REAL	CONST2	REFS	8			
43	D2	REAL	STM2	REFS	22	54		
41	D3	REAL	STM2	REFS	22	55		
37	D4	REAL	STM2	REFS	22	56		
50	F8	REAL	STM2	REFS	22	7*57		
32	HMAX	REAL	COMCON	REFS	15			
31	HMIN	REAL	COMCON	REFS	15			
33	HSMAX	REAL	COMCON	REFS	15			
34	H4MAX	REAL	COMCON	REFS	15			
0	P	REAL	F.P.	REFS	40	DEFINED	1	
2	PCA	REAL	COMCON	REFS	15			
15	PMAX	REAL	COMCON	REFS	15			
14	PMIN	REAL	COMCON	REFS	15			
16	PSMAX	REAL	COMCON	REFS	15			
7	PVDT	REAL	COMCON	REFS	15	61		
6	PVD10	REAL	COMCON	REFS	15			
13	P1	REAL	COMCON	REFS	15			
17	P3MIN	REAL	COMCON	REFS	15			
36	SMAX	REAL	COMCON	REFS	15			
35	SMIN	REAL	COMCON	REFS	15			
211	SPT2	REAL		DEFINED	61			
212	S0	REAL		REFS	61	DEFINED	47	
213	S1	REAL		REFS	61	DEFINED	49	
214	S2	REAL		REFS	61	DEFINED	54	
215	S3	REAL		REFS	61	DEFINED	55	
37	S3MIN	REAL	COMCON	REFS	15			

VARIABLES	SN	TYPE	RELOCATION				
216	S4	REAL		REFS	61	DEFINED	56
40	S4MAX	REAL	COMCON	REFS	15		
217	S9	REAL		REFS	61	DEFINED	57
0	T	REAL	F.P.	REFS	40	DEFINED	1
12	TC	REAL	COMCON	REFS	15		
4	TCA	REAL	COMCON	REFS	15		
1	THETA	REAL	STM2	REFS	22	4*47	
0	THM1	REAL	STM2	REFS	22		
2	TH2	REAL	STM2	REFS	22		
3	TH3	REAL	STM2	REFS	22		
4	TH4	REAL	STM2	REFS	22		
23	TMAX	REAL	COMCON	REFS	15		
22	TMIN	REAL	COMCON	REFS	15		
24	TSMAX	REAL	COMCON	REFS	15		
5	TZA	REAL	COMCON	REFS	15		
11	T1	REAL	COMCON	REFS	15		
25	T1MAX	REAL	COMCON	REFS	15		
44	T2	REAL	STM2	REFS	22	2*54	
26	T2MIN	REAL	COMCON	REFS	15		
42	T3	REAL	STM2	REFS	22	2*55	
30	T3MAX	REAL	COMCON	REFS	15		
27	T3MIN	REAL	COMCON	REFS	15		
40	T4	REAL	STM2	REFS	22	2*56	
3	VCA	REAL	COMCON	REFS	15		
21	V3MAX	REAL	COMCON	REFS	15		
20	V3MIN	REAL	COMCON	REFS	15		
5	X1	REAL	STM2	REFS	22	2*49	6*57
13	X10	REAL	STM2	REFS	22	2*49	
14	X11	REAL	STM2	REFS	22	49	54
15	X12	REAL	STM2	REFS	22		
16	X13	REAL	STM2	REFS	22		
17	X14	REAL	STM2	REFS	22	49	56
20	X17	REAL	STM2	REFS	22	49	
21	X18	REAL	STM2	REFS	22	55	
22	X19	REAL	STM2	REFS	22		
6	X2	REAL	STM2	REFS	22		
23	X24	REAL	STM2	REFS	22	49	
24	X25	REAL	STM2	REFS	22		
25	X27	REAL	STM2	REFS	22		
26	X28	REAL	STM2	REFS	22		
7	X3	REAL	STM2	REFS	22	49	
27	X32	REAL	STM2	REFS	22		
10	X4	REAL	STM2	REFS	22	49	
11	X6	REAL	STM2	REFS	22		
12	X8	REAL	STM2	REFS	22	2*49	

EXTERNALS	TYPE	ARGS	REFERENCES
ALOG	REAL	1 LIBRARY	2*47
COMT2		2	40

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	47	
0 2000	INACTIVE	62	

COMMON BLOCKS	LENGTH
CONST2	36
COMCON	33

```
COMMON BLOCKS    LENGTH
       STM2          44

STATISTICS
  PROGRAM LENGTH                2208      144
  SCM LABELED COMMON LENGTH     1618      113
```

```
 1            FUNCTION VPT1(P,T)                                              VPT1       2
        C  VPT1   SPECIFIC VOLUME - SUB REGION 1     A 2ND LEVEL SUBROUTINE     VPT1       3
        C         S = F(P,T)                                                    VPT1       4
        C         ENTRIES = V1E                                                 VPT1       5
 5      C         CALLS = COMT1                                                 VPT1       6
        C                                                                       VPT1       7
        C                                                                       VPT1       8
        C                                                                       VPT1       9
              COMMON /CONST1/AA0, AA1, AA2, AA3, AA4, AA5, AA6, AA7, AA8, AA9,  VPT1      10
10           1    AA10,AA11,AA12,AA13,AA14,AA15,AA16,AA17,AA18,AA19,AA20,AA21,  VPT1      11
             2    AA22,  A1,  A2,  A3,  A4,  A5,  A6,  A7,  A8,  A9, A10, A11,  VPT1      12
             3     A12                                                          VPT1      13
        C                                                                       VPT1      14
        C                                                                       VPT1      15
15            COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, VPT1      16
             1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, VPT1      17
             2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, VPT1      18
             3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         VPT1      19
        C                                                                       VPT1      20
20      C                                                                       VPT1      21
              COMMON /STM1/ THETA,  TH2,  TH4,  TH6,  TH7, TH10, TH11, TH16,    VPT1      22
             1   TH17, TH18, TH19, TH20, TH21, BETA,BETA2,BETA3,BETA4, Y,YP,    VPT1      23
             2  Z, ZP,  UA9, UA10,   UB,  UB2,   UC,  U3T,  UD4,   UP           VPT1      24
        C                                                                       VPT1      25
25            DATA    AA18T2 / +4.348040700E-8 /, AA19T3 / +3.317131494E-9 /,   VPT1      26
             1        AA21T3 / +3.924357216E-5 /, AA22T4 / +2.419050535E-13/    VPT1      27
        C                                                                       VPT1      28
              CALL COMT1 (P,T)                                                  VPT1      29
        C                                                                       VPT1      30
30            ENTRY V1E                                                         VPT1      31
        C                                                                       VPT1      32
        C     THIS ENTRY TO BE USED ONLY IF COMT1 WAS LAST CALLED WITH THE      VPT1      33
        C     VALUES OF P AND T THAT ARE TO BE ASSUMED HERE.                    VPT1      34
        C                                                                       VPT1      35
35       1000 V4 = BETA2*(AA21T3*(A12 - THETA) + AA22T4*BETA/TH20)              VPT1      36
              V3 = AA20*TH18*(A9 + TH2)*(A11 - 3.0/UD4)                         VPT1      37
              V2 = (AA17 + BETA*(AA18T2 + AA19T3*BETA))/UC                      VPT1      38
              V1 = AA12 + THETA*(AA13 + THETA*AA14) + AA15*UA10 + AA16/UB       VPT1      39
              VPT1 = (AA11*A5*ZP + V1 - V2 - V3 + V4)*VCA                       VPT1      40
40       2000 RETURN                                                            VPT1      41
              END                                                               VPT1      42
```

```
    SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS      DEF LINE      REFERENCES
   4  VPT1             1
  14  V1E             30           40

VARIABLES        SN  TYPE               RELOCATION
   0  AA0            REAL                   CONST1       REFS         9
   1  AA1            REAL                   CONST1       REFS         9
  12  AA10           REAL                   CONST1       REFS         9
  13  AA11           REAL                   CONST1       REFS         9         39
```

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VARIABLES	SN	TYPE	RELOCATION				
14	AA12	REAL	CONST1	REFS	9	38	
15	AA13	REAL	CONST1	REFS	9	38	
16	AA14	REAL	CONST1	REFS	9	38	
17	AA15	REAL	CONST1	REFS	9	38	
20	AA16	REAL	CONST1	REFS	9	38	
21	AA17	REAL	CONST1	REFS	9	37	
22	AA18	REAL	CONST1	REFS	9		
67	AA18T2	REAL		REFS	37	DEFINED	25
23	AA19	REAL	CONST1	REFS	9		
70	AA19T3	REAL		REFS	37	DEFINED	25
2	AA2	REAL	CONST1	REFS	9		
24	AA20	REAL	CONST1	REFS	9	36	
25	AA21	REAL	CONST1	REFS	9		
71	AA21T3	REAL		REFS	35	DEFINED	25
26	AA22	REAL	CONST1	REFS	9		
72	AA22T4	REAL		REFS	35	DEFINED	25
3	AA3	REAL	CONST1	REFS	9		
4	AA4	REAL	CONST1	REFS	9		
5	AA5	REAL	CONST1	REFS	9		
6	AA6	REAL	CONST1	REFS	9		
7	AA7	REAL	CONST1	REFS	9		
10	AA8	REAL	CONST1	REFS	9		
11	AA9	REAL	CONST1	REFS	9		
10	AI1	REAL	COMCON	REFS	15		
0	ALPHA0	REAL	COMCON	REFS	15		
1	ALPHA1	REAL	COMCON	REFS	15		
27	A1	REAL	CONST1	REFS	9		
40	A10	REAL	CONST1	REFS	9		
41	A11	REAL	CONST1	REFS	9	36	
42	A12	REAL	CONST1	REFS	9	35	
30	A2	REAL	CONST1	REFS	9		
31	A3	REAL	CONST1	REFS	9		
32	A4	REAL	CONST1	REFS	9		
33	A5	REAL	CONST1	REFS	9	39	
34	A6	REAL	CONST1	REFS	9		
35	A7	REAL	CONST1	REFS	9		
36	A8	REAL	CONST1	REFS	9		
37	A9	REAL	CONST1	REFS	9	36	
15	BETA	REAL	STM1	REFS	21	35	2*37
16	BETA2	REAL	STM1	REFS	21	35	
17	BETA3	REAL	STM1	REFS	21		
20	BETA4	REAL	STM1	REFS	21		
32	HMAX	REAL	COMCON	REFS	15		
31	HMIN	REAL	COMCON	REFS	15		
33	HSMAX	REAL	COMCON	REFS	15		
34	H4MAX	REAL	COMCON	REFS	15		
0	P	REAL	F.P.	REFS	28	DEFINED	1
2	PCA	REAL	COMCON	REFS	15		
15	PMAX	REAL	COMCON	REFS	15		
14	PMIN	REAL	COMCON	REFS	15		
16	PSMAX	REAL	COMCON	REFS	15		
7	PVOT	REAL	COMCON	REFS	15		
6	PV010	REAL	COMCON	REFS	15		
13	P1	REAL	COMCON	REFS	15		
17	P3MIN	REAL	COMCON	REFS	15		
36	SMAX	REAL	COMCON	REFS	15		
35	SMIN	REAL	COMCON	REFS	15		

VARIABLES	SN	TYPE	RELOCATION				
37	S3MIN	REAL	COMCON	REFS	15		
40	S4MAX	REAL	COMCON	REFS	15		
0	T	REAL	F.P.	REFS	28	DEFINED	1
12	TC	REAL	COMCON	REFS	15		
4	TCA	REAL	COMCON	REFS	15		
0	THETA	REAL	STM1	REFS	21	35	2*38
5	TH10	REAL	STM1	REFS	21		
6	TH11	REAL	STM1	REFS	21		
7	TH16	REAL	STM1	REFS	21		
10	TH17	REAL	STM1	REFS	21		
11	TH18	REAL	STM1	REFS	21	36	
12	TH19	REAL	STM1	REFS	21		
1	TH2	REAL	STM1	REFS	21	36	
13	TH20	REAL	STM1	REFS	21	35	
14	TH21	REAL	STM1	REFS	21		
2	TH4	REAL	STM1	REFS	21		
3	TH6	REAL	STM1	REFS	21		
4	TH7	REAL	STM1	REFS	21		
23	TMAX	REAL	COMCON	REFS	15		
22	TMIN	REAL	COMCON	REFS	15		
24	TSMAX	REAL	COMCON	REFS	15		
5	TZA	REAL	COMCON	REFS	15		
11	T1	REAL	COMCON	REFS	15		
25	T1MAX	REAL	COMCON	REFS	15		
26	T2MIN	REAL	COMCON	REFS	15		
30	T3MAX	REAL	COMCON	REFS	15		
27	T3MIN	REAL	COMCON	REFS	15		
26	UA10	REAL	STM1	REFS	21	38	
25	UA9	REAL	STM1	REFS	21		
27	UB	REAL	STM1	REFS	21	38	
30	UB2	REAL	STM1	REFS	21		
31	UC	REAL	STM1	REFS	21	37	
33	UD4	REAL	STM1	REFS	21	36	
34	UP	REAL	STM1	REFS	21		
32	U3T	REAL	STM1	REFS	21		
3	VCA	REAL	COMCON	REFS	15	39	
75	VPT1	REAL		DEFINED	39		
101	V1	REAL		REFS	39	DEFINED	38
100	V2	REAL		REFS	39	DEFINED	37
77	V3	REAL		REFS	39	DEFINED	36
21	V3MAX	REAL	COMCON	REFS	15		
20	V3MIN	REAL	COMCON	REFS	15		
76	V4	REAL		REFS	39	DEFINED	35
21	Y	REAL	STM1	REFS	21		
22	YP	REAL	STM1	REFS	21		
23	Z	REAL	STM1	REFS	21		
24	ZP	REAL	STM1	REFS	21	39	

EXTERNALS	TYPE	ARGS	REFERENCES
COMT1		2	28

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	35	
0 2000	INACTIVE	40	

COMMON BLOCKS	LENGTH
CONST1	35
COMCON	33
STM1	29

STATISTICS

PROGRAM LENGTH	1028	66
SCM LABELED COMMON LENGTH	1418	97

```
      FUNCTION VPT2(P,T)                                                VPT2    2
C  VPT2   SPECIFIC VOLUME - SUB REGION 2     A 2ND LEVEL SUBROUTINE     VPT2    3
C        S = F(P,T)                                                      VPT2    4
C        ENTRIES = V2E                                                   VPT2    5
C        CALLS = COMT2                                                   VPT2    6
C                                                                        VPT2    7
C                                                                        VPT2    8
C                                                                        VPT2    9
      COMMON /CONST2/ BB00, BB01, BB02, BB03, BB04, BB05, BB11, BB12,    VPT2   10
     1    BB21, BB22, BB23, BB31, BB32, BB41, BB42, BB51, BB52, BB53,    VPT2   11
     2    BB61, BB62, BB71, BB72, BB81, BB82,  B00,  B61,  B71,  B81,    VPT2   12
     3     B82, BB90, BB91, BB92, BB93, BB94, BB95, BB96                 VPT2   13
C                                                                        VPT2   14
C                                                                        VPT2   15
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, VPT2   16
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, VPT2   17
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, VPT2   18
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         VPT2   19
C                                                                        VPT2   20
C                                                                        VPT2   21
      COMMON /STM2/ THM1  ,THETA ,TH2   ,TH3   ,TH4   ,X1    ,X2    ,  VPT2   22
     1 X3   ,X4    ,X6    ,X8    ,X10   ,X11   ,X12   ,X13   ,X14   ,  VPT2   23
     2 X17  ,X18   ,X19   ,X24   ,X25   ,X27   ,X28   ,X32   ,BETA  ,  VPT2   24
     3 BETA2,BETA3 ,BETA4 ,BETA5 ,BETA6 ,BETA7 ,D4    ,T4    ,D3    ,  VPT2   25
     4 T3   ,D2    ,T2    ,BETAL ,B0BL  ,B0BLP ,FB    ,BB61F ,BB71F ,  VPT2   26
     5 BB81F                                                            VPT2   27
C                                                                        VPT2   28
      CALL COMT2 (P,T)                                                   VPT2   29
C                                                                        VPT2   30
      ENTRY V2E                                                          VPT2   31
C                                                                        VPT2   32
C     THIS ENTRY CAN BE USED ONLY IF COMT2 WAS LAST CALLED WITH THE      VPT2   33
C     VALUES OF P AND T THAT ARE TO BE ASSUMED HERE.                     VPT2   34
C                                                                        VPT2   35
 1000 V1 = X3*(BB11*X10 + BB12) + BETA*(2.0*X1*(BB21*X17                 VPT2   36
     1 + BB22*X1 + BB23) + BETA*(3.0*X10*(BB31*X8 + BB32)               VPT2   37
     2 + BETA*(4.0*X14*(BB41*X11 + BB42)                                VPT2   38
     3 + BETA*(5.0*X24*(BB51*X8 + BB52*X4 + BB53)))))                   VPT2   39
C                                                                        VPT2   40
C     V4, V3, AND V2 MUST BE EXPRESSED IN THIS WAY TO AVOID              VPT2   41
C         OVERFLOWS AT LOW PRESSURES.                                    VPT2   42
C                                                                        VPT2   43
      V2 = 4.0*X11*(BB61F + BB62)/(D2*BETA5*D2)                          VPT2   44
      V3 = 5.0*X18*(BB71F + BB72)/(D3*BETA6*D3)                          VPT2   45
      V4 = 6.0*X14*(BB81F + BB82)/(D4*BETA7*D4)                          VPT2   46
      V9 = 11.0*(B0BLP*(BB90 + X1*(BB91 + X1*(BB92 + X1*(BB93           VPT2   47
     1 + X1*(BB94 + X1*(BB95 + X1*BB96)))))))                           VPT2   48
      VPT2 = (AI1*THETA/BETA - V1 - V2 - V3 - V4 + V9)*VCA               VPT2   49
 2000 RETURN                                                             VPT2   50
      END                                                                VPT2   51
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	VPT2	1	
14	V2E	30	49

VARIABLES	SN	TYPE	RELOCATION				
10	A11	REAL	COMCON	REFS	15	48	
0	ALPHA0	REAL	COMCON	REFS	15		
1	ALPHA1	REAL	COMCON	REFS	15		
0	BB00	REAL	CONST2	REFS	9		
1	BB01	REAL	CONST2	REFS	9		
2	BB02	REAL	CONST2	REFS	9		
3	BB03	REAL	CONST2	REFS	9		
4	BB04	REAL	CONST2	REFS	9		
5	BB05	REAL	CONST2	REFS	9		
6	BB11	REAL	CONST2	REFS	9	35	
7	BB12	REAL	CONST2	REFS	9	35	
10	BB21	REAL	CONST2	REFS	9	35	
11	BB22	REAL	CONST2	REFS	9	35	
12	BB23	REAL	CONST2	REFS	9	35	
13	BB31	REAL	CONST2	REFS	9	35	
14	BB32	REAL	CONST2	REFS	9	35	
15	BB41	REAL	CONST2	REFS	9	35	
16	BB42	REAL	CONST2	REFS	9	35	
17	BB51	REAL	CONST2	REFS	9	35	
20	BB52	REAL	CONST2	REFS	9	35	
21	BB53	REAL	CONST2	REFS	9	35	
22	BB61	REAL	CONST2	REFS	9		
51	BB61F	REAL	STM2	REFS	21	43	
23	BB62	REAL	CONST2	REFS	9	43	
24	BB71	REAL	CONST2	REFS	9		
52	BB71F	REAL	STM2	REFS	21	44	
25	BB72	REAL	CONST2	REFS	9	44	
26	BB81	REAL	CONST2	REFS	9		
53	BB81F	REAL	STM2	REFS	21	45	
27	BB82	REAL	CONST2	REFS	9	45	
35	BB90	REAL	CONST2	REFS	9	46	
36	BB91	REAL	CONST2	REFS	9	46	
37	BB92	REAL	CONST2	REFS	9	46	
40	BB93	REAL	CONST2	REFS	9	46	
41	BB94	REAL	CONST2	REFS	9	46	
42	BB95	REAL	CONST2	REFS	9	46	
43	BB96	REAL	CONST2	REFS	9	46	
30	BETA	REAL	STM2	REFS	21	4*35	48
45	BETAL	REAL	STM2	REFS	21		
31	BETA2	REAL	STM2	REFS	21		
32	BETA3	REAL	STM2	REFS	21		
33	BETA4	REAL	STM2	REFS	21		
34	BETA5	REAL	STM2	REFS	21	43	
35	BETA6	REAL	STM2	REFS	21	44	
36	BETA7	REAL	STM2	REFS	21	45	
46	BOBL	REAL	STM2	REFS	21		
47	BOBLP	REAL	STM2	REFS	21	46	
30	B00	REAL	CONST2	REFS	9		
31	B61	REAL	CONST2	REFS	9		
32	B71	REAL	CONST2	REFS	9		
33	B81	REAL	CONST2	REFS	9		
34	B82	REAL	CONST2	REFS	9		
43	D2	REAL	STM2	REFS	21	2*43	

VARIABLES	SN	TYPE	RELOCATION				
41	D3	REAL	STM2	REFS	21	2*44	
37	D4	REAL	STM2	REFS	21	2*45	
50	F8	REAL	STM2	REFS	21		
32	HMAX	REAL	COMCON	REFS	15		
31	HMIN	REAL	COMCON	REFS	15		
33	HSMAX	REAL	COMCON	REFS	15		
34	H4MAX	REAL	COMCON	REFS	15		
0	P	REAL	F.P.	REFS	28	DEFINED	1
2	PCA	REAL	COMCON	REFS	15		
15	PMAX	REAL	COMCON	REFS	15		
14	PMIN	REAL	COMCON	REFS	15		
16	PSMAX	REAL	COMCON	REFS	15		
7	PVOT	REAL	COMCON	REFS	15		
6	PV010	REAL	COMCON	REFS	15		
13	P1	REAL	COMCON	REFS	15		
17	P3MIN	REAL	COMCON	REFS	15		
36	SMAX	REAL	COMCON	REFS	15		
35	SMIN	REAL	COMCON	REFS	15		
37	S3MIN	REAL	COMCON	REFS	15		
40	S4MAX	REAL	COMCON	REFS	15		
0	T	REAL	F.P.	REFS	28	DEFINED	1
12	TC	REAL	COMCON	REFS	15		
4	TCA	REAL	COMCON	REFS	15		
1	THETA	REAL	STM2	REFS	21	48	
0	THM1	REAL	STM2	REFS	21		
2	TH2	REAL	STM2	REFS	21		
3	TH3	REAL	STM2	REFS	21		
4	TH4	REAL	STM2	REFS	21		
23	TMAX	REAL	COMCON	REFS	15		
22	TMIN	REAL	COMCON	REFS	15		
24	TSMAX	REAL	COMCON	REFS	15		
5	TZA	REAL	COMCON	REFS	15		
11	T1	REAL	COMCON	REFS	15		
25	T1MAX	REAL	COMCON	REFS	15		
44	T2	REAL	STM2	REFS	21		
26	T2MIN	REAL	COMCON	REFS	15		
42	T3	REAL	STM2	REFS	21		
30	T3MAX	REAL	COMCON	REFS	15		
27	T3MIN	REAL	COMCON	REFS	15		
40	T4	REAL	STM2	REFS	21		
3	VCA	REAL	COMCON	REFS	15	48	
143	VPT2	REAL		DEFINED	48		
144	V1	REAL		REFS	48	DEFINED	35
145	V2	REAL		REFS	48	DEFINED	43
146	V3	REAL		REFS	48	DEFINED	44
21	V3MAX	REAL	COMCON	REFS	15		
20	V3MIN	REAL	COMCON	REFS	15		
147	V4	REAL		REFS	48	DEFINED	45
150	V9	REAL		REFS	48	DEFINED	46
5	X1	REAL	STM2	REFS	21	2*35	6*46
13	X10	REAL	STM2	REFS	21	2*35	
14	X11	REAL	STM2	REFS	21	35	43
15	X12	REAL	STM2	REFS	21		
16	X13	REAL	STM2	REFS	21		
17	X14	REAL	STM2	REFS	21	35	45
20	X17	REAL	STM2	REFS	21	35	
21	X18	REAL	STM2	REFS	21	44	

VARIABLES	SN	TYPE	RELOCATION			
22	X19	REAL	STM2	REFS	21	
6	X2	REAL	STM2	REFS	21	
23	X24	REAL	STM2	REFS	21	35
24	X25	REAL	STM2	REFS	21	
25	X27	REAL	STM2	REFS	21	
26	X28	REAL	STM2	REFS	21	
7	X3	REAL	STM2	REFS	21	35
27	X32	REAL	STM2	REFS	21	
10	X4	REAL	STM2	REFS	21	35
11	X6	REAL	STM2	REFS	21	
12	X8	REAL	STM2	REFS	21	2*35

EXTERNALS	TYPE	ARGS	REFERENCES
COMT2		2	28

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	35	
0 2000	INACTIVE	49	

COMMON BLOCKS	LENGTH
CONST2	36
COMCON	33
STM2	44

STATISTICS

PROGRAM LENGTH	1518	105
SCM LABELED COMMON LENGTH	1618	113

```
      FUNCTION VPT3(PRES,TEMP)                                          VPT3     2
C  VPT3   SPECIFIC VOLUME - SUBREGION 3  A 3RD LEVEL ROUTINE            VPT3     3
C        WITH ENTRIES VPT3L, VPT3D, VPTF3, AND VPTG3                     VPT3     4
C        CALLS PSATT, STER, PVT3                                         VPT3     5
C                                                                        VPT3     6
C                                                                        VPT3     7
C                                                                        VPT3     8
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, VPT3     9
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, VPT3    10
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, VPT3    11
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         VPT3    12
C                                                                        VPT3    13
      DATA PT3 /6H VPT3 /, PTL3 /6H VPT3L /, PTD3 /6H VPT3D /           VPT3    14
      DATA  F3 /6H VPTF3/,   G3 /6H VPTG3 /                             VPT3    15
C                                                                        VPT3    16
      CODE = PT3                                                        VPT3    17
      GO TO 100                                                         VPT3    18
C                                                                        VPT3    19
C                                                                        VPT3    20
      ENTRY VPT3L                                                       VPT3    21
C     A 3RD LEVEL ENTRY                                                 VPT3    22
C                                                                        VPT3    23
      CODE = PTL3                                                       VPT3    24
      GO TO 100                                                         VPT3    25
C                                                                        VPT3    26
      ENTRY VPT3D                                                       VPT3    27
C     A 3RD LEVEL ENTRY                                                 VPT3    28
C                                                                        VPT3    29
      CODE = PTD3                                                       VPT3    30
  100 P = PRES                                                          VPT3    31
      T = TEMP                                                          VPT3    32
      VUP = V3MAX                                                       VPT3    33
      VLO = V3MIN                                                       VPT3    34
      IF(CODE .EQ. PTL3) GO TO 400                                      VPT3    35
      IF(CODE .EQ. PTD3) GO TO 500                                      VPT3    36
      PLINE = PCA                                                       VPT3    37
      IF( T .LT. TC) PLINE = PSL(T)                                     VPT3    38
      IF(P .GE. PLINE) GO TO 400                                        VPT3    39
      GO TO 500                                                         VPT3    40
C                                                                        VPT3    41
      ENTRY VPTF3                                                       VPT3    42
C     A 3RD LEVEL ENTRY                                                 VPT3    43
C                                                                        VPT3    44
      P = PRES                                                          VPT3    45
      T = TEMP                                                          VPT3    46
      CODE = F3                                                         VPT3    47
      B = T/TC                                                          VPT3    48
      VUP = VCA*B*B                                                     VPT3    49
      VLO = V3MIN                                                       VPT3    50
      PLINE = PSL(T)                                                    VPT3    51
      DP = 1.0D-6*PLINE                                                 VPT3    52
      IF(DP .LT. 5.0D-7) DP = 5.0D-7                                    VPT3    53
      IF( P .LT. (PLINE - DP)) CALL STER(CODE, 12, P, T)                VPT3    54
  400 V = (0.077D0 + 92.8D0/P)*(T - 482.0)/(T + 58.0D0)                 VPT3    55
      GO TO 600                                                         VPT3    56
C                                                                        VPT3    57
      ENTRY VPTG3                                                       VPT3    58
```

```
                C     A 3RD LEVEL ENTRY                                          VPT3       59
                C                                                                VPT3       60
     60               P = PRES                                                   VPT3       61
                      T = TEMP                                                   VPT3       62
                      CODE = G3                                                  VPT3       63
                      B = TC/T                                                   VPT3       64
                      VUP = V3MAX                                                VPT3       65
     65               VLO = VCA*B*B                                              VPT3       66
                      PLINE = PSL(T)                                             VPT3       67
                      DP = 1.0D-6*PLINE                                          VPT3       68
                      IF(DP .LT. 5.0D-7) DP = 5.0D-7                             VPT3       69
                      IF( P .GT. (PLINE + DP)) CALL STER(CODE, 12, P, T)         VPT3       70
     70         500 V = 0.3D0*(T + TZA)/P                                        VPT3       71
                600 IF(P .LT. P3MIN .OR. P .GT. PMAX) CALL STER(CODE, 12, P, T)  VPT3       72
                      DF = 0.25D0                                                VPT3       73
                      PCTP = 0.0D0                                               VPT3       74
                      DO 4000 I = 1,100                                          VPT3       75
     75               IF(V .LE. VUP) GO TO 800                                   VPT3       76
                      V = VUP                                                    VPT3       77
                      DF = 1.0D0                                                 VPT3       78
                      GO TO 900                                                  VPT3       79
                800 IF(V .GE. VLO) GO TO 900                                     VPT3       80
     80               V = VLO                                                    VPT3       81
                      DF = 1.0D0                                                 VPT3       82
                900 PCALC = PVT3(V,T)                                            VPT3       83
                      PCT = (PCALC - P)/P                                        VPT3       84
                910 IF( ABS(PCT) .LE. 1.0E-7) GO TO 6000                         VPT3       85
     85               IF(I .LT. 2) GO TO 970                                     VPT3       86
                      IF(PCTP*PCT) 940,940,920                                   VPT3       87
                920 IF( ABS(PCT) .GT.  ABS(0.3E0*PCTP)) GO TO 960                VPT3       88
                      GO TO 950                                                  VPT3       89
                940 DF = 0.67D0*DF                                               VPT3       90
     90         950 DV = (V - VPREV)*(P - PCALC)/(PCALC - PPREV)                 VPT3       91
                      GO TO 2000                                                 VPT3       92
                960 DF = 1.5D0*DF                                                VPT3       93
                970 DV = V*PCT*DF                                                VPT3       94
               2000 VPREV = V                                                    VPT3       95
     95               PPREV = PCALC                                              VPT3       96
                      PCTP = PCT                                                 VPT3       97
                      V = V + DV                                                 VPT3       98
               4000 CONTINUE                                                     VPT3       99
                      CALL STER( CODE, -12, P, T)                                VPT3      100
    100         6000 VPT3 = V                                                    VPT3      101
                      RETURN                                                     VPT3      102
                      END                                                        VPT3      103
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
55	VPTF3	41	
137	VPTG3	57	101
4	VPT3	1	
22	VPT3D	26	

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ENTRY POINTS	DEF LINE	REFERENCES
11 VPT3L	20	

VARIABLES	SN	TYPE	RELOCATION								
10	AI1	REAL	COMCON	REFS	8						
0	ALPHA0	REAL	COMCON	REFS	8						
1	ALPHA1	REAL	COMCON	REFS	8						
365	B	REAL		REFS	2*48	2*65	DEFINED	47	63		
357	CODE	REAL		REFS	34	35	53	69	71	99	
				DEFINED	16	23	29	46	62		
370	DF	REAL		REFS	89	92	93	DEFINED	72	77	81
				89	92						
366	DP	REAL		REFS	52	53	68	69	DEFINED	51	52
				67	68						
375	DV	REAL		REFS	97	DEFINED	90	93			
323	F3	REAL		REFS	46	DEFINED	14				
324	G3	REAL		REFS	62	DEFINED	14				
32	HMAX	REAL	COMCON	REFS	8						
31	HMIN	REAL	COMCON	REFS	8						
33	HSMAX	REAL	COMCON	REFS	8						
34	H4MAX	REAL	COMCON	REFS	8						
372	I	INTEGER		REFS	85	DEFINED	74				
360	P	REAL		REFS	38	2*53	54	2*69	70	3*71	2*83
				90	99	DEFINED	30	44	60		
2	PCA	REAL	COMCON	REFS	8	36					
373	PCALC	REAL		REFS	83	2*90	95	DEFINED	82		
374	PCT	REAL		REFS	84	86	87	93	96		
				DEFINED	83						
371	PCTP	REAL		REFS	86	87	DEFINED	73	96		
364	PLINE	REAL		REFS	38	51	53	67	69		
				DEFINED	36	37	50	66			
15	PMAX	REAL	COMCON	REFS	8	71					
14	PMIN	REAL	COMCON	REFS	8						
377	PPREV	REAL		REFS	90	DEFINED	95				
0	PRES	REAL	F.P.	REFS	30	44	60	DEFINED	1		
16	PSMAX	REAL	COMCON	REFS	8						
322	PTD3	REAL		REFS	29	35	DEFINED	13			
321	PTL3	REAL		REFS	23	34	DEFINED	13			
320	PT3	REAL		REFS	16	DEFINED	13				
7	PVOT	REAL	COMCON	REFS	8						
6	PV010	REAL	COMCON	REFS	8						
13	P1	REAL	COMCON	REFS	8						
17	P3MIN	REAL	COMCON	REFS	8	71					
36	SMAX	REAL	COMCON	REFS	8						
35	SMIN	REAL	COMCON	REFS	8						
37	S3MIN	REAL	COMCON	REFS	8						
40	S4MAX	REAL	COMCON	REFS	8						
361	T	REAL		REFS	2*37	47	50	53	2*54	63	66
				69	70	71	82	99	DEFINED	31	45
				61							
12	TC	REAL	COMCON	REFS	8	37	47	63			
4	TCA	REAL	COMCON	REFS	8						
0	TEMP	REAL	F.P.	REFS	31	45	61	DEFINED	1		
23	TMAX	REAL	COMCON	REFS	8						
22	TMIN	REAL	COMCON	REFS	8						
24	TSMAX	REAL	COMCON	REFS	8						
5	TZA	REAL	COMCON	REFS	8	70					
11	T1	REAL	COMCON	REFS	8						

VARIABLES	SN	TYPE	RELOCATION							
25	T1MAX	REAL	COMCON	REFS	8					
26	T2MIN	REAL	COMCON	REFS	8					
30	T3MAX	REAL	COMCON	REFS	8					
27	T3MIN	REAL	COMCON	REFS	8					
367	V	REAL		REFS	75	79	82	90	93	94	97
				100	DEFINED	54	70	76	80	97	
3	VCA	REAL	COMCON	REFS	8	48	65				
363	VLO	REAL		REFS	79	80	DEFINED	33	49	65	
376	VPREV	REAL		REFS	90	DEFINED	94				
356	VPT3	REAL		DEFINED	100						
362	VUP	REAL		REFS	75	76	DEFINED	32	48	64	
21	V3MAX	REAL	COMCON	REFS	8	32	64				
20	V3MIN	REAL	COMCON	REFS	8	33	49				

EXTERNALS	TYPE	ARGS	REFERENCES			
PSL	REAL	1	37	50	66	
PVT3	REAL	2	82			
STER		4	53	69	71	99

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES
ABS	REAL	1 INTRIN		84 2*87

STATEMENT LABELS			DEF LINE	REFERENCES	
33	100		30	17	24
113	400		54	34	38
175	500		70	35	39
206	600		71	55	
225	800		79	75	
232	900		82	78	79
0	910	INACTIVE	84		
0	920	INACTIVE	87	86	
250	940		89	2*86	
253	950		90	88	
261	960		92	87	
263	970		93	85	
266	2000		94	91	
0	4000		98	74	
300	6000		100	84	

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	EXT REFS	EXITS
220	4000	* I	74 98	568			

COMMON BLOCKS	LENGTH
COMCON	33

STATISTICS		
PROGRAM LENGTH	400B	256
SCM LABELED COMMON LENGTH	41B	33

```
      SUBROUTINE COMT1 (PE,TE)                                          COMT1      2
C  COMT1  COMMON TERMS  - SUB REGION 1                                   COMT1      3
C         A 1ST LEVEL SUBROUTINE                                         COMT1      4
C                                                                        COMT1      5
C                                                                        COMT1      6
C     FIRST ARGUMENT IS PRESSURE                                         COMT1      7
C     SECOND ARGUMENT IS TEMPERATURE                                     COMT1      8
C                                                                        COMT1      9
C                                                                        COMT1     10
      COMMON /CONST1/AA0, AA1, AA2, AA3, AA4, AA5, AA6, AA7, AA8, AA9,   COMT1     11
     1    AA10,AA11,AA12,AA13,AA14,AA15,AA16,AA17,AA18,AA19,AA20,AA21,   COMT1     12
     2    AA22,  A1,  A2,  A3,  A4,  A5,  A6,  A7,  A8,  A9, A10, A11,   COMT1     13
     3     A12                                                           COMT1     14
C                                                                        COMT1     15
C                                                                        COMT1     16
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010,  COMT1     17
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN,  COMT1     18
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,  COMT1     19
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX          COMT1     20
C                                                                        COMT1     21
      COMMON /CURENT / P, T, V, H, S                                     COMT1     22
C                                                                        COMT1     23
C                                                                        COMT1     24
      COMMON /STM1/ THETA,  TH2,  TH4,  TH6,  TH7, TH10, TH11, TH16,    COMT1     25
     1   TH17, TH18, TH19, TH20, TH21, BETA,BETA2,BETA3,BETA4, Y,YP,     COMT1     26
     2  Z, ZP,  UA9, UA10,   UB,  UB2,   UC,  U3T,  UD4,   UP           COMT1     27
C                                                                        COMT1     28
      P = PE                                                             COMT1     29
      T = TE                                                             COMT1     30
      IF(P .LT. PMIN .OR. P .GT. PMAX) CALL STER(6H COMT1, 12, P, T)     COMT1     31
      IF(T .LT. TMIN .OR. T .GT.T1MAX) CALL STER(6H COMT1, 12, P, T)     COMT1     32
      BETA = P/PCA                                                       COMT1     33
      THETA = (T + TZA)/TCA                                              COMT1     34
 1000 TH2 = THETA * THETA                                                COMT1     35
      TH4 = TH2 * TH2                                                    COMT1     36
      TH6 = TH2 * TH4                                                    COMT1     37
      TH7 = TH6 * THETA                                                  COMT1     38
      TH10 = TH4 * TH6                                                   COMT1     39
      TH11 = TH4 * TH7                                                   COMT1     40
      TH16 = TH6 * TH10                                                  COMT1     41
      TH17 = TH7 * TH10                                                  COMT1     42
      TH18 = TH2 * TH16                                                  COMT1     43
      TH19 = TH2 * TH17                                                  COMT1     44
      TH20 = TH4 * TH16                                                  COMT1     45
      TH21 = TH2 * TH19                                                  COMT1     46
      BETA2 = BETA * BETA                                                COMT1     47
      BETA3 = BETA * BETA2                                               COMT1     48
      BETA4 = BETA * BETA3                                               COMT1     49
      UA = A6 - THETA                                                    COMT1     50
      UA9 = UA**9                                                        COMT1     51
 3000 UA10 = UA * UA9                                                    COMT1     52
      UB = A7 + TH19                                                     COMT1     53
      UB2 = UB*UB                                                        COMT1     54
      UC = A8 + TH11                                                     COMT1     55
      U3T = BETA * (AA17 + BETA * (AA18 + AA19*BETA))/UC/UC              COMT1     56
      UD = A10 + BETA                                                    COMT1     57
      UD3 = UD*UD*UD                                                     COMT1     58
```

```
                      UD4 = UD*UD3                                              COMT1      59
                      UP = 1.0/UD3 + A11*BETA                                   COMT1      60
   60                 Y = 1.0 - A1*TH2 - A2/TH6                                 COMT1      61
                      Z = Y +  SQRT(A3*Y*Y + 2.0 *(A5*BETA - A4*THETA))         COMT1      62
                      YP = 6.0*A2/TH7 - 2.0*THETA*A1                            COMT1      63
                      ZP = Z**(-5.0/17.0)                                       COMT1      64
                 6000 RETURN                                                    COMT1      65
   65                 END                                                       COMT1      66
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES				
3	COMT1	1	64				

VARIABLES	SN	TYPE	RELOCATION				
0	AA0	REAL	CONST1	REFS	10		
1	AA1	REAL	CONST1	REFS	10		
12	AA10	REAL	CONST1	REFS	10		
13	AA11	REAL	CONST1	REFS	10		
14	AA12	REAL	CONST1	REFS	10		
15	AA13	REAL	CONST1	REFS	10		
16	AA14	REAL	CONST1	REFS	10		
17	AA15	REAL	CONST1	REFS	10		
20	AA16	REAL	CONST1	REFS	10		
21	AA17	REAL	CONST1	REFS	10	55	
22	AA18	REAL	CONST1	REFS	10	55	
23	AA19	REAL	CONST1	REFS	10	55	
2	AA2	REAL	CONST1	REFS	10		
24	AA20	REAL	CONST1	REFS	10		
25	AA21	REAL	CONST1	REFS	10		
26	AA22	REAL	CONST1	REFS	10		
3	AA3	REAL	CONST1	REFS	10		
4	AA4	REAL	CONST1	REFS	10		
5	AA5	REAL	CONST1	REFS	10		
6	AA6	REAL	CONST1	REFS	10		
7	AA7	REAL	CONST1	REFS	10		
10	AA8	REAL	CONST1	REFS	10		
11	AA9	REAL	CONST1	REFS	10		
10	AI1	REAL	COMCON	REFS	16		
0	ALPHA0	REAL	COMCON	REFS	16		
1	ALPHA1	REAL	COMCON	REFS	16		
27	A1	REAL	CONST1	REFS	10	60	62
40	A10	REAL	CONST1	REFS	10	56	
41	A11	REAL	CONST1	REFS	10	59	
42	A12	REAL	CONST1	REFS	10		
30	A2	REAL	CONST1	REFS	10	60	62
31	A3	REAL	CONST1	REFS	10	61	
32	A4	REAL	CONST1	REFS	10	61	
33	A5	REAL	CONST1	REFS	10	61	
34	A6	REAL	CONST1	REFS	10	49	
35	A7	REAL	CONST1	REFS	10	52	
36	A8	REAL	CONST1	REFS	10	54	
37	A9	REAL	CONST1	REFS	10		

VARIABLES	SN	TYPE	RELOCATION								
15	BETA	REAL	STM1	REFS	24	2*46	47	48	3*55	56	59
				61	DEFINED	32					
16	BETA2	REAL	STM1	REFS	24	47	DEFINED	46			
17	BETA3	REAL	STM1	REFS	24	48	DEFINED	47			
20	BETA4	REAL	STM1	REFS	24	DEFINED	48				
3	H	REAL	CURENT	REFS	21						
32	HMAX	REAL	COMCON	REFS	16						
31	HMIN	REAL	COMCON	REFS	16						
33	HSMAX	REAL	COMCON	REFS	16						
34	H4MAX	REAL	COMCON	REFS	16						
0	P	REAL	CURENT	REFS	21	3*30	31	32	DEFINED	28	
2	PCA	REAL	COMCON	REFS	16	32					
0	PE	REAL	F.P.	REFS	28	DEFINED	1				
15	PMAX	REAL	COMCON	REFS	16	30					
14	PMIN	REAL	COMCON	REFS	16	30					
16	PSMAX	REAL	COMCON	REFS	16						
7	PVOT	REAL	COMCON	REFS	16						
6	PV010	REAL	COMCON	REFS	16						
13	P1	REAL	COMCON	REFS	16						
17	P3MIN	REAL	COMCON	REFS	16						
4	S	REAL	CURENT	REFS	21						
36	SMAX	REAL	COMCON	REFS	16						
35	SMIN	REAL	COMCON	REFS	16						
37	S3MIN	REAL	COMCON	REFS	16						
40	S4MAX	REAL	COMCON	REFS	16						
1	T	REAL	CURENT	REFS	21	30	3*31	33	DEFINED	29	
12	TC	REAL	COMCON	REFS	16						
4	TCA	REAL	COMCON	REFS	16	33					
0	TE	REAL	F.P.	REFS	29	DEFINED	1				
0	THETA	REAL	STM1	REFS	24	2*34	37	49	61	62	
				DEFINED	33						
5	TH10	REAL	STM1	REFS	24	40	41	DEFINED	38		
6	TH11	REAL	STM1	REFS	24	54	DEFINED	39			
7	TH16	REAL	STM1	REFS	24	42	44	DEFINED	40		
10	TH17	REAL	STM1	REFS	24	43	DEFINED	41			
11	TH18	REAL	STM1	REFS	24	DEFINED	42				
12	TH19	REAL	STM1	REFS	24	45	52	DEFINED	43		
1	TH2	REAL	STM1	REFS	24	2*35	36	42	43	45	60
				DEFINED	34						
13	TH20	REAL	STM1	REFS	24	DEFINED	44				
14	TH21	REAL	STM1	REFS	24	DEFINED	45				
2	TH4	REAL	STM1	REFS	24	36	38	39	44		
				DEFINED	35						
3	TH6	REAL	STM1	REFS	24	37	38	40	60		
				DEFINED	36						
4	TH7	REAL	STM1	REFS	24	39	41	62	DEFINED	37	
23	TMAX	REAL	COMCON	REFS	16						
22	TMIN	REAL	COMCON	REFS	16	31					
24	TSMAX	REAL	COMCON	REFS	16						
5	TZA	REAL	COMCON	REFS	16	33					
11	T1	REAL	COMCON	REFS	16						
25	T1MAX	REAL	COMCON	REFS	16	31					
26	T2MIN	REAL	COMCON	REFS	16						
30	T3MAX	REAL	COMCON	REFS	16						
27	T3MIN	REAL	COMCON	REFS	16						
135	UA	REAL		REFS	50	51	DEFINED	49			
26	UA10	REAL	STM1	REFS	24	DEFINED	51				

VARIABLES	SN	TYPE	RELOCATION					
25	UA9	REAL	STM1	REFS	24	51	DEFINED	50
27	UB	REAL	STM1	REFS	24	2*53	DEFINED	52
30	UB2	REAL	STM1	REFS	24	DEFINED	53	
31	UC	REAL	STM1	REFS	24	2*55	DEFINED	54
136	UD	REAL		REFS	3*57	58	DEFINED	56
137	UD3	REAL		REFS	58	59	DEFINED	57
33	UD4	REAL	STM1	REFS	24	DEFINED	58	
34	UP	REAL	STM1	REFS	24	DEFINED	59	
32	U3T	REAL	STM1	REFS	24	DEFINED	55	
2	V	REAL	CURENT	REFS	21			
3	VCA	REAL	COMCON	REFS	16			
21	V3MAX	REAL	COMCON	REFS	16			
20	V3MIN	REAL	COMCON	REFS	16			
21	Y	REAL	STM1	REFS	24	3*61	DEFINED	60
22	YP	REAL	STM1	REFS	24	DEFINED	62	
23	Z	REAL	STM1	REFS	24	63	DEFINED	61
24	ZP	REAL	STM1	REFS	24	DEFINED	63	

EXTERNALS	TYPE	ARGS	REFERENCES	
SQRT	REAL	1 LIBRARY	61	
STER		4	30	31

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	34	
0 3000	INACTIVE	51	
0 6000	INACTIVE	64	

COMMON BLOCKS	LENGTH
CONST1	35
COMCON	33
CURENT	5
STM1	29

STATISTICS

PROGRAM LENGTH	144B	100
SCM LABELED COMMON LENGTH	146B	102

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      SUBROUTINE COMT2 (PE,TE)                                          COMT2    2
C  COMT2  COMMON TERMS - SUB REGION 2                                    COMT2    3
C        A 1ST LEVEL SUBROUTINE                                          COMT2    4
C                                                                        COMT2    5
C                                                                        COMT2    6
C     FIRST ARGUMENT IS PRESSURE                                         COMT2    7
C     SECOND ARGUMENT IS TEMPERATURE                                     COMT2    8
C                                                                        COMT2    9
C                                                                        COMT2   10
      COMMON /CONST2/ BB00, BB01, BB02, BB03, BB04, BB05, BB11, BB12,    COMT2   11
     1    BB21, BB22, BB23, BB31, BB32, BB41, BB42, BB51, BB52, BB53,   COMT2   12
     2    BB61, BB62, BB71, BB72, BB81, BB82,  B00,  B61,  B71,  B81,   COMT2   13
     3     B82, BB90, BB91, BB92, BB93, BB94, BB95, BB96                 COMT2   14
C                                                                        COMT2   15
      COMMON /CONSTL/ AL0, AL1, AL2, AL2T2                               COMT2   16
C                                                                        COMT2   17
C                                                                        COMT2   18
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, COMT2   19
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, COMT2   20
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, COMT2   21
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         COMT2   22
C                                                                        COMT2   23
      COMMON /CURENT / P, T, V, H, S                                     COMT2   24
C                                                                        COMT2   25
C                                                                        COMT2   26
      COMMON /STM2/ THM1  ,THETA ,TH2   ,TH3   ,TH4   ,X1    ,X2    ,  COMT2   27
     1 X3   ,X4    ,X6    ,X8    ,X10   ,X11   ,X12   ,X13   ,X14   ,  COMT2   28
     2 X17  ,X18   ,X19   ,X24   ,X25   ,X27   ,X28   ,X32   ,BETA  ,  COMT2   29
     3 BETA2,BETA3 ,BETA4 ,BETA5 ,BETA6 ,BETA7 ,D4    ,T4    ,D3    ,  COMT2   30
     4 T3   ,D2    ,T2    ,BETAL ,B0BL  ,B0BLP ,FB    ,BB61F ,B871F ,  COMT2   31
     5 BB81F                                                           COMT2   32
C                                                                        COMT2   33
      P = PE                                                             COMT2   34
      T = TE                                                             COMT2   35
      IF(P .LT. PMIN .OR. P .GT. PMAX) CALL STER (6H COMT2, 12, P, T)    COMT2   36
      IF(T .LT. T2MIN.OR. T .GT. TMAX) CALL STER (6H COMT2, 12, P, T)    COMT2   37
      BETA = P/PCA                                                       COMT2   38
      THETA = (T + TZA)/TCA                                              COMT2   39
  150 THM1 = 1.0/THETA                                                   COMT2   40
      TH2 = THETA * THETA                                                COMT2   41
      TH3 = THETA * TH2                                                  COMT2   42
      TH4 = TH2 * TH2                                                    COMT2   43
      X1  =  EXP (B00 *(1.0 - THETA))                                    COMT2   44
      X2  = X1 * X1                                                      COMT2   45
      X3  = X1 * X2                                                      COMT2   46
      X4  = X2 * X2                                                      COMT2   47
      X6  = X3 * X3                                                      COMT2   48
      X8  = X4 * X4                                                      COMT2   49
      X10 = X4 * X6                                                      COMT2   50
      X11 = X1 * X10                                                     COMT2   51
      X12 = X6 * X6                                                      COMT2   52
      X13 = X2 * X11                                                     COMT2   53
      X14 = X6 * X8                                                      COMT2   54
      X17 = X6 * X11                                                     COMT2   55
      X18 = X8 * X10                                                     COMT2   56
      X19 = X8 * X11                                                     COMT2   57
      X24 = X11 * X13                                                    COMT2   58
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                      X25 = X11 * X14                                          COMT2      59
                      X27 = X13 * X14                                          COMT2      60
     60               X28 = X14 * X14                                          COMT2      61
                      X32 = X4  * X28                                          COMT2      62
                      BB61F = BB61 * X1                                        COMT2      63
                      BB71F = BB71 * X6                                        COMT2      64
                      BB81F = BB81 * X10                                       COMT2      65
     65               BETA2 = BETA * BETA                                      COMT2      66
                      BETA3 = BETA * BETA2                                     COMT2      67
                      BETA4 = BETA * BETA3                                     COMT2      68
                      BETA5 = BETA * BETA4                                     COMT2      69
                      BETA6 = BETA * BETA5                                     COMT2      70
     70               BETA7 = BETA * BETA6                                     COMT2      71
                  200 D4 = 1.0/BETA6 + X27*(BB1 * X27 + BB2)                   COMT2      72
                      T4 = 27.0 * X27 *(2.0*BB1 * X27 + BB2)/D4                COMT2      73
                      D3 = 1.0/BETA5 + B71 * X19                               COMT2      74
                      T3 = 19.0 * B71 * X19/D3                                 COMT2      75
     75               D2 = 1.0/BETA4 + B61 * X14                               COMT2      76
                      T2 = 14.0 * B61 * X14/D2                                 COMT2      77
                      BETAL = AL0 + THETA*(AL1 + THETA*AL2)                    COMT2      78
                      FB = 10.0 * (AL1 + THETA * AL2T2)/BETAL                  COMT2      79
                  300 BOBL = BETA/BETAL                                        COMT2      80
     80               BOBLP= BOBL**10                                          COMT2      81
                 6000 RETURN                                                   COMT2      82
                      END                                                      COMT2      83
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
3	COMT2	1	81

VARIABLES	SN	TYPE	RELOCATION				
10	A11	REAL	COMCON	REFS	10		
0	ALPHA0	REAL	COMCON	REFS	10		
1	ALPHA1	REAL	COMCON	REFS	10		
0	AL0	REAL	CONSTL	REFS	15	77	
1	AL1	REAL	CONSTL	REFS	15	77	78
2	AL2	REAL	CONSTL	REFS	15	77	
3	AL2T2	REAL	CONSTL	REFS	15	78	
0	BB00	REAL	CONST2	REFS	10		
1	BB01	REAL	CONST2	REFS	10		
2	BB02	REAL	CONST2	REFS	10		
3	BB03	REAL	CONST2	REFS	10		
4	BB04	REAL	CONST2	REFS	10		
5	BB05	REAL	CONST2	REFS	10		
6	BB11	REAL	CONST2	REFS	10		
7	BB12	REAL	CONST2	REFS	10		
10	BB21	REAL	CONST2	REFS	10		
11	BB22	REAL	CONST2	REFS	10		
12	BB23	REAL	CONST2	REFS	10		
13	BB31	REAL	CONST2	REFS	10		
14	BB32	REAL	CONST2	REFS	10		
15	BB41	REAL	CONST2	REFS	10		

VARIABLES	SN	TYPE	RELOCATION								
16	BB42	REAL	CONST2	REFS	10						
17	BB51	REAL	CONST2	REFS	10						
20	BB52	REAL	CONST2	REFS	10						
21	BB53	REAL	CONST2	REFS	10						
22	BB61	REAL	CONST2	REFS	10	62					
51	BB61F	REAL	STM2	REFS	26	DEFINED	62				
23	BB62	REAL	CONST2	REFS	10						
24	BB71	REAL	CONST2	REFS	10	63					
52	BB71F	REAL	STM2	REFS	26	DEFINED	63				
25	BB72	REAL	CONST2	REFS	10						
26	BB81	REAL	CONST2	REFS	10	64					
53	BB81F	REAL	STM2	REFS	26	DEFINED	64				
27	BB82	REAL	CONST2	REFS	10						
35	BB90	REAL	CONST2	REFS	10						
36	BB91	REAL	CONST2	REFS	10						
37	BB92	REAL	CONST2	REFS	10						
40	BB93	REAL	CONST2	REFS	10						
41	BB94	REAL	CONST2	REFS	10						
42	BB95	REAL	CONST2	REFS	10						
43	BB96	REAL	CONST2	REFS	10						
30	BETA	REAL	STM2	REFS	26	2*65	66	67	68	69	70
				79	DEFINED	37					
45	BETAL	REAL	STM2	REFS	26	78	79	DEFINED	77		
31	BETA2	REAL	STM2	REFS	26	66	DEFINED	65			
32	BETA3	REAL	STM2	REFS	26	67	DEFINED	66			
33	BETA4	REAL	STM2	REFS	26	68	75	DEFINED	67		
34	BETA5	REAL	STM2	REFS	26	69	73	DEFINED	68		
35	BETA6	REAL	STM2	REFS	26	70	71	DEFINED	69		
36	BETA7	REAL	STM2	REFS	26	DEFINED	70				
46	BOBL	REAL	STM2	REFS	26	80	DEFINED	79			
47	BOBLP	REAL	STM2	REFS	26	DEFINED	80				
30	B00	REAL	CONST2	REFS	10	43					
31	B61	REAL	CONST2	REFS	10	75	76				
32	B71	REAL	CONST2	REFS	10	73	74				
33	B81	REAL	CONST2	REFS	10	71	72				
34	B82	REAL	CONST2	REFS	10	71	72				
43	D2	REAL	STM2	REFS	26	76	DEFINED	75			
41	D3	REAL	STM2	REFS	26	74	DEFINED	73			
37	D4	REAL	STM2	REFS	26	72	DEFINED	71			
50	FB	REAL	STM2	REFS	26	DEFINED	78				
3	H	REAL	CURENT	REFS	23						
32	HMAX	REAL	COMCON	REFS	18						
31	HMIN	REAL	COMCON	REFS	18						
33	H5MAX	REAL	COMCON	REFS	18						
34	H4MAX	REAL	COMCON	REFS	18						
0	P	REAL	CURENT	REFS	23	3*35	36	37	DEFINED	33	
2	PCA	REAL	COMCON	REFS	18	37					
0	PE	REAL	F.P.	REFS	33	DEFINED	1				
15	PMAX	REAL	COMCON	REFS	18	35					
14	PMIN	REAL	COMCON	REFS	18	35					
16	PSMAX	REAL	COMCON	REFS	18						
7	PVOT	REAL	COMCON	REFS	18						
6	PV010	REAL	COMCON	REFS	18						
13	P1	REAL	COMCON	REFS	18						
17	P3MIN	REAL	COMCON	REFS	18						
4	S	REAL	CURENT	REFS	23						
36	SMAX	REAL	COMCON	REFS	18						

VARIABLES	SN	TYPE	RELOCATION								
35	S4IN	REAL	COMCON	REFS	18						
37	S3MIN	REAL	COMCON	REFS	18						
40	S4MAX	REAL	COMCON	REFS	18						
1	T	REAL	CURENT	REFS	23	35	3*36	38	DEFINED	34	
12	TC	REAL	COMCON	REFS	18						
4	TCA	REAL	COMCON	REFS	18	38					
0	TE	REAL	F.P.	REFS	34	DEFINED	1				
1	THETA	REAL	STM2	REFS	26	39	2*40	41	43	2*77	78
				DEFINED	38						
0	TH1	REAL	STM2	REFS	26	DEFINED	39				
2	TH2	REAL	STM2	REFS	26	41	2*42	DEFINED	40		
3	TH3	REAL	STM2	REFS	26	DEFINED	41				
4	TH4	REAL	STM2	REFS	26	DEFINED	42				
23	TMAX	REAL	COMCON	REFS	18	36					
22	TMIN	REAL	COMCON	REFS	18						
24	TSMAX	REAL	COMCON	REFS	18						
5	TZA	REAL	COMCON	REFS	18	38					
11	T1	REAL	COMCON	REFS	18						
25	T1MAX	REAL	COMCON	REFS	18						
44	T2	REAL	STM2	REFS	26	DEFINED	76				
26	T2MIN	REAL	COMCON	REFS	18	36					
42	T3	REAL	STM2	REFS	26	DEFINED	74				
30	T3MAX	REAL	COMCON	REFS	18						
27	T3MIN	REAL	COMCON	REFS	18						
40	T4	REAL	STM2	REFS	26	DEFINED	72				
2	V	REAL	CURENT	REFS	23						
3	VCA	REAL	COMCON	REFS	18						
21	V3MAX	REAL	COMCON	REFS	18						
20	V3MIN	REAL	COMCON	REFS	18						
5	X1	REAL	STM2	REFS	26	2*44	45	50	62		
				DEFINED	43						
13	X10	REAL	STM2	REFS	26	50	55	64	DEFINED	49	
14	X11	REAL	STM2	REFS	26	52	54	56	57	58	
				DEFINED	50						
15	X12	REAL	STM2	REFS	26	DEFINED	51				
16	X13	REAL	STM2	REFS	26	57	59	DEFINED	52		
17	X14	REAL	STM2	REFS	26	58	59	2*60	75	76	
				DEFINED	53						
20	X17	REAL	STM2	REFS	26	DEFINED	54				
21	X18	REAL	STM2	REFS	26	DEFINED	55				
22	X19	REAL	STM2	REFS	26	73	74	DEFINED	56		
6	X2	REAL	STM2	REFS	26	45	2*46	52	DEFINED	44	
23	X24	REAL	STM2	REFS	26	DEFINED	57				
24	X25	REAL	STM2	REFS	26	DEFINED	58				
25	X27	REAL	STM2	REFS	26	2*71	2*72	DEFINED	59		
26	X28	REAL	STM2	REFS	26	61	DEFINED	60			
7	X3	REAL	STM2	REFS	26	2*47	DEFINED	45			
27	X32	REAL	STM2	REFS	26	DEFINED	61				
10	X4	REAL	STM2	REFS	26	2*48	49	61	DEFINED	46	
11	X6	REAL	STM2	REFS	26	49	2*51	53	54	63	
				DEFINED	47						
12	X8	REAL	STM2	REFS	26	53	55	56	DEFINED	48	

EXTERNALS	TYPE	ARGS	REFERENCES		
EXP	REAL	1	LIBRARY	43	
STER		4	35	36	

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STATEMENT LABELS		DEF LINE	REFERENCES
0	150	INACTIVE	39
0	200	INACTIVE	71
0	300	INACTIVE	79
0	6000	INACTIVE	81

COMMON BLOCKS	LENGTH
CONST2	36
CONSTL	4
COMCON	33
CURENT	5
STM2	44

STATISTICS		
PROGRAM LENGTH	153B	107
SCM LABELED COMMON LENGTH	172B	122

```
      SUBROUTINE COMT3(VE,TE)                                                COMT3    2
C  COMT3  COMMON TERMS - SUB REGION 3                                        COMT3    3
C         A 1ST LEVEL SUBROUTINE                                           COMT3    4
C                                                                          COMT3    5
C                                                                          COMT3    6
C     FIRST ARGUMENT IS SPECIFIC VOLUME                                    COMT3    7
C     SECOND ARGUMENT IS TEMPERATURE                                       COMT3    8
C                                                                          COMT3    9
C                                                                          COMT3   10
C                                                                          COMT3   11
      COMMON /CONST3/ C00, C01, C02, C03, C04, C05, C06, C07, C08, C09,    COMT3   12
     1C010,C011,C012, C11, C12, C13, C14, C15, C16, C17, C21, C22, C23,    COMT3   13
     2 C24, C25, C26, C27, C28, C31, C32, C33, C34, C35, C36, C37, C38,    COMT3   14
     3 C39,C310, C40, C41, C50, C60, C61, C62, C63, C64, C70, C71, C72,    COMT3   15
     4 C73, C74, C75, C76, C77, C78, D30, D31, D32, D33, D34, D40, D41,    COMT3   16
     5 D42, D43, D44, D50, D51, D52                                        COMT3   17
C                                                                          COMT3   18
C                                                                          COMT3   19
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010,   COMT3   20
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN,   COMT3   21
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,   COMT3   22
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX           COMT3   23
C                                                                          COMT3   24
      COMMON /CURENT / P, T, V, H, S                                       COMT3   25
C                                                                          COMT3   26
C                                                                          COMT3   27
      COMMON /STM3/  THETA ,THL1  ,THLOG ,THM1  ,THM22 ,THM23 ,EX    ,    COMT3   28
     1 EXM1  ,EXM2  ,EXM5  ,EXM6  ,EXLOG ,X50TH2,X60TH2,OMTH1 ,D3SV  ,    COMT3   29
     2 VD3SV ,D4SV  ,VD4SV ,D5SV  ,VD5SV ,Y     ,Y2    ,Y3    ,Y30 ,Y31   COMT3   30
C                                                                          COMT3   31
      DATA D32T2, D33T3 / -5.381798746E+00, +2.721294782E+00/              COMT3   32
      DATA D34T4, D42T2 / -4.555164624E-01, +3.993530724E+00/              COMT3   33
      DATA D43T3, D44T4 / -1.998467104E+00, +3.308344236E-01/              COMT3   34
      DATA D52T2        / +2.310036618E-03 /                               COMT3   35
C                                                                          COMT3   36
      V = VE                                                               COMT3   37
      T = TE                                                               COMT3   38
      IF(V .LT. V3MIN .OR. V .GT. V3MAX) CALL STER(6H COMT3, 42, V, T)     COMT3   39
      IF(T .LT. T3MIN .OR. T .GT. T3MAX) CALL STER(6H COMT3, 42, V, T)     COMT3   40
      EX = V/VCA                                                           COMT3   41
      THETA = (T + TZA)/TCA                                                COMT3   42
 1000 THL1 = THETA - 1.0                                                   COMT3   43
      THL1E2 = THL1 * THL1                                                 COMT3   44
      THL1E3 = THL1 * THL1E2                                               COMT3   45
      THETA1 = (T1 + TZA)/TCA                                              COMT3   46
      OMTH1 = 1.0 - THETA1                                                 COMT3   47
      Y = (1.0 - THETA)/OMTH1                                              COMT3   48
      Y2 = Y*Y                                                             COMT3   49
      Y3 = Y*Y2                                                            COMT3   50
      Y30 = Y**30                                                          COMT3   51
      Y31 = Y * Y30                                                        COMT3   52
      THLOG = ALOG(THETA)                                                  COMT3   53
      EXM1 = VCA/V                                                         COMT3   54
      EXM2 = EXM1 * EXM1                                                   COMT3   55
      EXM4 = EXM2 * EXM2                                                   COMT3   56
      EXM5 = EXM4 * EXM1                                                   COMT3   57
      EXM6 = EXM5 * EXM1                                                   COMT3   58
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                      EXLOG = ALOG(EX)                                                  COMT3      59
                      D3SV = D30 + EXM1*(D31 + EXM1*(D32 + EXM1*(D33 + EXM1*D34)))      COMT3      60
     60               VD3SV = EXM2*(D31 + EXM1*(D32T2 + EXM1*(D33T3 + EXM1*D34T4)))     COMT3      61
                      D4SV = D40 + EXM1*(D41 + EXM1*(D42 + EXM1*(D43 + EXM1*D44)))      COMT3      62
                      VD4SV = EXM2*(D41 + EXM1*(D42T2 + EXM1*(D43T3 + EXM1*D44T4)))     COMT3      63
                      D5SV = D50 + EX*(D51 + EX*D52)                                    COMT3      64
                      VD5SV = D51 + D52T2*EX                                            COMT3      65
     65               THM1 = 1.0/THETA                                                  COMT3      66
                      THM22 = THM1**22                                                  COMT3      67
                      THM23 = THM22*THM1                                                COMT3      68
                      X50TH2 = EX**5/(THETA*THETA)                                      COMT3      69
                      X60TH2 = EX*X50TH2                                                COMT3      70
     70          6000 RETURN                                                            COMT3      71
                      END                                                               COMT3      72
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
3	COMT3	1	70

VARIABLES	SN	TYPE	RELOCATION		
10	AI1	REAL	COMCON	REFS	19
0	ALPHA0	REAL	COMCON	REFS	19
1	ALPHA1	REAL	COMCON	REFS	19
0	C00	REAL	CONST3	REFS	11
1	C01	REAL	CONST3	REFS	11
12	C010	REAL	CONST3	REFS	11
13	C011	REAL	CONST3	REFS	11
14	C012	REAL	CONST3	REFS	11
2	C02	REAL	CONST3	REFS	11
3	C03	REAL	CONST3	REFS	11
4	C04	REAL	CONST3	REFS	11
5	C05	REAL	CONST3	REFS	11
6	C06	REAL	CONST3	REFS	11
7	C07	REAL	CONST3	REFS	11
10	C08	REAL	CONST3	REFS	11
11	C09	REAL	CONST3	REFS	11
15	C11	REAL	CONST3	REFS	11
16	C12	REAL	CONST3	REFS	11
17	C13	REAL	CONST3	REFS	11
20	C14	REAL	CONST3	REFS	11
21	C15	REAL	CONST3	REFS	11
22	C16	REAL	CONST3	REFS	11
23	C17	REAL	CONST3	REFS	11
24	C21	REAL	CONST3	REFS	11
25	C22	REAL	CONST3	REFS	11
26	C23	REAL	CONST3	REFS	11
27	C24	REAL	CONST3	REFS	11
30	C25	REAL	CONST3	REFS	11
31	C26	REAL	CONST3	REFS	11
32	C27	REAL	CONST3	REFS	11
33	C28	REAL	CONST3	REFS	11
34	C31	REAL	CONST3	REFS	11

VARIABLES	SN	TYPE	RELOCATION								
45	C310	REAL	CONST3	REFS	11						
35	C32	REAL	CONST3	REFS	11						
36	C33	REAL	CONST3	REFS	11						
37	C34	REAL	CONST3	REFS	11						
40	C35	REAL	CONST3	REFS	11						
41	C36	REAL	CONST3	REFS	11						
42	C37	REAL	CONST3	REFS	11						
43	C38	REAL	CONST3	REFS	11						
44	C39	REAL	CONST3	REFS	11						
46	C40	REAL	CONST3	REFS	11						
47	C41	REAL	CONST3	REFS	11						
50	C50	REAL	CONST3	REFS	11						
51	C60	REAL	CONST3	REFS	11						
52	C61	REAL	CONST3	REFS	11						
53	C62	REAL	CONST3	REFS	11						
54	C63	REAL	CONST3	REFS	11						
55	C64	REAL	CONST3	REFS	11						
56	C70	REAL	CONST3	REFS	11						
57	C71	REAL	CONST3	REFS	11						
60	C72	REAL	CONST3	REFS	11						
61	C73	REAL	CONST3	REFS	11						
62	C74	REAL	CONST3	REFS	11						
63	C75	REAL	CONST3	REFS	11						
64	C76	REAL	CONST3	REFS	11						
65	C77	REAL	CONST3	REFS	11						
66	C78	REAL	CONST3	REFS	11						
17	D3SV	REAL	STM3	REFS	27	DEFINED	59				
67	D30	REAL	CONST3	REFS	11	59					
70	D31	REAL	CONST3	REFS	11	59	60				
71	D32	REAL	CONST3	REFS	11	59					
141	D32T2	REAL		REFS	60	DEFINED	31				
72	D33	REAL	CONST3	REFS	11	59					
142	D33T3	REAL		REFS	60	DEFINED	31				
73	D34	REAL	CONST3	REFS	11	59					
143	D34T4	REAL		REFS	60	DEFINED	32				
21	D4SV	REAL	STM3	REFS	27	DEFINED	61				
74	D40	REAL	CONST3	REFS	11	61					
75	D41	REAL	CONST3	REFS	11	61	62				
76	D42	REAL	CONST3	REFS	11	61					
144	D42T2	REAL		REFS	62	DEFINED	32				
77	D43	REAL	CONST3	REFS	11	61					
145	D43T3	REAL		REFS	62	DEFINED	33				
100	D44	REAL	CONST3	REFS	11	61					
146	D44T4	REAL		REFS	62	DEFINED	33				
23	D5SV	REAL	STM3	REFS	27	DEFINED	63				
101	D50	REAL	CONST3	REFS	11	63					
102	D51	REAL	CONST3	REFS	11	63	64				
103	D52	REAL	CONST3	REFS	11	63					
147	D52T2	REAL		REFS	64	DEFINED	34				
6	EX	REAL	STM3	REFS	27	58	2*63	64	68	69	
				DEFINED	40						
13	EXLOG	REAL	STM3	REFS	27	DEFINED	58				
7	EXM1	REAL	STM3	REFS	27	2*54	56	57	4*59	3*60	4*61
				3*62	DEFINED	53					
10	EXM2	REAL	STM3	REFS	27	2*55	60	62	DEFINED	54	
155	EXM4	REAL		REFS	56	DEFINED	55				
11	EXM5	REAL	STM3	REFS	27	57	DEFINED	56			

VARIABLES	SN	TYPE	RELOCATION								
12	EXM6	REAL	STM3	REFS	27	DEFINED	57				
3	H	REAL	CURENT	REFS	24						
32	HMAX	REAL	COMCON	REFS	19						
31	HMIN	REAL	COMCON	REFS	19						
33	HSMAX	REAL	COMCON	REFS	19						
34	H4MAX	REAL	COMCON	REFS	19						
16	OMTH1	REAL	STM3	REFS	27	47	DEFINED	46			
0	P	REAL	CURENT	REFS	24						
2	PCA	REAL	COMCON	REFS	19						
15	PMAX	REAL	COMCON	REFS	19						
14	PMIN	REAL	COMCON	REFS	19						
16	PSMAX	REAL	COMCON	REFS	19						
7	PVOT	REAL	COMCON	REFS	19						
6	PVOI0	REAL	COMCON	REFS	19						
13	P1	REAL	COMCON	REFS	19						
17	P3MIN	REAL	COMCON	REFS	19						
4	S	REAL	CURENT	REFS	24						
36	SMAX	REAL	COMCON	REFS	19						
35	SMIN	REAL	COMCON	REFS	19						
37	S3MIN	REAL	COMCON	REFS	19						
40	S4MAX	REAL	COMCON	REFS	19						
1	T	REAL	CURENT	REFS	24	38	3*39	41	DEFINED	37	
12	TC	REAL	COMCON	REFS	19						
4	TCA	REAL	COMCON	REFS	19	41	45				
0	TE	REAL	F.P.	REFS	37	DEFINED	1				
0	THETA	REAL	STM3	REFS	27	42	47	52	65	2*68	
				DEFINED	41						
154	THETA1	REAL		REFS	46	DEFINED	45				
2	THLOG	REAL	STM3	REFS	27	DEFINED	52				
1	THL1	REAL	STM3	REFS	27	2*43	44	DEFINED	42		
152	THL1E2	REAL		REFS	44	DEFINED	43				
153	THL1E3	* REAL		DEFINED	44						
3	THM1	REAL	STM3	REFS	27	66	67	DEFINED	65		
4	THM22	REAL	STM3	REFS	27	67	DEFINED	66			
5	THM23	REAL	STM3	REFS	27	DEFINED	67				
23	TMAX	REAL	COMCON	REFS	19						
22	TMIN	REAL	COMCON	REFS	19						
24	TSMAX	REAL	COMCON	REFS	19						
5	TZA	REAL	COMCON	REFS	19	41	45				
11	T1	REAL	COMCON	REFS	19	45					
25	T1MAX	REAL	COMCON	REFS	19						
26	T2MIN	REAL	COMCON	REFS	19						
30	T3MAX	REAL	COMCON	REFS	19	39					
27	T3MIN	REAL	COMCON	REFS	19	39					
2	V	REAL	CURENT	REFS	24	3*38	39	40	53		
				DEFINED	36						
3	VCA	REAL	COMCON	REFS	19	40	53				
20	VD3SV	REAL	STM3	REFS	27	DEFINED	60				
22	VD4SV	REAL	STM3	REFS	27	DEFINED	62				
24	VD5SV	REAL	STM3	REFS	27	DEFINED	64				
0	VE	REAL	F.P.	REFS	36	DEFINED	1				
21	V3MAX	REAL	COMCON	REFS	19	38					
20	V3MIN	REAL	COMCON	REFS	19	38					
14	X50TH2	REAL	STM3	REFS	27	69	DEFINED	68			
15	X60TH2	REAL	STM3	REFS	27	DEFINED	69				
25	Y	REAL	STM3	REFS	27	2*48	49	50	51		
				DEFINED	47						

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VARIABLES     SN  TYPE          RELOCATION
   26  Y2         REAL              STM3        REFS       27        49   DEFINED       48
   27  Y3         REAL              STM3        REFS       27    DEFINED       49
   30  Y30        REAL              STM3        REFS       27        51   DEFINED       50
   31  Y31        REAL              STM3        REFS       27    DEFINED       51

EXTERNALS           TYPE    ARGS        REFERENCES
       ALOG         REAL      1 LIBRARY     52        58
       STER                   4             38        39

STATEMENT LABELS              DEF LINE   REFERENCES
    0  1000        INACTIVE     42
    0  6000        INACTIVE     70

COMMON BLOCKS   LENGTH
       CONST3       68
       COMCON       33
       CURENT        5
       STM3         26

STATISTICS
  PROGRAM LENGTH                162B      114
  SCM LABELED COMMON LENGTH     204B      132
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      FUNCTION VISL (P,TIN)                                                  VISL       2
C     VISL    VISCOSITY AS A FUNCTION OF PRESSURE AND TEMPERATURE            VISL       3
C          A 6TH LEVEL SUBROUTINE                                            VISL       4
C                                                                            VISL       5
C                                                                            VISL       6
C     FIRST ARGUMENT IS PRESSURE                                             VISL       7
C     SECOND ARGUMENT IS TEMPERATURE                                         VISL       8
C     RETURNS WITH VISCOSITY IN LB/FT SEC                                    VISL       9
C     VISV IS ENTRY FOR VAPOR REGION                                         VISL      10
C     VISL IS ENTRY FOR LIQUID REGION                                        VISL      11
C                                                                            VISL      12
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010,     VISL      13
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN,     VISL      14
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,     VISL      15
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX             VISL      16
      DIMENSION T(4), VIS(4), PA(16), VA(16), VB(16), VC(10), VD(8), TSC     VISL      17
     1(6),VE(6)                                                             VISL      18
      DATA PA /   0., 200., 225., 250., 275., 300., 350., 400., 450.,       VISL      19
     1          500., 550., 600., 650., 700., 750., 800./                   VISL      20
      DATA VA / 822., 843., 850., 856., 863., 869., 883., 897., 911.,       VISL      21
     1          925., 939., 953., 966., 979., 992.,1004./                   VISL      22
      DATA VB / 716., 733., 746., 759., 772., 783., 801., 818., 834.,       VISL      23
     1          849., 864., 879., 893., 907., 921.,934./                    VISL      24
      DATA VC / 695., 724., 748., 769., 788., 806., 823., 839., 854.,       VISL      25
     1          868./                                                       VISL      26
      DATA VD / 665., 695., 718., 739., 758., 775., 790., 804./             VISL      27
      DATA TSC/ 300., 325., 350., 360., 370., 374.15 /                      VISL      28
      DATA VE / 900., 822., 716., 662., 565., 433.5  /                      VISL      29
C                                                                            VISL      30
      NV=0                                                                   VISL      31
      GO TO 5                                                                VISL      32
C                                                                            VISL      33
      ENTRY VISV                                                             VISL      34
C     A 6TH LEVEL ENTRY                                                      VISL      35
C                                                                            VISL      36
      NV=1                                                                   VISL      37
    5 NRET=1                                                                 VISL      38
      TEMP=TIN                                                               VISL      39
      IF (P.GT.12500..OR.TIN.GT.TMAX) GO TO 100                              VISL      40
      PB=P/14.503773773                                                      VISL      41
      TB=(TIN-32.)/1.8                                                       VISL      42
      IF (P.GT.PCA) GO TO 20                                                 VISL      43
      IF (NV) 10,20,10                                                       VISL      44
   10 DENS=HSS(P,TEMP,DENS,VOL)                                              VISL      45
      DENS=0.01601846331/VOL                                                 VISL      46
      TM=(TEMP-32.)/1.8                                                      VISL      47
      DV1=-DENS*(1858.0-5.9*TM)                                              VISL      48
      DV=DV2=((102.1*DENS+676.5)*DENS+353.0)*DENS                            VISL      49
      IF (TM.GE.365.0) GO TO 15                                              VISL      50
      DV=DV1                                                                 VISL      51
      IF (TM.LE.340.0) GO TO 15                                              VISL      52
      DV=(DV1-DV2)*(365.0-TM)/25.+DV2                                        VISL      53
   15 V=VIS(4)=0.407*TM+80.4+DV                                              VISL      54
      GO TO (95,90), NRET                                                    VISL      55
   20 NSET=1                                                                 VISL      56
      IF (TIN.LT.572.0) GO TO 45                                             VISL      57
      IF (TIN-797.) 30,25,25                                                 VISL      58
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      25 TEMP=TIN                                                        VISL       59
         NRET=1                                                          VISL       60
   60    GO TO 10                                                        VISL       61
      30 IF (TIN.LT.752.) GO TO 35                                       VISL       62
         IF (PB-450.) 25,40,40                                           VISL       63
      35 IF (TIN.LT.707.) GO TO 40                                       VISL       64
         IF (PB.LE.350.) GO TO 25                                        VISL       65
   65 40 T(1)=300.0                                                      VISL       66
         T(2)=325.0                                                      VISL       67
         T(3)=350.0                                                      VISL       68
         T(4)=375.0                                                      VISL       69
         NSET=2                                                          VISL       70
   70    TEMP=572.0                                                      VISL       71
      45 TK=273.15+(TEMP-32.)/1.8                                        VISL       72
         DP=(P-PSL(TEMP))/14.503773773E6                                 VISL       73
         IF (DP.LT.0) DP=0                                               VISL       74
         PHI=1.04673*(TK-305.0)                                          VISL       75
   75    Y=247.8/(TK-140.0)                                              VISL       76
         VIS(1)=V=241.4*10.**Y*(1.+(DP*PHI))                             VISL       77
         GO TO (95,50,60,90), NSET                                       VISL       78
      50 PA(1)=120.5569                                                  VISL       79
         VIS(2)=GRS(PA,1,VA,1,PB,16,NRANGE)                              VISL       80
   80    PA(1)=165.35125                                                 VISL       81
         VIS(3)=GRS(PA,1,VB,1,PB,16,NRANGE)                              VISL       82
         VIS(4)=GRS(PA(7),1,VC,1,PB,10,NRANGE)                           VISL       83
         IF (TB.GT.374.15) GO TO 65                                      VISL       84
         IF (P.GT.PCA) GO TO 65                                          VISL       85
   85    T(4)=(TSL(P)-32.)/1.8                                           VISL       86
         VIS(4)=GRS(TSC,1,VE,1,T(4),6,NRANGE)                            VISL       87
         IF (T(4).GT.350.0) GO TO 90                                     VISL       88
         NSET=3                                                          VISL       89
         TEMP=562.0                                                      VISL       90
   90    VIS(3)=VIS(2)                                                   VISL       91
         VIS(2)=VIS(1)                                                   VISL       92
         T(3)=T(2)                                                       VISL       93
         T(2)=T(1)                                                       VISL       94
         T(1)=(TEMP-32.)/1.8                                             VISL       95
   95    GO TO 45                                                        VISL       96
      60 IF (T(4).GT.325.0) GO TO 90                                     VISL       97
         NSET=4                                                          VISL       98
         TEMP=552.0                                                      VISL       99
         GO TO 55                                                        VISL      100
  100    65 IF (TB.LT.375.) GO TO 90                                     VISL      101
         NRET=2                                                          VISL      102
         NREX=1                                                          VISL      103
      70 VIS(1)=VIS(2)                                                   VISL      104
         VIS(2)=VIS(3)                                                   VISL      105
  105    VIS(3)=VIS(4)                                                   VISL      106
         T(1)=T(2)                                                       VISL      107
         T(2)=T(3)                                                       VISL      108
         T(3)=T(4)                                                       VISL      109
         GO TO (75,85), NREX                                             VISL      110
  110    75 TEMP=752.                                                    VISL      111
         T(4)=400.                                                       VISL      112
         IF (PB.LT.450.) GO TO 10                                        VISL      113
         VIS(4)=GRS(PA(9),1,VD,1,PB,8,NRANGE)                            VISL      114
         GO TO (80,90), NREX                                             VISL      115
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              80 NREX=2.                                                          VISL      116
                 GO TO 70                                                         VISL      117
              85 TEMP=797.                                                        VISL      118
                 PA(1)=0.                                                         VISL      119
                 T(4)=425.                                                        VISL      120
                 GO TO 10                                                         VISL      121
              90 V=GRS(T,1,VIS,1,TB,4,NRANGE)                                     VISL      122
              95 VISL=0.67197E-7*V                                                VISL      123
                 RETURN                                                           VISL      124
             100 CALL STER (4HVISL,12,P,TIN)                                      VISL      125
           C     END OF VISL                                                      VISL      126
                 END                                                              VISL      127
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CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

    54     I                  AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
   109     I                  AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
   114     I                  AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
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      SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS      DEF LINE     REFERENCES
    4   VISL           1
   11   VISV          33         123       126

VARIABLES       SN  TYPE            RELOCATION
   10   AI1         REAL                 COMCON      REFS         12
    0   ALPHA0      REAL                 COMCON      REFS         12
    1   ALPHA1      REAL                 COMCON      REFS         12
  521   DENS        REAL                             REFS         44        47      3*48   DEFINED        44        45
  532   DP          REAL                             REFS         73        76   DEFINED        72        73
  525   DV          REAL                             REFS         53   DEFINED        48        50        52
  524   DV1         REAL                             REFS         50        52   DEFINED        47
  526   DV2         REAL                             REFS       2*52   DEFINED        48
   32   HMAX        REAL                 COMCON      REFS         12
   31   HMIN        REAL                 COMCON      REFS         12
   33   HSMAX       REAL                 COMCON      REFS         12
   34   H4MAX       REAL                 COMCON      REFS         12
  535   NRANGE      INTEGER                          REFS         79        81        82        86       113       121
  515   NRET        INTEGER                          REFS         54   DEFINED        37        59       101
  536   NREX        INTEGER                          REFS        109       114   DEFINED       102       115
  530   NSET        INTEGER                          REFS         77   DEFINED        55        69        88        97
  514   NV          INTEGER                          REFS         43   DEFINED        30        36
    0   P           REAL                   F.P.      REFS         39        40        42        44        72        84        85
                                                      124    DEFINED         1
  547   PA          REAL         ARRAY               REFS         16        79        81        82       113
                                                  DEFINED         18        78        80       118
  517   PB          REAL                             REFS         62        64        79        81        82       112       113
                                                  DEFINED         40
    2   PCA         REAL                 COMCON      REFS         12        42        84
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VARIABLES	SN	TYPE	RELOCATION								
533	PHI	REAL		REFS	76	DEFINED	74				
15	PMAX	REAL	COMCON	REFS	12						
14	PMIN	REAL	COMCON	REFS	12						
16	PSMAX	REAL	COMCON	REFS	12						
7	PVOT	REAL	COMCON	REFS	12						
6	PV010	REAL	COMCON	REFS	12						
13	P1	REAL	COMCON	REFS	12						
17	P3MIN	REAL	COMCON	REFS	12						
36	SMAX	REAL	COMCON	REFS	12						
35	SMIN	REAL	COMCON	REFS	12						
37	S3MIN	REAL	COMCON	REFS	12						
40	S4MAX	REAL	COMCON	REFS	12						
537	T	REAL	ARRAY	REFS	16	86	87	92	93	96	106
					107	108	121	DEFINED	65	66	67	68
					85	92	93	94	106	107	108	111
					119							
520	TB	REAL		REFS	83	100	121	DEFINED	41			
12	TC	REAL	COMCON	REFS	12							
4	TCA	REAL	COMCON	REFS	12							
516	TEMP	REAL		REFS	44	46	71	72	94			
				DEFINED	38	58	70	89	98	110	117	
0	TIN	REAL	F.P.	REFS	38	39	41	56	57	58	61	
				63	124	DEFINED	1					
531	TK	REAL		REFS	74	75	DEFINED	71				
523	TM	REAL		REFS	47	49	51	52	53			
				DEFINED	46							
23	TMAX	REAL	COMCON	REFS	12	39						
22	TMIN	REAL	COMCON	REFS	12							
651	TSC	REAL	ARRAY	REFS	16	86	DEFINED	27				
24	TSMAX	REAL	COMCON	REFS	12							
5	TZA	REAL	COMCON	REFS	12							
11	T1	REAL	COMCON	REFS	12							
25	T1MAX	REAL	COMCON	REFS	12							
26	T2MIN	REAL	COMCON	REFS	12							
30	T3MAX	REAL	COMCON	REFS	12							
27	T3MIN	REAL	COMCON	REFS	12							
527	V	REAL		REFS	122	DEFINED	53	76	121			
567	VA	REAL	ARRAY	REFS	16	79	DEFINED	20				
607	VB	REAL	ARRAY	REFS	16	81	DEFINED	22				
627	VC	REAL	ARRAY	REFS	16	82	DEFINED	24				
3	VCA	REAL	COMCON	REFS	12							
641	VD	REAL	ARRAY	REFS	16	113	DEFINED	26				
657	VE	REAL	ARRAY	REFS	16	86	DEFINED	28				
543	VIS	REAL	ARRAY	REFS	16	90	91	103	104	105	121	
				DEFINED	53	76	79	81	82	86	90	
				91	103	104	105	113				
513	VISL	REAL		DEFINED	122							
522	VOL	REAL		REFS	44	45						
21	V3MAX	REAL	COMCON	REFS	12							
20	V3MIN	REAL	COMCON	REFS	12							
534	Y	REAL		REFS	76	DEFINED	75					

EXTERNALS	TYPE	ARGS	REFERENCES					
GRS	REAL	7	79	81	82	86	113	121
HSS	REAL	4	44					
PSL	REAL	1	72					
STER		4	124					

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EXTERNALS	TYPE	ARGS	REFERENCES
TSL	REAL	1	85

STATEMENT LABELS		DEF LINE	REFERENCES					
21	5	37	31					
37	10	44	2*43	60	112	120		
66	15	53	49	51				
101	20	55	42	43				
107	25	58	2*57	62	64			
112	30	61	57					
120	35	63	61					
126	40	65	2*62	63				
136	45	71	56	95				
174	50	78	77					
227	55	90	99					
237	60	96	77					
245	65	100	83	84				
252	70	103	116					
270	75	110	109					
306	80	115	114					
310	85	117	109					
314	90	121	54	77	87	96	100	114
317	95	122	54	77				
322	100	124	39					

COMMON BLOCKS	LENGTH
COMCON	33

STATISTICS

PROGRAM LENGTH	667B	439
SCM LABELED COMMON LENGTH	41B	33

```
      FUNCTION VPTD(PIN,TIN)                                            VPTD        2
     CVPTD FUNCTIONS OF PRESSURE AND TEMPERATURE IN DRY REGION          VPTD        3
     C     A 4TH LEVEL SUBROUTINE                                       VPTD        4
     C     WITH ENTRIES VDRY, HPTD, HDRY, SPTD, SDRY                    VPTD        5
     C                                                                  VPTD        6
     C                                                                  VPTD        7
     C     FIRST ARGUMENT IS PRESSURE                                   VPTD        8
     C     SECOND ARGUMENT IS TEMPERATURE                               VPTD        9
     C     RETURNS WITH SPECIFIC VOLUME, ENTHALPY, OR ENTROPY           VPTD       10
     C                                                                  VPTD       11
     C     V = F(P,T) IN THE SUPERHEAT OR CRITICAL REGION               VPTD       12
     C                                                                  VPTD       13
           P = PIN                                                      VPTD       14
           T = TIN                                                      VPTD       15
           P23 = P23T(T)                                                VPTD       16
           IF (P .GT. P23) GO TO 1000                                   VPTD       17
           A = VPT2(P,T)                                                VPTD       18
           GO TO 6000                                                   VPTD       19
     C                                                                  VPTD       20
           ENTRY VDRY                                                   VPTD       21
     C                                                                  VPTD       22
     C     THIS ENTRY CAN BE USED ONLY IF V2E (OR VPT3) WAS LAST CALLED WITH VPTD       23
     C     THE VALUES OF P (OR V) AND T THAT ARE TO BE ASSUMED HERE.    VPTD       24
     C                                                                  VPTD       25
           IF (P .GT. P23) GO TO 1500                                   VPTD       26
           A = V2E(P)                                                   VPTD       27
           GO TO 6000                                                   VPTD       28
      1000 V = VPT3D(P,T)                                               VPTD       29
      1500 A = V                                                        VPTD       30
           GO TO 6000                                                   VPTD       31
     C                                                                  VPTD       32
     C     H = F(P,T) IN THE SUPERHEAT OR CRITICAL REGION               VPTD       33
     C                                                                  VPTD       34
           ENTRY HPTD                                                   VPTD       35
     C     A 4TH LEVEL ENTRY                                            VPTD       36
     C                                                                  VPTD       37
           P = PIN                                                      VPTD       38
           T = TIN                                                      VPTD       39
           P23 = P23T(T)                                                VPTD       40
           IF (P .GT. P23) GO TO 3000                                   VPTD       41
           A = HPT2(P,T)                                                VPTD       42
           GO TO 6000                                                   VPTD       43
     C                                                                  VPTD       44
           ENTRY HDRY                                                   VPTD       45
     C                                                                  VPTD       46
     C     THIS ENTRY CAN BE USED ONLY IF H2E (OR H3E) WAS LAST CALLED WITH VPTD       47
     C     THE VALUES OF P (OR V) AND T THAT ARE TO BE ASSUMED HERE.    VPTD       48
     C                                                                  VPTD       49
           IF (P .GT. P23) GO TO 3500                                   VPTD       50
           A = H2E(P)                                                   VPTD       51
           GO TO 6000                                                   VPTD       52
      3000 V = VPT3D(P,T)                                               VPTD       53
      3500 A = H3E(V)                                                   VPTD       54
           GO TO 6000                                                   VPTD       55
     C                                                                  VPTD       56
     C     S = F(P,T) IN THE SUPERHEAT OR CRITICAL REGION               VPTD       57
     C                                                                  VPTD       58
```

```
                      ENTRY SPTD                                                    VPTD       59
                C     A 4TH LEVEL ENTRY                                             VPTD       60
     60         C                                                                   VPTD       61
                      P = PIN                                                       VPTD       62
                      T = TIN                                                       VPTD       63
                      P23 = P23T(T)                                                 VPTD       64
                      IF (P .GT. P23) GO TO 5000                                    VPTD       65
     65               A = SPT2(P,T)                                                 VPTD       66
                      GO TO 6000                                                    VPTD       67
                C                                                                   VPTD       68
                      ENTRY SDRY                                                    VPTD       69
                C                                                                   VPTD       70
     70         C     THIS ENTRY CAN BE USED ONLY IF S2E (OR S3E) WAS LAST CALLED WITH VPTD       71
                C     THE VALUES OF P (OR V) AND T THAT ARE TO BE ASSUMED HERE.     VPTD       72
                C                                                                   VPTD       73
                      IF (P .GT. P23) GO TO 5500                                    VPTD       74
                      A = S2E(P)                                                    VPTD       75
     75               GO TO 6000                                                    VPTD       76
                5000  V = VPT3D(P,T)                                               VPTD       77
                5500  A = S3E(V)                                                   VPTD       78
                6000  VPTD = A                                                     VPTD       79
                      RETURN                                                        VPTD       80
     80               END                                                           VPTD       81
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
65	HDRY	44	
43	HPTD	34	
131	SDRY	68	79
107	SPTD	58	
22	VDRY	20	
4	VPTD	1	

VARIABLES	SN	TYPE	RELOCATION								
171	A	REAL		REFS	78	DEFINED	17	26	29	41	50
				53	65	74	77				
166	P	REAL		REFS	16	17	25	26	28	40	41
				49	50	52	64	65	73	74	76
				DEFINED	13	37	61				
0	PIN	REAL	F.P.	REFS	13	37	61	DEFINED	1		
170	P23	REAL		REFS	16	25	40	49	64	73	
				DEFINED	15	39	63				
167	T	REAL		REFS	15	17	28	39	41	52	63
				65	76	DEFINED	14	38	62		
0	TIN	REAL	F.P.	REFS	14	38	62	DEFINED	1		
172	V	REAL		REFS	29	53	77	DEFINED	28	52	76
165	VPTD	REAL		DEFINED	78						

EXTERNALS	TYPE	ARGS	REFERENCES
H2PT2	REAL	2	41
H2E	REAL	1	50
H3E	REAL	1	53

EXTERNALS	TYPE	ARGS	REFERENCES		
P23T	REAL	1	15	39	63
SPT2	REAL	2	65		
S2E	REAL	1	74		
S3E	REAL	1	77		
VPT2	REAL	2	17		
VPT3D	REAL	2	28	52	76
V2E	REAL	1	26		

STATEMENT LABELS		DEF LINE	REFERENCES							
36	1000	28	16							
41	1500	29	25							
101	3000	52	40							
104	3500	53	49							
145	5000	76	64							
150	5500	77	73							
153	6000	78	18	27	30	42	51	54	66	75

STATISTICS

PROGRAM LENGTH 173B 123

```
            FUNCTION HSS(P,T,S,V)                                          HSS       2
      CHSS  SUPERHEATED STEAM H,S, AND V AS A FUNCTION OF P AND T          HSS       3
      C                                                                    HSS       4
      C                                                                    HSS       5
            V=VPTD(P,T)                                                    HSS       6
            S=SDRY(P,T)                                                    HSS       7
            HSS=HDRY(P,T)                                                  HSS       8
            RETURN                                                         HSS       9
            END                                                            HSS      10
```

```
    SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS      DEF LINE      REFERENCES
    4  HSS            1            8

VARIABLES      SN  TYPE           RELOCATION
   30  HSS         REAL                          DEFINED       7
    0  P           REAL                 F.P.       REFS        5       6       7    DEFINED      1
    0  S           REAL                 F.P.     DEFINED       1       6
    0  T           REAL                 F.P.       REFS        5       6       7    DEFINED      1
    0  V           REAL                 F.P.     DEFINED       1       5

EXTERNALS           TYPE    ARGS        REFERENCES
       HDRY         REAL     2               7
       SDRY         REAL     2               6
       VPTD         REAL     2               5

STATISTICS
  PROGRAM LENGTH                  31B       25
```

```
  1          FUNCTION HPTL(PIN.TIN)                                                  HPTL     2
       CHPTL H = F(P.T)  IN LIQUID REGION                                           HPTL     3
       C     A 4TH LEVEL SUBROUTINE                                                 HPTL     4
       C                                                                            HPTL     5
  5    C                                                                            HPTL     6
       C     FIRST ARGUMENT IS PRESSURE                                             HPTL     7
       C     SECOND ARGUMENT IS TEMPERATURE                                         HPTL     8
       C     RETURNS WITH SPECIFIC ENTHALPY                                         HPTL     9
       C                                                                            HPTL    10
 10          COMMON /COMCON/ ALPHA0.ALPHA1.   PCA.   VCA.   TCA.   TZA. PV010.      HPTL    11
            1   PVOT.    AI1.    T1.    TC.    P1.  PMIN.  PMAX. PSMAX. P3MIN.      HPTL    12
            2  V3MIN.  V3MAX.  TMIN.  TMAX. TSMAX. T1MAX. T2MIN. T3MIN. T3MAX.      HPTL    13
            3   HMIN.   HMAX. HSMAX. H4MAX.  SMIN.  SMAX. S3MIN. S4MAX              HPTL    14
       C                                                                            HPTL    15
 15          P = PIN                                                                HPTL    16
             T = TIN                                                                HPTL    17
             IF ( T .LT.T1) GO TO 1000                                              HPTL    18
             V = VPT3L(P.T)                                                         HPTL    19
             HPTL = H3E(V)                                                          HPTL    20
 20          GO TO 2000                                                             HPTL    21
        1000 HPTL = HPT1(P.T)                                                       HPTL    22
        2000 RETURN                                                                 HPTL    23
             END                                                                    HPTL    24
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	HPTL	1	22

VARIABLES		SN	TYPE	RELOCATION						
10	AI1		REAL	COMCON	REFS	10				
0	ALPHA0		REAL	COMCON	REFS	10				
1	ALPHA1		REAL	COMCON	REFS	10				
32	HMAX		REAL	COMCON	REFS	10				
31	HMIN		REAL	COMCON	REFS	10				
31	HPTL		REAL		DEFINED	19	21			
33	HSMAX		REAL	COMCON	REFS	10				
34	H4MAX		REAL	COMCON	REFS	10				
32	P		REAL		REFS	18	21	DEFINED	15	
2	PCA		REAL	COMCON	REFS	10				
0	PIN		REAL	F.P.	REFS	15	DEFINED	1		
15	PMAX		REAL	COMCON	REFS	10				
14	PMIN		REAL	COMCON	REFS	10				
16	PSMAX		REAL	COMCON	REFS	10				
7	PVOT		REAL	COMCON	REFS	10				
6	PV010		REAL	COMCON	REFS	10				
13	P1		REAL	COMCON	REFS	10				
17	P3MIN		REAL	COMCON	REFS	10				
36	SMAX		REAL	COMCON	REFS	10				
35	SMIN		REAL	COMCON	REFS	10				
37	S3MIN		REAL	COMCON	REFS	10				
40	S4MAX		REAL	COMCON	REFS	10				
33	T		REAL		REFS	17	18	21	DEFINED	16

VARIABLES	SN	TYPE	RELOCATION				
12	TC	REAL	COMCON	REFS	10		
4	TCA	REAL	COMCON	REFS	10		
0	TIN	REAL	F.P.	REFS	16	DEFINED	1
23	TMAX	REAL	COMCON	REFS	10		
22	TMIN	REAL	COMCON	REFS	10		
24	TSMAX	REAL	COMCON	REFS	10		
5	TZA	REAL	COMCON	REFS	10		
11	T1	REAL	COMCON	REFS	10	17	
25	T1MAX	REAL	COMCON	REFS	10		
26	T2MIN	REAL	COMCON	REFS	10		
30	T3MAX	REAL	COMCON	REFS	10		
27	T3MIN	REAL	COMCON	REFS	10		
34	V	REAL		REFS	19	DEFINED	18
3	VCA	REAL	COMCON	REFS	10		
21	V3MAX	REAL	COMCON	REFS	10		
20	V3MIN	REAL	COMCON	REFS	10		

EXTERNALS	TYPE	ARGS	REFERENCES
HPT1	REAL	2	21
H3E	REAL	1	19
VPT3L	REAL	2	18

STATEMENT LABELS		DEF LINE	REFERENCES
20	1000	21	17
23	2000	22	20

COMMON BLOCKS	LENGTH
COMCON	33

STATISTICS

PROGRAM LENGTH	358	29
SCM LABELED COMMON LENGTH	418	33

424099

```
      FUNCTION CPPT1(P,T)                                                CPPT1    2
C         SPECIFIC HEAT - SUB REGION 1                                   CPPT1    3
C         A 2ND LEVEL SUBROUTINE                                         CPPT1    4
C         WITH ENTRY CP1E                                                CPPT1    5
C                                                                        CPPT1    6
C                                                                        CPPT1    7
C     FIRST ARGUMENT IS PRESSURE                                         CPPT1    8
C     SECOND ARGRMENT IS TEMPERATURE                                     CPPT1    9
C     RETURNS WITH SPECIFIC HEAT                                         CPPT1   10
C                                                                        CPPT1   11
      COMMON /CONST1/AA0, AA1, AA2, AA3, AA4, AA5, AA6, AA7, AA8, AA9,   CPPT1   12
     1    AA10,AA11,AA12,AA13,AA14,AA15,AA16,AA17,AA18,AA19,AA20,AA21,   CPPT1   13
     2    AA22,  A1,  A2,  A3,  A4,  A5,  A6,  A7,  A8,  A9, A10, A11,   CPPT1   14
     3     A12                                                           CPPT1   15
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010,  CPPT1   16
     1   PVOT,    AI1,    T1,    TC,    PI,  PMIN,  PMAX, PSMAX, P3MIN,  CPPT1   17
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,  CPPT1   18
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX          CPPT1   19
      COMMON /STM1/ THETA,  TH2,  TH4,  TH6,  TH7, TH10, TH11, TH16,     CPPT1   20
     1   TH17, TH18, TH19, TH20, TH21, BETA,BETA2,BETA3,BETA4, Y,YP,     CPPT1   21
     2  Z, ZP,  UA9, UA10,   UB,  UB2,   UC,  U3T,  UD4,   UP           CPPT1   22
C                                                                        CPPT1   23
      DATA AA3T2, AA4T6 / +7.882573574E4, -4.039966643E5 /               CPPT1   24
      DATA AA5T12, AA6T20 / +1.188285723E6, -2.187823548E6 /             CPPT1   25
      DATA AA7T30, AA8T42 / +2.577252500E6, -1.894690872E6 /             CPPT1   26
      DATA AA9T56, AA1072 / +7.941577986E5, -1.452435201E5 /             CPPT1   27
      DATA AA14T2, AA1590 / +4.568558108E-2, 2.179482303E4 /             CPPT1   28
      DATA AA22B / +2.540003062E-11 /                                    CPPT1   29
      DATA A1T2, A2T6 / +1.687675081E0, +3.217297297E-3 /                CPPT1   30
      DATA A2T42, A9T306 / +2.252108108E-2, +4.341528000E1 /             CPPT1   31
      DATA A4T2, A5T2 / +1.468455698E-1, +9.951717740E-2 /               CPPT1   32
C                                                                        CPPT1   33
      CALL COMT1(P,T)                                                    CPPT1   34
C                                                                        CPPT1   35
      ENTRY CP1E                                                         CPPT1   36
C                                                                        CPPT1   37
C     THIS ENTRY CAN BE USED ONLY IF COMT1 WAS LAST CALLED WITH THE      CPPT1   38
C     VALUES OF P AND T THAT ARE TO BE ASSUMED HERE.                     CPPT1   39
C                                                                        CPPT1   40
 1000 UA = A6 - THETA                                                    CPPT1   41
      UA8 = UA**8                                                        CPPT1   42
      WW = A3*Y*Y + A5T2*BETA - A4T2*THETA                               CPPT1   43
      W = SQRT(WW)                                                       CPPT1   44
      Z12 = Z**(12.0E0/17.0E0)                                           CPPT1   45
      Z22 = Z**(-22.0E0/17.0E0)                                          CPPT1   46
      DYDTH = -A1T2*THETA + A2T6/TH7                                     CPPT1   47
      WA = (A3*Y*DYDTH - A4)/W                                           CPPT1   48
      DYDTH2 = -A1T2 - A2T42/(TH7*THETA)                                 CPPT1   49
      DZDTH = DYDTH + WA                                                 CPPT1   50
      DZDTH2 = DYDTH2 +(A3/W)*(DYDTH*DYDTH + Y*DYDTH2) - WA*WA/W         CPPT1   51
      CP1 = AA0 - THETA*(AA3T2 + THETA*(AA4T6 + THETA*(AA5T12 + THETA*(  CPPT1   52
     1 AA6T20 + THETA*(AA7T30 + THETA*(AA8T42 + THETA*(AA9T56 + THETA*   CPPT1   53
     2 AA1072))))))                                                      CPPT1   54
      CP2 = AA11*THETA*(12.0E0*(Z/29.0E0 - Y/12.0E0)*(ZP*DZDTH2          CPPT1   55
     1  - 5.0E0*Z22*DZDTH*DZDTH/17.0E0) + 24.0E0*(DZDTH/29.0E0           CPPT1   56
     2 - DYDTH/12.0E0)*ZP*DZDTH + 17.0E0*(DZDTH2/29.0E0                 CPPT1   57
     3 - DYDTH2/12.0E0)*Z12)                                            CPPT1   58
```

```
                      CP3 = THETA*BETA*(AA14T2 + AA1590*UA8                          CPPT1      59
                     1 + TH17*AA16*(722.0E0*TH19/UB - 342.0E0)/UB2)                  CPPT1      60
     60               CP4 = TH10*(242.0E0*TH11/UC - 110.0E0)*U3T                     CPPT1      61
                      CP5 = AA20*TH17*(A9T306 + 380.0E0*TH2)*UP                      CPPT1      62
                      CP6 = AA228*BETA4/TH21                                         CPPT1      63
                      CPPT1 = (CP1 - CP2 - CP3 + CP4 + CP5 - CP6)*PVOT               CPPT1      64
                 2000 RETURN                                                         CPPT1      65
     65               END                                                            CPPT1      66
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
4	CPPT1	1	
14	CP1E	35	64

VARIABLES

		SN	TYPE	RELOCATION				
0	AA0		REAL	CONST1	REFS	11	51	
1	AA1		REAL	CONST1	REFS	11		
12	AA10		REAL	CONST1	REFS	11		
176	AA1072		REAL		REFS	51	DEFINED	26
13	AA11		REAL	CONST1	REFS	11	54	
14	AA12		REAL	CONST1	REFS	11		
15	AA13		REAL	CONST1	REFS	11		
16	AA14		REAL	CONST1	REFS	11		
177	AA14T2		REAL		REFS	58	DEFINED	27
17	AA15		REAL	CONST1	REFS	11		
200	AA1590		REAL		REFS	58	DEFINED	27
20	AA16		REAL	CONST1	REFS	11	58	
21	AA17		REAL	CONST1	REFS	11		
22	AA18		REAL	CONST1	REFS	11		
23	AA19		REAL	CONST1	REFS	11		
2	AA2		REAL	CONST1	REFS	11		
24	AA20		REAL	CONST1	REFS	11	61	
25	AA21		REAL	CONST1	REFS	11		
26	AA22		REAL	CONST1	REFS	11		
201	AA22B		REAL		REFS	62	DEFINED	28
3	AA3		REAL	CONST1	REFS	11		
167	AA3T2		REAL		REFS	51	DEFINED	23
4	AA4		REAL	CONST1	REFS	11		
170	AA4T6		REAL		REFS	51	DEFINED	23
5	AA5		REAL	CONST1	REFS	11		
171	AA5T12		REAL		REFS	51	DEFINED	24
6	AA6		REAL	CONST1	REFS	11		
172	AA6T20		REAL		REFS	51	DEFINED	24
7	AA7		REAL	CONST1	REFS	11		
173	AA7T30		REAL		REFS	51	DEFINED	25
10	AA8		REAL	CONST1	REFS	11		
174	AA8T42		REAL		REFS	51	DEFINED	25
11	AA9		REAL	CONST1	REFS	11		
175	AA9T56		REAL		REFS	51	DEFINED	26
10	AI1		REAL	COMCON	REFS	15		
0	ALPHA0		REAL	COMCON	REFS	15		
1	ALPHA1		REAL	COMCON	REFS	15		

VARIABLES	SN	TYPE	RELOCATION								
27	A1	REAL	CONST1	REFS	11						
202	A1T2	REAL		REFS	46	48	DEFINED	29			
40	A10	REAL	CONST1	REFS	11						
41	A11	REAL	CONST1	REFS	11						
42	A12	REAL	CONST1	REFS	11						
30	A2	REAL	CONST1	REFS	11						
204	A2T42	REAL		REFS	48	DEFINED	30				
203	A2T6	REAL		REFS	46	DEFINED	29				
31	A3	REAL	CONST1	REFS	11	42	47	50			
32	A4	REAL	CONST1	REFS	11	47					
206	A4T2	REAL		REFS	42	DEFINED	31				
33	A5	REAL	CONST1	REFS	11						
207	A5T2	REAL		REFS	42	DEFINED	31				
34	A6	REAL	CONST1	REFS	11	40					
35	A7	REAL	CONST1	REFS	11						
36	A8	REAL	CONST1	REFS	11						
37	A9	REAL	CONST1	REFS	11						
205	A9T306	REAL		REFS	61	DEFINED	30				
15	BETA	REAL	STM1	REFS	19	42	58				
16	BETA2	REAL	STM1	REFS	19						
17	BETA3	REAL	STM1	REFS	19						
20	BETA4	REAL	STM1	REFS	19	62					
232	CPPT1	REAL		DEFINED	63						
246	CP1	REAL		REFS	63	DEFINED	51				
247	CP2	REAL		REFS	63	DEFINED	54				
250	CP3	REAL		REFS	63	DEFINED	58				
251	CP4	REAL		REFS	63	DEFINED	60				
252	CP5	REAL		REFS	63	DEFINED	61				
253	CP6	REAL		REFS	63	DEFINED	62				
241	DYDTH	REAL		REFS	47	49	2*50	54	DEFINED	46	
243	DYDTH2	REAL		REFS	2*50	54	DEFINED	48			
244	DZDTH	REAL		REFS	4*54	DEFINED	49				
245	DZDTH2	REAL		REFS	2*54	DEFINED	50				
32	HMAX	REAL	COMCON	REFS	15						
31	HMIN	REAL	COMCON	REFS	15						
33	HSMAX	REAL	COMCON	REFS	15						
34	H4MAX	REAL	COMCON	REFS	15						
0	P	REAL	F.P.	REFS	33	DEFINED	1				
2	PCA	REAL	COMCON	REFS	15						
15	PMAX	REAL	COMCON	REFS	15						
14	PMIN	REAL	COMCON	REFS	15						
16	PSMAX	REAL	COMCON	REFS	15						
7	PVOT	REAL	COMCON	REFS	15	63					
6	PV010	REAL	COMCON	REFS	15						
13	P1	REAL	COMCON	REFS	15						
17	P3MIN	REAL	COMCON	REFS	15						
36	SMAX	REAL	COMCON	REFS	15						
35	SMIN	REAL	COMCON	REFS	15						
37	S3MIN	REAL	COMCON	REFS	15						
40	S4MAX	REAL	COMCON	REFS	15						
0	T	REAL	F.P.	REFS	33	DEFINED	1				
12	TC	REAL	COMCON	REFS	15						
4	TCA	REAL	COMCON	REFS	15						
0	THETA	REAL	STM1	REFS	19	40	42	46	48	8*51	54
				58							
5	TH10	REAL	STM1	REFS	19	60					
6	TH11	REAL	STM1	REFS	19	60					

VARIABLES	SN	TYPE	RELOCATION						
7	TH16	REAL	STM1	REFS	19				
10	TH17	REAL	STM1	REFS	19	58	61		
11	TH18	REAL	STM1	REFS	19				
12	TH19	REAL	STM1	REFS	19	58			
1	TH2	REAL	STM1	REFS	19	61			
13	TH20	REAL	STM1	REFS	19				
14	TH21	REAL	STM1	REFS	19	62			
2	TH4	REAL	STM1	REFS	19				
3	TH6	REAL	STM1	REFS	19				
4	TH7	REAL	STM1	REFS	19	46	48		
23	TMAX	REAL	COMCON	REFS	15				
22	TMIN	REAL	COMCON	REFS	15				
24	TSMAX	REAL	COMCON	REFS	15				
5	TZA	REAL	COMCON	REFS	15				
11	T1	REAL	COMCON	REFS	15				
25	T1MAX	REAL	COMCON	REFS	15				
26	T2MIN	REAL	COMCON	REFS	15				
30	T3MAX	REAL	COMCON	REFS	15				
27	T3MIN	REAL	COMCON	REFS	15				
233	UA	REAL		REFS	41	DEFINED	40		
26	UA10	REAL	STM1	REFS	19				
234	UA8	REAL		REFS	58	DEFINED	41		
25	UA9	REAL	STM1	REFS	19				
27	UB	REAL	STM1	REFS	19	58			
30	UB2	REAL	STM1	REFS	19	58			
31	UC	REAL	STM1	REFS	19	60			
33	UD4	REAL	STM1	REFS	19				
34	UP	REAL	STM1	REFS	19	61			
32	U3T	REAL	STM1	REFS	19	60			
3	VCA	REAL	COMCON	REFS	15				
21	V3MAX	REAL	COMCON	REFS	15				
20	V3MIN	REAL	COMCON	REFS	15				
236	W	REAL		REFS	47	2*50	DEFINED	43	
242	WA	REAL		REFS	49	2*50	DEFINED	47	
235	WW	REAL		REFS	43	DEFINED	42		
21	Y	REAL	STM1	REFS	19	2*42	47	50	54
22	YP	REAL	STM1	REFS	19				
23	Z	REAL	STM1	REFS	19	44	45	54	
24	ZP	REAL	STM1	REFS	19	2*54			
237	Z12	REAL		REFS	54	DEFINED	44		
240	Z22	REAL		REFS	54	DEFINED	45		

EXTERNALS	TYPE	ARGS	REFERENCES
COMT1		2	33
SQRT	REAL	1 LIBRARY	43

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	40	
0 2000	INACTIVE	64	

COMMON BLOCKS	LENGTH
CONST1	35
COMCON	33
STM1	29

STATISTICS

PROGRAM LENGTH	2548	172
SCM LABELED COMMON LENGTH	1418	97

```
      FUNCTION CPPT2(P,T)                                                CPPT2    2
CCPPT2     SPECIFIC HEAT - SUB REGION 2                                  CPPT2    3
C          A 2ND LEVEL SUBROUTINE                                        CPPT2    4
C          WITH ENTRY CP2E                                               CPPT2    5
C                                                                        CPPT2    6
C     FIRST ARGRMENT IS PRESSURE                                         CPPT2    7
C     SECOND ARGUMENT IS TEMPERATURE                                     CPPT2    8
C     RETURNS WITH SPECIFIC HEAT                                         CPPT2    9
C                                                                        CPPT2   10
      COMMON /CONST2/ BB00, BB01, BB02, BB03, BB04, BB05, BB11, BB12,    CPPT2   11
     1    BB21, BB22, BB23, BB31, BB32, BB41, BB42, BB51, BB52, BB53,    CPPT2   12
     2    BB61, BB62, BB71, BB72, BB81, BB82,  B00,  B61,  B71,  B81,    CPPT2   13
     3     B82, BB90, BB91, BB92, BB93, BB94, BB95, BB96                 CPPT2   14
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010, CPPT2   15
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN, CPPT2   16
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX, CPPT2   17
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX         CPPT2   18
      COMMON/CONSTL/AL0,AL1,AL2,AL2T2                                    CPPT2   19
      COMMON /STM2/ THM1  ,THETA ,TH2   ,TH3   ,TH4   ,X1    ,X2    ,   CPPT2   20
     1 X3   ,X4    ,X6    ,X8    ,X10   ,X11   ,X12   ,X13   ,X14   ,   CPPT2   21
     2 X17  ,X18   ,X19   ,X24   ,X25   ,X27   ,X28   ,X32   ,BETA  ,   CPPT2   22
     3 BETA2,BETA3 ,BETA4 ,BETA5 ,BETA6 ,BETA7 ,D4    ,T4    ,D3    ,   CPPT2   23
     4 T3   ,D2    ,T2    ,BETAL ,B0BL  ,B0BLP ,FB    ,BB61F ,BB71F ,   CPPT2   24
     5 BB81F                                                             CPPT2   25
C                                                                        CPPT2   26
      DATA BB03T2,BB04T6 /+8.661325668E-1, -3.92862701BE0 /              CPPT2   27
      DATA BB0512 /+1.027821847E0 /                                      CPPT2   28
      DATA BB11A, BB12T9 /+1.127293530E1, 1.250085421E1 /                CPPT2   29
      DATA BB21A, BB22T4 / 2.718393802E+1, 1.045868357E-1 /              CPPT2   30
      DATA BB31A, BB32A /+1.464777725E2, 1.069036614E1 /                 CPPT2   31
      DATA BB41A, BB42A /-3.734585442E2, -1.734117018E1 /                CPPT2   32
      DATA BB51A, BB52A /+6.101044848E2, -4.044893844E2 /                CPPT2   33
      DATA BB53A /+1.195212166E2 /                                       CPPT2   34
      DATA BB6211, BB62P /-1.0853B9155E+0, -1.193928070E1 /              CPPT2   35
      DATA BB7218, BB72P / -1.045698840E+0, -1.882257912E1 /             CPPT2   36
      DATA BB8214, BB82P / +7.994306109E-3, +1.119202855E-1 /            CPPT2   37
      DATA BB92T2, BB92T4 /+8.253214438E3, 1.650642876E4 /               CPPT2   38
      DATA BB93T3, BB93T9 /-1.952463503E4,-5.857390509E4 /               CPPT2   39
      DATA BB94T4, BB9416 /+2.298393622E4, 9.193574486E4 /               CPPT2   40
      DATA BB95T5, BB9525 /-1.346544183E4,-6.732720913E4 /               CPPT2   41
      DATA BB96T6, BB9636 /3.141431174E3, 1.884858704E4/                 CPPT2   42
      DATA B00T14, B00T19 / 1.068666667E1, 1.450333333E1/                CPPT2   43
      DATA B00SQ, B00T27 / 5.826777777E-1, 2.061000000E1 /               CPPT2   44
C                                                                        CPPT2   45
      CALL COMT2 (P,T)                                                   CPPT2   46
C                                                                        CPPT2   47
      ENTRY CP2E                                                         CPPT2   48
C                                                                        CPPT2   49
C     THIS ENTRY CAN BE USED ONLY IF COMT2 WAS LAST CALLED WITH THE      CPPT2   50
C     VALUES OF P AND T THAT ARE TO BE ASSUMED HERE.                     CPPT2   51
C                                                                        CPPT2   52
 1000  CP0 = BB00/THETA - (BB03T2 + THETA*(BB04T6+THETA*BB0512))         CPPT2   53
      CP1 = X3*(BB11A*X10 + BB12T9)                                      CPPT2   54
      CP2 = X1*(BB21A*X17 + BB22T4*X1 + BB23)                            CPPT2   55
      CP3 = X10*(BB31A*X8 + BB32A)                                       CPPT2   56
      CP4 = X14*(BB41A*X11 + BB42A)                                      CPPT2   57
      CP5 = X24*(BB51A*X8 + BB52A*X4 + BB53A)                            CPPT2   58
```

```
                CPPA = CP0 + BETA*(CP1 + BETA*(CP2 + BETA*(CP3 + BETA*(CP4          CPPT2      59
               1 + BETA*CP5))))*B00SQ                                               CPPT2      60
 60             BB61F = BB61*X1                                                     CPPT2      61
                BB71F = BB71*X6                                                     CPPT2      62
                BB81F = BB81*X10                                                    CPPT2      63
                B4X11 = BETA4*X11                                                   CPPT2      64
                B5X18 = BETA5*X18                                                   CPPT2      65
 65             B6X14 = BETA6*X14                                                   CPPT2      66
                F60 = B4X11*(BB61F + BB62)                                          CPPT2      67
                F70 = B5X18*(BB71F + BB72)                                          CPPT2      68
                F80 = B6X14*(BB81F + BB82)                                          CPPT2      69
                F60P = -B00*B4X11*(12.0E0*BB61F + BB6211)                           CPPT2      70
 70             F70P = -B00*B5X18*(24.0E0*BB71F + BB7218)                           CPPT2      71
                F80P = -B00*B6X14*(24.0E0*BB81F + BB8214)                           CPPT2      72
                F60PP =   B00SQ*B4X11*(144.0E0*BB61F + BB62P)                       CPPT2      73
                F70PP =   B00SQ*B5X18*(576.0E0*BB71F + BB72P)                       CPPT2      74
                F80PP =   B00SQ*B6X14*(576.0E0*BB81F + BB82P)                       CPPT2      75
 75             FF61 =  B61*X14*BETA4                                               CPPT2      76
                FF71 = B71*X19*BETA5                                                CPPT2      77
                FF81 =  B81*X27*BETA6*X27                                           CPPT2      78
                FF82 =  B82*X27*BETA6                                               CPPT2      79
                G60 = 1.0E0 + FF61                                                  CPPT2      80
 80             G70 = 1.0E0 + FF71                                                  CPPT2      81
                G80 = 1.0E0 + FF81 + FF82                                           CPPT2      82
                G60P = -B00T14*FF61                                                 CPPT2      83
                G70P = -B00T19*FF71                                                 CPPT2      84
                G80P = -B00T27*(2.0E0*FF81 + FF82)                                  CPPT2      85
 85             G60PP = -B00T14*G60P                                                CPPT2      86
                G70PP = -B00T19*G70P                                                CPPT2      87
                G80PP = 729.0E0*B00SQ*(4.0E0*FF81 + FF82)                           CPPT2      88
                CP60 = (F60PP + ((-2.0E0*F60P*G60P - F60*G60PP)                     CPPT2      89
               1 + 2.0E0*F60*G60P*G60P/G60)/G60)/G60                                CPPT2      90
 90             CP70 = (F70PP + ((-2.0E0*F70P*G70P - F70*G70PP)                     CPPT2      91
               1 + 2.0E0*F70*G70P*G70P/G70)/G70)/G70                                CPPT2      92
                CP80 = (F80PP + ((-2.0E0*F80P*G80P - F80*G80PP)                     CPPT2      93
               1 + 2.0E0*F80*G80P*G80P/G80)/G80)/G80                                CPPT2      94
                CPPB = CP60 + CP70 + CP80                                           CPPT2      95
 95             BP = AL1 + AL2T2*THETA                                              CPPT2      96
                B08L11 = B08L*B08LP                                                 CPPT2      97
                SUMX = BB90 + X1*(BB91 + X1*(BB92 + X1*(BB93 + X1*(BB94 + X1*(BB95 CPPT2      98
               1 + X1*BB96)))))                                                     CPPT2      99
                SUMVX = B00*X1*(BB91 + X1*(BB92T2 + X1*(BB93T3                      CPPT2     100
100            1 + X1*(BB94T4 + X1*(BB95T5 + BB96T6*X1))))                         CPPT2     101
                VVSUMX =   B00SQ*X1*(BB91+ X1*(BB92T4 + X1*(BB93T9                  CPPT2     102
               1 + X1*(BB9416 + X1*(BB9525 + X1*BB9636)))))                        CPPT2     103
                CPP = B08L11*(((110.0E0/BETAL)*BP*BP - 10.0E0*AL2T2)*SUMX           CPPT2     104
               1 + 20.0E0*BP*SUMVX + BETAL*VVSUMX)                                  CPPT2     105
105             CPPT2 = THETA*(CPPA + CPPB - CPP)*PVOT                              CPPT2     106
           2000  RETURN                                                            CPPT2     107
                 END                                                               CPPT2     108
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES
4	CPPT2	1	
14	CP2E	47	106

VARIABLES	SN	TYPE	RELOCATION							
10	AI1	REAL	COMCON	REFS	14					
0	ALPHA0	REAL	COMCON	REFS	14					
1	ALPHA1	REAL	COMCON	REFS	14					
0	AL0	REAL	CONSTL	REFS	18					
1	AL1	REAL	CONSTL	REFS	18	95				
2	AL2	REAL	CONSTL	REFS	18					
3	AL2T2	REAL	CONSTL	REFS	18	95	103			
0	BB00	REAL	CONST2	REFS	10	52				
1	BB01	REAL	CONST2	REFS	10					
2	BB02	REAL	CONST2	REFS	10					
3	BB03	REAL	CONST2	REFS	10					
315	BB03T2	REAL		REFS	52	DEFINED	26			
4	BB04	REAL	CONST2	REFS	10					
316	BB04T6	REAL		REFS	52	DEFINED	26			
5	BB05	REAL	CONST2	REFS	10					
317	BB0512	REAL		REFS	52	DEFINED	27			
6	BB11	REAL	CONST2	REFS	10					
320	BB11A	REAL		REFS	53	DEFINED	28			
7	BB12	REAL	CONST2	REFS	10					
321	BB12T9	REAL		REFS	53	DEFINED	28			
10	BB21	REAL	CONST2	REFS	10					
322	BB21A	REAL		REFS	54	DEFINED	29			
11	BB22	REAL	CONST2	REFS	10					
323	BB22T4	REAL		REFS	54	DEFINED	29			
12	BB23	REAL	CONST2	REFS	10	54				
13	BB31	REAL	CONST2	REFS	10					
324	BB31A	REAL		REFS	55	DEFINED	30			
14	BB32	REAL	CONST2	REFS	10					
325	BB32A	REAL		REFS	55	DEFINED	30			
15	BB41	REAL	CONST2	REFS	10					
326	BB41A	REAL		REFS	56	DEFINED	31			
16	BB42	REAL	CONST2	REFS	10					
327	BB42A	REAL		REFS	56	DEFINED	31			
17	BB51	REAL	CONST2	REFS	10					
330	BB51A	REAL		REFS	57	DEFINED	32			
20	BB52	REAL	CONST2	REFS	10					
331	BB52A	REAL		REFS	57	DEFINED	32			
21	BB53	REAL	CONST2	REFS	10					
332	BB53A	REAL		REFS	57	DEFINED	33			
22	BB61	REAL	CONST2	REFS	10	60				
51	BB61F	REAL	STM2	REFS	19	66	69	72	DEFINED	60
23	BB62	REAL	CONST2	REFS	10	66				
334	BB62P	REAL		REFS	72	DEFINED	34			
333	BB6211	REAL		REFS	69	DEFINED	34			
24	BB71	REAL	CONST2	REFS	10	61				
52	BB71F	REAL	STM2	REFS	19	67	70	73	DEFINED	61
25	BB72	REAL	CONST2	REFS	10	67				
336	BB72P	REAL		REFS	73	DEFINED	35			
335	BB7218	REAL		REFS	70	DEFINED	35			
26	BB81	REAL	CONST2	REFS	10	62				
53	BB81F	REAL	STM2	REFS	19	68	71	74	DEFINED	62
27	BB82	REAL	CONST2	REFS	10	68				
340	BB82P	REAL		REFS	74	DEFINED	36			

VARIABLES	SN	TYPE	RELOCATION								
337	BB8214	REAL		REFS	71	DEFINED	36				
35	BB90	REAL	CONST2	REFS	10	97					
36	BB91	REAL	CONST2	REFS	10	97	99	101			
37	BB92	REAL	CONST2	REFS	10	97					
341	BB92T2	REAL		REFS	99	DEFINED	37				
342	BB92T4	REAL		REFS	101	DEFINED	37				
40	BB93	REAL	CONST2	REFS	10	97					
343	BB93T3	REAL		REFS	99	DEFINED	38				
344	BB93T9	REAL		REFS	101	DEFINED	38				
41	BB94	REAL	CONST2	REFS	10	97					
345	BB94T4	REAL		REFS	99	DEFINED	39				
346	BB9416	REAL		REFS	101	DEFINED	39				
42	BB95	REAL	CONST2	REFS	10	97					
347	BB95T5	REAL		REFS	99	DEFINED	40				
350	BB9525	REAL		REFS	101	DEFINED	40				
43	BB96	REAL	CONST2	REFS	10	97					
351	BB96T6	REAL		REFS	99	DEFINED	41				
352	BB9636	REAL		REFS	101	DEFINED	41				
30	BETA	REAL	STM2	REFS	19	5*58					
45	BETAL	REAL	STM2	REFS	19	2*103					
31	BETA2	REAL	STM2	REFS	19						
32	BETA3	REAL	STM2	REFS	19						
33	BETA4	REAL	STM2	REFS	19	63	75				
34	BETA5	REAL	STM2	REFS	19	64	76				
35	BETA6	REAL	STM2	REFS	19	65	77	78			
36	BETA7	REAL	STM2	REFS	19						
46	BOBL	REAL	STM2	REFS	19	96					
47	BOBLP	REAL	STM2	REFS	19	96					
441	BOBL11	REAL		REFS	103	DEFINED	96				
440	BP	REAL		REFS	3*103	DEFINED	95				
30	B00	REAL	CONST2	REFS	10	69	70	71	99		
355	B00S@	REAL		REFS	58	72	73	74	87	101	
				DEFINED	43						
353	B00T14	REAL		REFS	82	85	DEFINED	42			
354	B00T19	REAL		REFS	83	86	DEFINED	42			
356	B00T27	REAL		REFS	84	DEFINED	43				
403	B4X11	REAL		REFS	66	69	72	DEFINED	63		
404	B5X18	REAL		REFS	67	70	73	DEFINED	64		
405	B6X14	REAL		REFS	68	71	74	DEFINED	65		
31	B61	REAL	CONST2	REFS	10	75					
32	B71	REAL	CONST2	REFS	10	76					
33	B81	REAL	CONST2	REFS	10	77					
34	B82	REAL	CONST2	REFS	10	78					
445	CPP	REAL		REFS	105	DEFINED	103				
402	CPPA	REAL		REFS	105	DEFINED	58				
437	CPPB	REAL		REFS	105	DEFINED	94				
373	CPPT2	REAL		DEFINED	105						
374	CP0	REAL		REFS	58	DEFINED	52				
375	CP1	REAL		REFS	58	DEFINED	53				
376	CP2	REAL		REFS	58	DEFINED	54				
377	CP3	REAL		REFS	58	DEFINED	55				
400	CP4	REAL		REFS	58	DEFINED	56				
401	CP5	REAL		REFS	58	DEFINED	57				
434	CP60	REAL		REFS	94	DEFINED	88				
435	CP70	REAL		REFS	94	DEFINED	90				
436	CP80	REAL		REFS	94	DEFINED	92				
43	D2	REAL	STM2	REFS	19						

VARIABLES	SN	TYPE	RELOCATION						
41	D3	REAL	STM2	REFS	19				
37	D4	REAL	STM2	REFS	19				
50	F8	REAL	STM2	REFS	19				
417	FF61	REAL		REFS	79	82	DEFINED	75	
420	FF71	REAL		REFS	80	83	DEFINED	76	
421	FF81	REAL		REFS	81	84	87	DEFINED	77
422	FF82	REAL		REFS	81	84	87	DEFINED	78
406	F60	REAL		REFS	2*88	DEFINED	66		
411	F60P	REAL		REFS	88	DEFINED	69		
414	F60PP	REAL		REFS	88	DEFINED	72		
407	F70	REAL		REFS	2*90	DEFINED	67		
412	F70P	REAL		REFS	90	DEFINED	70		
415	F70PP	REAL		REFS	90	DEFINED	73		
410	F80	REAL		REFS	2*92	DEFINED	68		
413	F80P	REAL		REFS	92	DEFINED	71		
416	F80PP	REAL		REFS	92	DEFINED	74		
423	G60	REAL		REFS	3*88	DEFINED	79		
426	G60P	REAL		REFS	85	3*88	DEFINED	82	
431	G60PP	REAL		REFS	88	DEFINED	85		
424	G70	REAL		REFS	3*90	DEFINED	80		
427	G70P	REAL		REFS	86	3*90	DEFINED	83	
432	G70PP	REAL		REFS	90	DEFINED	86		
425	G80	REAL		REFS	3*92	DEFINED	81		
430	G80P	REAL		REFS	3*92	DEFINED	84		
433	G80PP	REAL		REFS	92	DEFINED	87		
32	HMAX	REAL	COMCON	REFS	14				
31	HMIN	REAL	COMCON	REFS	14				
33	HSMAX	REAL	COMCON	REFS	14				
34	H4MAX	REAL	COMCON	REFS	14				
0	P	REAL	F.P.	REFS	45	DEFINED	1		
2	PCA	REAL	COMCON	REFS	14				
15	PMAX	REAL	COMCON	REFS	14				
14	PMIN	REAL	COMCON	REFS	14				
16	PSMAX	REAL	COMCON	REFS	14				
7	PVOT	REAL	COMCON	REFS	14	105			
6	PV010	REAL	COMCON	REFS	14				
13	P1	REAL	COMCON	REFS	14				
17	P3MIN	REAL	COMCON	REFS	14				
36	SMAX	REAL	COMCON	REFS	14				
35	SMIN	REAL	COMCON	REFS	14				
443	SUMVX	REAL		REFS	103	DEFINED	99		
442	SUMX	REAL		REFS	103	DEFINED	97		
37	S3MIN	REAL	COMCON	REFS	14				
40	S4MAX	REAL	COMCON	REFS	14				
0	T	REAL	F.P.	REFS	45	DEFINED	1		
12	TC	REAL	COMCON	REFS	14				
4	TCA	REAL	COMCON	REFS	14				
1	THETA	REAL	STM2	REFS	19	3*52	95	105	
0	TH1	REAL	STM2	REFS	19				
2	TH2	REAL	STM2	REFS	19				
3	TH3	REAL	STM2	REFS	19				
4	TH4	REAL	STM2	REFS	19				
23	TMAX	REAL	COMCON	REFS	14				
22	TMIN	REAL	COMCON	REFS	14				
24	TSMAX	REAL	COMCON	REFS	14				
5	TZA	REAL	COMCON	REFS	14				
11	T1	REAL	COMCON	REFS	14				

VARIABLES	SN	TYPE	RELOCATION							
25	T1MAX	REAL	COMCON	REFS	14					
44	T2	REAL	STM2	REFS	19					
26	T2MIN	REAL	COMCON	REFS	14					
42	T3	REAL	STM2	REFS	19					
30	T3MAX	REAL	COMCON	REFS	14					
27	T3MIN	REAL	COMCON	REFS	14					
40	T4	REAL	STM2	REFS	19					
3	VCA	REAL	COMCON	REFS	14					
444	VVSUMX	REAL		REFS	103	DEFINED	101			
21	V3MAX	REAL	COMCON	REFS	14					
20	V3MIN	REAL	COMCON	REFS	14					
5	X1	REAL	STM2	REFS	19	2*54	60	6*97	6*99	6*101
13	X10	REAL	STM2	REFS	19	53	55	62		
14	X11	REAL	STM2	REFS	19	56	63			
15	X12	REAL	STM2	REFS	19					
16	X13	REAL	STM2	REFS	19					
17	X14	REAL	STM2	REFS	19	56	65	75		
20	X17	REAL	STM2	REFS	19	54				
21	X18	REAL	STM2	REFS	19	64				
22	X19	REAL	STM2	REFS	19	76				
6	X2	REAL	STM2	REFS	19					
23	X24	REAL	STM2	REFS	19	57				
24	X25	REAL	STM2	REFS	19					
25	X27	REAL	STM2	REFS	19	2*77	78			
26	X28	REAL	STM2	REFS	19					
7	X3	REAL	STM2	REFS	19	53				
27	X32	REAL	STM2	REFS	19					
10	X4	REAL	STM2	REFS	19	57				
11	X6	REAL	STM2	REFS	19	61				
12	X8	REAL	STM2	REFS	19	55	57			

EXTERNALS	TYPE	ARGS	REFERENCES
COMT2		2	45

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	52	
0 2000	INACTIVE	106	

COMMON BLOCKS	LENGTH
CONST2	36
COMCON	33
CONSTL	4
STM2	44

STATISTICS

PROGRAM LENGTH	446B	294
SCM LABELED COMMON LENGTH	165B	117

```
      FUNCTION CPVT3(V,T)                                                    CPVT3     2
C                                                                            CPVT3     3
CCPVT3      SPECIFIC HEAT - SUB REGION 3                                     CPVT3     4
C           A 2ND LEVEL SUBROUTINE                                           CPVT3     5
C           WITH ENTRY CP3E                                                  CPVT3     6
C                                                                            CPVT3     7
C     FIRST ARGUMENT IS SPECIFIC VOLUME                                      CPVT3     8
C     SECOND ARGUMENT IS TEMPERATURE                                         CPVT3     9
C     RETURNS WITH SPECIFIC HEAT                                             CPVT3    10
C                                                                            CPVT3    11
      COMMON /CONST3/ C00, C01, C02, C03, C04, C05, C06, C07, C08, C09,      CPVT3    12
     1C010,C011,C012, C11, C12, C13, C14, C15, C16, C17, C21, C22, C23,      CPVT3    13
     2 C24, C25, C26, C27, C28, C31, C32, C33, C34, C35, C36, C37, C38,      CPVT3    14
     3 C39,C310, C40, C41, C50, C60, C61, C62, C63, C64, C70, C71, C72,      CPVT3    15
     4 C73, C74, C75, C76, C77, C78, D30, D31, D32, D33, D34, D40, D41,      CPVT3    16
     5 D42, D43, D44, D50, D51, D52                                          CPVT3    17
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010,     CPVT3    18
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN,     CPVT3    19
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,     CPVT3    20
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX             CPVT3    21
      COMMON /STM3/  THETA ,THL1  ,THLOG ,THM1  ,THM22 ,THM23 ,EX    ,      CPVT3    22
     1 EXM1  ,EXM2  ,EXM5  ,EXM6  ,EXLOG ,X50TH2,X60TH2,OMTH1 ,D3SV  ,      CPVT3    23
     2 VD3SV ,D4SV  ,VD4SV ,D5SV  ,VD5SV ,Y     ,Y2    ,Y3    ,Y30 ,Y31     CPVT3    24
      DATA C02T2,  C03T6 /-1.554350078E1, +2.522764512E1 /                   CPVT3    25
      DATA C04T12, C05T20 /-3.321684456E1, +4.208394140E1 /                  CPVT3    26
      DATA C06T30, C07T42 /-3.439487640E1, +9.371799570E0 /                  CPVT3    27
      DATA C08T56, C09T72 /+6.510020328E0, -5.910483917E0 /                  CPVT3    28
      DATA C01090, C011T  /+1.747163151E0, -1.864176336E-1 /                 CPVT3    29
      DATA C12T2 /+2.473589100E1 /                                           CPVT3    30
      DATA C13T2, C14T3     /-2.407780080E1, +1.621312266E1 /                CPVT3    31
      DATA C13T6, C14T12 /-7.223340240E1, 6.4852490064E1 /                   CPVT3    32
      DATA C15T4, C16T5 /-3.975460172E0, +3.137615910E-1 /                   CPVT3    33
      DATA C15T20, C16T30 /-1.987730086E1, 1.882569546E0 /                   CPVT3    34
      DATA C22T2, C23T6 /+8.628610760E1, -8.497158780E1 /                    CPVT3    35
      DATA C23T2, C24T3 /-2.83238626E1, +1.212517377E1 /                     CPVT3    36
      DATA C24T12,C25T20 /+4.850069508E1, +3.110926520E1 /                   CPVT3    37
      DATA C25T4, C26T5 /+6.221853040E0, -8.328446750E0 /                    CPVT3    38
      DATA C26T30, C27T42 /-4.997068050E1, +1.364500864E1 /                  CPVT3    39
      DATA C27T6 /+1.949286948E0 /                                           CPVT3    40
      DATA C32T2, C33T6 /+1.617719494E2, -5.016920280E2 /                    CPVT3    41
      DATA C33T2, C34T3 /-1.672306760E2, +1.075909551E2 /                    CPVT3    42
      DATA C34T12, C35T20 /+4.303638204E2, +1.503791908E2 /                  CPVT3    43
      DATA C35T4, C36T5 /+3.007583816E1, -6.308032000E1 /                    CPVT3    44
      DATA C36T30, C37T42 /-3.784819200E2, +4.608133404E1 /                  CPVT3    45
      DATA C37T6, C38T7 /+6.583047720E0, +1.485018444E1 /                    CPVT3    46
      DATA C38T56, C39T72 /+1.188014755E2, -3.935012875E1 /                  CPVT3    47
      DATA C39T8 /-4.372236528E0 /                                           CPVT3    48
      DATA C41T5, C41T30 /-2.545369925E-3, -1.527221955E-2 /                 CPVT3    49
      DATA C60T2, C60T6  /+1.105787067E-1, +3.317361201E-1 /                 CPVT3    50
      DATA C61T3, C61T12 /-7.009097865E-1, -2.803639146E0 /                  CPVT3    51
      DATA C62T4, C62T20 /+1.478828568E0, +7.394142840E0 /                   CPVT3    52
      DATA C63T5, C63T30 /-1.298207737E0, -7.789246410E0 /                   CPVT3    53
      DATA C64T6, C64T42 /+4.096852208E-1, +2.867796546E0 /                  CPVT3    54
      DATA C71T2, C72T6  /-3.037567430E+2, +1.332433925E2 /                  CPVT3    55
      DATA C73T12, C74T20 /-2.162447484E3, +4.714192440E4 /                  CPVT3    56
      DATA C75T30, C76T42 /-4.387007094E5, +1.908024985E6 /                  CPVT3    57
      DATA C77T56, C78T72 /-3.949991602E6, +3.154731428E6 /                  CPVT3    58
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      DATA D31T2, D32T6 /+7.052779750E0, -1.614539624E1 /                    CPVT3   59
      DATA D33T12, D34T20 /+1.088517913E1, -2.277582312E0 /                  CPVT3   60
60    DATA D41T2, D42T6 /-5.285555486E0, +1.198059217E1 /                    CPVT3   61
      DATA D43T12, D44T20 /-7.993868416E0, +1.654172118E0 /                  CPVT3   62
      DATA D52T2 /+2.310036618E-3 /                                          CPVT3   63
C                                                                            CPVT3   64
      CALL COMT3(V,T)                                                        CPVT3   65
65    C                                                                      CPVT3   66
      ENTRY CP3E                                                             CPVT3   67
C                                                                            CPVT3   68
C     THIS ENTRY CAN BE USED ONLY IF COMT3 WAS LAST CALLED WITH THE          CPVT3   69
C     VALUES OF V AND T THAT ARE TO BE ASSUMED HERE.                         CPVT3   70
70    C                                                                      CPVT3   71
      EXM3 = EXM1*EXM2                                                       CPVT3   72
 1000  CP2 = 2.0E0*(C21*EX + EXM1*(C22 + EXM1*(C23 + EXM1*(C24               CPVT3   73
     1 + EXM1*(C25 + EXM1*(C26 + EXM1*C27))))) + C28*EXLOG)                  CPVT3   74
      CP3 = 6.0E0*(C31*EX + EXM1*(C32 + EXM1*(C33 + EXM1*(C34                CPVT3   75
75   1 + EXM1*(C35 + EXM1*(C36 + EXM1*(C37 + EXM1*(C38                      CPVT3   76
     2 + EXM1*C39)))))) + C310*EXLOG)*THL1                                   CPVT3   77
      CP4 = (C40 + C41*EXM5)*(506.0E0 - 552.0E0*THM1)*THM23 + C50            CPVT3   78
      CP6 = (X60TH2/(THETA*THETA))*(C60T6 + THM1*(C61T12 + THM1*(C62T20       CPVT3   79
     1 + THM1*(C63T30 + THM1*C64T42))))                                      CPVT3   80
80    CP7 = C71T2 + THL1*(C72T6 + THL1*(C73T12 + THL1*(C74T20 + THL1*        CPVT3   81
     1 (C75T30 + THL1*(C76T42 + THL1*(C77T56 + THL1*C78T72))))))            CPVT3   82
      CP = -THETA*(CP2 + CP3 + CP6 + CP7) - CP4                              CPVT3   83
      CPN1 = C11 - EXM2*(C12 + EXM1*(C13T2 + EXM1*(C14T3 + EXM1*(C15T4       CPVT3   84
     1 + EXM1*C16T5));) + C17*EXM1                                           CPVT3   85
85    CPN2 = 2.0E0*(C21 - EXM2*(C22 + EXM1*(C23T2 + EXM1*(C24T3 + EXM1*(     CPVT3   86
     1 C25T4 + EXM1*(C26T5 + EXM1*C27T6))))) + C28*EXM1)*THL1                CPVT3   87
      CPN3 = 3.0E0*(C31 - EXM2*(C32 + EXM1*(C33T2 + EXM1*(C34T3 + EXM1*(     CPVT3   88
     1 C35T4 + EXM1*(C36T5 + EXM1*(C37T6 + EXM1*(C38T7 + EXM1*C39T8)))))     CPVT3   89
     2)) + C310*EXM1)*THL1*THL1                                              CPVT3   90
90    CPN4 = C41T5*EXM6*(-22.0E0 + 23.0E0*THM1)*THM23                        CPVT3   91
      CPN6 = 6.0E0*X50TH2*THM1*(C60T2 + THM1*(C61T3 + THM1*(C62T4            CPVT3   92
     1 + THM1*(C63T5  + THM1*C64T6))))                                       CPVT3   93
      CPN = CPN1 + CPN2 + CPN3 - CPN4 - CPN6                                 CPVT3   94
      CPD0 = EXM3*(C02T2 + EXM1*(C03T6 + EXM1*(C04T12 + EXM1*(C05T20         CPVT3   95
95   1 + EXM1*(C06T30 + EXM1*(C07T42 + EXM1*(C08T56 + EXM1*(C09T72           CPVT3   96
     2 + EXM1*(C01090 + EXM1*C011T)))))))) - C012*EXM2                       CPVT3   97
      CPD1 = (EXM3*(C12T2 + EXM1*(C13T6 + EXM1*(C14T12 + EXM1*(C15T20        CPVT3   98
     1 + EXM1*C16T30)))) - C17*EXM2)                                         CPVT3   99
      CPD2 = (EXM3*(C22T2 + EXM1*(C23T6 + EXM1*(C24T12 + EXM1*(C25T20        CPVT3  100
100  1 + EXM1*(C26T30 + EXM1*C27T42))))) - C28*EXM2)                         CPVT3  101
      CPD3 = EXM3*(C32T2 + EXM1*(C33T6 + EXM1*(C34T12 + EXM1 *(C35T20        CPVT3  102
     1 + EXM1*(C36T30 + EXM1*(C37T42 + EXM1*(C38T56 + EXM1*C39T72)))))))     CPVT3  103
     2 - C310*EXM2                                                           CPVT3  104
      CPD4 = C41T30*EXM5*EXM2*(1.0E0 - THM1)*THM22                           CPVT3  105
105   CPD6 = 30.0E0*X50TH2*EXM1*(C60 + THM1*(C61 + THM1*(C62                 CPVT3  106
     1 + THM1*(C63 + THM1*C64))))                                            CPVT3  107
      CPD = CPD0 + THL1*(CPD1 + THL1*(CPD2 + THL1*CPD3)) + CPD4 + CPD6       CPVT3  108
      IF (THETA .GE. 1.0E0 .OR.EX .GE. 1.0E0) GO TO 1500                     CPVT3  109
      PHID = (1.0E0/(OMTH1*OMTH1))*(6.0E0*Y*D3SV + 12.0E0*Y2*D4SV            CPVT3  110
110  1 + 992.0E0*Y30*D5SV)                                                   CPVT3  111
      PHIDN = (1.0E0/OMTH1)*(3.0E0*Y2*VD3SV + 4.0E0*Y3*VD4SV                 CPVT3  112
     1 - 32.0E0*Y31*VD5SV)                                                   CPVT3  113
      VVD3V = Y3*EXM3*(D31T2 + EXM1*(D32T6 + EXM1*(D33T12                    CPVT3  114
     1 + EXM1*D34T20)))                                                      CPVT3  115
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                VVD4V = Y*Y3*EXM3*(D41T2 + EXM1*(D42T6 + EXM1*(D43T12                CPVT3   116
               1 + EXM1*D44T20)))                                                    CPVT3   117
                VVD5V = Y*Y31*D52T2                                                  CPVT3   118
                PHIDD = VVD3V + VVD4V + VVD5V                                        CPVT3   119
                CP = CP - THETA*PHID                                                 CPVT3   120
                CPN = CPN + PHIDN                                                    CPVT3   121
                CPD = CPD + PHIDD                                                    CPVT3   122
           1500  CPVT3 = (CP + THETA*CPN*CPN/CPD)*PVOT                             CPVT3   123
           2000  RETURN                                                            CPVT3   124
                 END                                                               CPVT3   125
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
4	CPVT3	1	
14	CP3E	66	123

VARIABLES

		SN	TYPE	RELOCATION						
10	AI1		REAL	COMCON	REFS	17				
0	ALPHA0		REAL	COMCON	REFS	17				
1	ALPHA1		REAL	COMCON	REFS	17				
602	CP		REAL		REFS	119	122	DEFINED	82	119
617	CPD		REAL		REFS	121	122	DEFINED	107	121
611	CPD0		REAL		REFS	107	DEFINED	94		
612	CPD1		REAL		REFS	107	DEFINED	97		
613	CPD2		REAL		REFS	107	DEFINED	99		
614	CPD3		REAL		REFS	107	DEFINED	101		
615	CPD4		REAL		REFS	107	DEFINED	104		
616	CPD6		REAL		REFS	107	DEFINED	105		
610	CPN		REAL		REFS	120	2*122	DEFINED	93	120
603	CPN1		REAL		REFS	93	DEFINED	83		
604	CPN2		REAL		REFS	93	DEFINED	85		
605	CPN3		REAL		REFS	93	DEFINED	87		
606	CPN4		REAL		REFS	93	DEFINED	90		
607	CPN6		REAL		REFS	93	DEFINED	91		
573	CPVT3		REAL		DEFINED	122				
575	CP2		REAL		REFS	82	DEFINED	72		
576	CP3		REAL		REFS	82	DEFINED	74		
577	CP4		REAL		REFS	82	DEFINED	77		
600	CP6		REAL		REFS	82	DEFINED	78		
601	CP7		REAL		REFS	82	DEFINED	80		
0	C00		REAL	CONST3	REFS	11				
1	C01		REAL	CONST3	REFS	11				
12	C010		REAL	CONST3	REFS	11				
453	C01090		REAL		REFS	94	DEFINED	28		
13	C011		REAL	CONST3	REFS	11				
454	C011T		REAL		REFS	94	DEFINED	28		
14	C012		REAL	CONST3	REFS	11	94			
2	C02		REAL	CONST3	REFS	11				
443	C02T2		REAL		REFS	94	DEFINED	24		
3	C03		REAL	CONST3	REFS	11				
444	C03T6		REAL		REFS	94	DEFINED	24		
4	C04		REAL	CONST3	REFS	11				

VARIABLES	SN	TYPE	RELOCATION						
445	C04T12	REAL		REFS	94	DEFINED	25		
5	C05	REAL	CONST3	REFS	11				
446	C05T20	REAL		REFS	94	DEFINED	25		
6	C06	REAL	CONST3	REFS	11				
447	C06T30	REAL		REFS	94	DEFINED	26		
7	C07	REAL	CONST3	REFS	11				
450	C07T42	REAL		REFS	94	DEFINED	26		
10	C08	REAL	CONST3	REFS	11				
451	C08T56	REAL		REFS	94	DEFINED	27		
11	C09	REAL	CONST3	REFS	11				
452	C09T72	REAL		REFS	94	DEFINED	27		
15	C11	REAL	CONST3	REFS	11	83			
16	C12	REAL	CONST3	REFS	11	83			
455	C12T2	REAL		REFS	97	DEFINED	29		
17	C13	REAL	CONST3	REFS	11				
456	C13T2	REAL		REFS	83	DEFINED	30		
460	C13T6	REAL		REFS	97	DEFINED	31		
20	C14	REAL	CONST3	REFS	11				
461	C14T12	REAL		REFS	97	DEFINED	31		
457	C14T3	REAL		REFS	83	DEFINED	30		
21	C15	REAL	CONST3	REFS	11				
464	C15T20	REAL		REFS	97	DEFINED	33		
462	C15T4	REAL		REFS	83	DEFINED	32		
22	C16	REAL	CONST3	REFS	11				
465	C16T30	REAL		REFS	97	DEFINED	33		
463	C16T5	REAL		REFS	83	DEFINED	32		
23	C17	REAL	CONST3	REFS	11	83	97		
24	C21	REAL	CONST3	REFS	11	72	85		
25	C22	REAL	CONST3	REFS	11	72	85		
466	C22T2	REAL		REFS	99	DEFINED	34		
26	C23	REAL	CONST3	REFS	11	72			
470	C23T2	REAL		REFS	85	DEFINED	35		
467	C23T6	REAL		REFS	99	DEFINED	34		
27	C24	REAL	CONST3	REFS	11	72			
472	C24T12	REAL		REFS	99	DEFINED	36		
471	C24T3	REAL		REFS	85	DEFINED	35		
30	C25	REAL	CONST3	REFS	11	72			
473	C25T20	REAL		REFS	99	DEFINED	36		
474	C25T4	REAL		REFS	85	DEFINED	37		
31	C26	REAL	CONST3	REFS	11	72			
476	C26T30	REAL		REFS	99	DEFINED	38		
475	C26T5	REAL		REFS	85	DEFINED	37		
32	C27	REAL	CONST3	REFS	11	72			
477	C27T42	REAL		REFS	99	DEFINED	38		
500	C27T6	REAL		REFS	85	DEFINED	39		
33	C28	REAL	CONST3	REFS	11	72	85	99	
34	C31	REAL	CONST3	REFS	11	74	87		
45	C310	REAL	CONST3	REFS	11	74	87	101	
35	C32	REAL	CONST3	REFS	11	74	87		
501	C32T2	REAL		REFS	101	DEFINED	40		
36	C33	REAL	CONST3	REFS	11	74			
503	C33T2	REAL		REFS	87	DEFINED	41		
502	C33T6	REAL		REFS	101	DEFINED	40		
37	C34	REAL	CONST3	REFS	11	74			
505	C34T12	REAL		REFS	101	DEFINED	42		
504	C34T3	REAL		REFS	87	DEFINED	41		
40	C35	REAL	CONST3	REFS	11	74			

VARIABLES	SN	TYPE	RELOCATION					
506	C35T20	REAL		REFS	101	DEFINED	42	
507	C35T4	REAL		REFS	87	DEFINED	43	
41	C36	REAL	CONST3	REFS	11	74		
511	C36T30	REAL		REFS	101	DEFINED	44	
510	C36T5	REAL		REFS	87	DEFINED	43	
42	C37	REAL	CONST3	REFS	11	74		
512	C37T42	REAL		REFS	101	DEFINED	44	
513	C37T6	REAL		REFS	87	DEFINED	45	
43	C38	REAL	CONST3	REFS	11	74		
515	C38T56	REAL		REFS	101	DEFINED	46	
514	C38T7	REAL		REFS	87	DEFINED	45	
44	C39	REAL	CONST3	REFS	11	74		
516	C39T72	REAL		REFS	101	DEFINED	46	
517	C39T8	REAL		REFS	87	DEFINED	47	
46	C40	REAL	CONST3	REFS	11	77		
47	C41	REAL	CONST3	REFS	11	77		
521	C41T30	REAL		REFS	104	DEFINED	48	
520	C41T5	REAL		REFS	90	DEFINED	48	
50	C50	REAL	CONST3	REFS	11	77		
51	C60	REAL	CONST3	REFS	11	105		
522	C60T2	REAL		REFS	91	DEFINED	49	
523	C60T6	REAL		REFS	78	DEFINED	49	
52	C61	REAL	CONST3	REFS	11	105		
525	C61T12	REAL		REFS	78	DEFINED	50	
524	C61T3	REAL		REFS	91	DEFINED	50	
53	C62	REAL	CONST3	REFS	11	105		
527	C62T20	REAL		REFS	78	DEFINED	51	
526	C62T4	REAL		REFS	91	DEFINED	51	
54	C63	REAL	CONST3	REFS	11	105		
531	C63T30	REAL		REFS	78	DEFINED	52	
530	C63T5	REAL		REFS	91	DEFINED	52	
55	C64	REAL	CONST3	REFS	11	105		
533	C64T42	REAL		REFS	78	DEFINED	53	
532	C64T6	REAL		REFS	91	DEFINED	53	
56	C70	REAL	CONST3	REFS	11			
57	C71	REAL	CONST3	REFS	11			
534	C71T2	REAL		REFS	80	DEFINED	54	
60	C72	REAL	CONST3	REFS	11			
535	C72T6	REAL		REFS	80	DEFINED	54	
61	C73	REAL	CONST3	REFS	11			
536	C73T12	REAL		REFS	80	DEFINED	55	
62	C74	REAL	CONST3	REFS	11			
537	C74T20	REAL		REFS	80	DEFINED	55	
63	C75	REAL	CONST3	REFS	11			
540	C75T30	REAL		REFS	80	DEFINED	56	
64	C76	REAL	CONST3	REFS	11			
541	C76T42	REAL		REFS	80	DEFINED	56	
65	C77	REAL	CONST3	REFS	11			
542	C77T56	REAL		REFS	80	DEFINED	57	
66	C78	REAL	CONST3	REFS	11			
543	C78T72	REAL		REFS	80	DEFINED	57	
17	D3SV	REAL	STM3	REFS	21	109		
67	D30	REAL	CONST3	REFS	11			
70	D31	REAL	CONST3	REFS	11			
544	D31T2	REAL		REFS	113	DEFINED	58	
71	D32	REAL	CONST3	REFS	11			
545	D32T6	REAL		REFS	113	DEFINED	58	

VARIABLES	SN	TYPE	RELOCATION								
72	D33	REAL	CONST3	REFS	11						
546	D33T12	REAL		REFS	113	DEFINED	59				
73	D34	REAL	CONST3	REFS	11						
547	D34T20	REAL		REFS	113	DEFINED	59				
21	D4SV	REAL	STM3	REFS	21	109					
74	D40	REAL	CONST3	REFS	11						
75	D41	REAL	CONST3	REFS	11						
550	D41T2	REAL		REFS	115	DEFINED	60				
76	D42	REAL	CONST3	REFS	11						
551	D42T6	REAL		REFS	115	DEFINED	60				
77	D43	REAL	CONST3	REFS	11						
552	D43T12	REAL		REFS	115	DEFINED	61				
100	D44	REAL	CONST3	REFS	11						
553	D44T20	REAL		REFS	115	DEFINED	61				
23	D5SV	REAL	STM3	REFS	21	109					
101	D50	REAL	CONST3	REFS	11						
102	D51	REAL	CONST3	REFS	11						
103	D52	REAL	CONST3	REFS	11						
554	D52T2	REAL		REFS	117	DEFINED	62				
6	EX	REAL	STM3	REFS	21	72	74	108			
13	EXLOG	REAL	STM3	REFS	21	72	74				
7	EXM1	REAL	STM3	REFS	21	71	6*72	8*74	5*83	6*85	8*87
				9*94	4*97	5*99	7*101	105	3*113	3*115	
10	EXM2	REAL	STM3	REFS	21	71	83	85	87	94	97
				99	101	104					
574	EXM3	REAL		REFS	94	97	99	101	113	115	
				DEFINED	71						
11	EXM5	REAL	STM3	REFS	21	77	104				
12	EXM6	REAL	STM3	REFS	21	90					
32	HMAX	REAL	COMCON	REFS	17						
31	HMIN	REAL	COMCON	REFS	17						
33	HSMAX	REAL	COMCON	REFS	17						
34	H4MAX	REAL	COMCON	REFS	17						
16	OMTH1	REAL	STM3	REFS	21	2*109	111				
2	PCA	REAL	COMCON	REFS	17						
620	PHID	REAL		REFS	119	DEFINED	109				
625	PHIDD	REAL		REFS	121	DEFINED	118				
621	PHIDN	REAL		REFS	120	DEFINED	111				
15	PMAX	REAL	COMCON	REFS	17						
14	PMIN	REAL	COMCON	REFS	17						
16	PSMAX	REAL	COMCON	REFS	17						
7	PVOT	REAL	COMCON	REFS	17	122					
6	PV010	REAL	COMCON	REFS	17						
13	P1	REAL	COMCON	REFS	17						
17	P3MIN	REAL	COMCON	REFS	17						
36	SMAX	REAL	COMCON	REFS	17						
35	SMIN	REAL	COMCON	REFS	17						
37	S3MIN	REAL	COMCON	REFS	17						
40	S4MAX	REAL	COMCON	REFS	17						
0	T	REAL	F.P.	REFS	64	DEFINED	1				
12	TC	REAL	COMCON	REFS	17						
4	TCA	REAL	COMCON	REFS	17						
0	THETA	REAL	STM3	REFS	21	2*78	82	108	119	122	
2	THLOG	REAL	STM3	REFS	21						
1	THL1	REAL	STM3	REFS	21	74	7*80	85	2*87	3*107	
3	THM1	REAL	STM3	REFS	21	77	4*78	90	5*91	104	4*105
4	THM22	REAL	STM3	REFS	21	104					

VARIABLES	SN	TYPE	RELOCATION					
5	THM23	REAL	STM3	REFS	21	77	90	
23	TMAX	REAL	COMCON	REFS	17			
22	TMIN	REAL	COMCON	REFS	17			
24	TSMAX	REAL	COMCON	REFS	17			
5	TZA	REAL	COMCON	REFS	17			
11	T1	REAL	COMCON	REFS	17			
25	T1MAX	REAL	COMCON	REFS	17			
26	T2MIN	REAL	COMCON	REFS	17			
30	T3MAX	REAL	COMCON	REFS	17			
27	T3MIN	REAL	COMCON	REFS	17			
0	V	REAL	F.P.	REFS	64	DEFINED	1	
3	VCA	REAL	COMCON	REFS	17			
20	VD3SV	REAL	STM3	REFS	21	111		
22	VD4SV	REAL	STM3	REFS	21	111		
24	VD5SV	REAL	STM3	REFS	21	111		
622	VVD3V	REAL		REFS	118	DEFINED	113	
623	VVD4V	REAL		REFS	118	DEFINED	115	
624	VVD5V	REAL		REFS	118	DEFINED	117	
21	V3MAX	REAL	COMCON	REFS	17			
20	V3MIN	REAL	COMCON	REFS	17			
14	X50TH2	REAL	STM3	REFS	21	91	105	
15	X60TH2	REAL	STM3	REFS	21	78		
25	Y	REAL	STM3	REFS	21	109	115	117
26	Y2	REAL	STM3	REFS	21	109	111	
27	Y3	REAL	STM3	REFS	21	111	113	115
30	Y30	REAL	STM3	REFS	21	109		
31	Y31	REAL	STM3	REFS	21	111	117	

EXTERNALS	TYPE	ARGS	REFERENCES
COMT3		2	64

STATEMENT LABELS		DEF LINE	REFERENCES
0 1000	INACTIVE	72	
426 1500		122	108
0 2000	INACTIVE	123	

COMMON BLOCKS	LENGTH
CONST3	68
COMCON	33
STM3	26

STATISTICS

PROGRAM LENGTH	626B	406
SCM LABELED COMMON LENGTH	177B	127

```
      FUNCTION CONDV(P,TIN)                                                  COR1      260
     CCOND THERMAL CONDUCTIVITY AS A FUNCTION OF PRESSURE AND TEMP.          COR1      261
     C                                                                       COR1      262
     C                                                                       COR1      263
     C     FIRST ARGUMENT IS PRESSURE                                        COR1      264
     C     SECOND ARGUMENT IS TEMPERATURE                                    COR1      265
     C     RETURNS WITH THERMAL CONDUCTIVITY IN BTU/HR-FT-DEGF               COR1      266
     C     CONDV IS ENTRY FOR VAPOR REGION                                   COR1      267
     C     CONDL IS ENTRY FOR LIQUID REGION                                  COR1      268
     C                                                                       COR1      269
      COMMON /COMCON/ ALPHA0,ALPHA1,   PCA,   VCA,   TCA,   TZA, PV010,     COR1      270
     1   PVOT,    AI1,    T1,    TC,    P1,  PMIN,  PMAX, PSMAX, P3MIN,     COR1      271
     2  V3MIN,  V3MAX,  TMIN,  TMAX, TSMAX, T1MAX, T2MIN, T3MIN, T3MAX,     COR1      272
     3   HMIN,   HMAX, HSMAX, H4MAX,  SMIN,  SMAX, S3MIN, S4MAX             COR1      273
      DIMENSION QA(4),QB(13),T(4),THC(4),TSV(5),PV(4),PLV(9),                COR1      274
     2         THCD1(5),THCD2(5),THCD3(4),THCD4(9),THCD5(9),                 COR1      275
     3         TA(5),PB1(5),PB2(5)                                           COR1      276
      DATA   TSV/ 671., 680., 689., 698., 705.47 /                           COR1      277
      DATA    PV/ 150., 175., 200., 221.2 /                                  COR1      278
      DATA   PLV/ 200., 225., 250., 275., 300., 350., 400., 450., 500. /     COR1      279
      DATA THCD1/ 422.5, 407., 393., 372., 273. /                            COR1      280
      DATA THCD2/ 150., 166., 183., 213., 273. /                             COR1      281
      DATA THCD3/ 87.5, 106., 126., 270. /                                   COR1      282
      DATA THCD4/ 416., 433., 450., 461., 472., 491., 507., 523., 536. /     COR1      283
      DATA THCD5/ 138., 297., 376., 402., 419., 444., 468., 486., 501. /     COR1      284
      DATA    QA/ -4.51E-8, 1.04E-4, 5.87E-2, 17.6 /                         COR1      285
      DATA    QB/ -73.44, 525.77, -1800.7, 2839.5, -922.47, 0.51536,         COR1      286
     1-2.0012, 2.5186, -.9473, -7.1693E-4, 2.9323E-3, -3.8929E-3,            COR1      287
     2 1.6563E-3 /                                                           COR1      288
      DATA    TA/ 400., 425., 450., 500., 550. /                             COR1      289
      DATA   PB1/ 175., 225., 275., 350., 450. /                             COR1      290
      DATA   PB2/ 170., 220., 270., 345., 445. /                             COR1      291
      VAP=1.0                                                                COR1      292
      GO TO 10                                                               COR1      293
     C                                                                       COR1      294
      ENTRYCONDL                                                             COR1      295
     C                                                                       COR1      296
      VAP=0                                                                  COR1      297
     10 PB=P/14.503773773                                                    COR1      298
        IF(P.GT.7500..OR.TIN.GT.TMAX) GO TO 200                              COR1      299
        TEMP=TIN                                                             COR1      300
        IF(VAP.NE.1.0) GO TO 35                                              COR1      301
        IF(PB.GT.221.2) GO TO 35                                             COR1      302
        IF(PB.GT.175.0) GO TO 20                                             COR1      303
     14 NSET=1                                                               COR1      304
        TEMP=TIN                                                             COR1      305
     C  FUNCTION THCONV                                                      COR1      306
     15 TM=(TEMP-32.0)/1.8                                                   COR1      307
        H=HSS(P,TEMP,S,VOL)                                                  COR1      308
        DENS=1./(VOL*62.42796058)                                            COR1      309
        C1=0                                                                 COR1      310
        DO 16 K=1,4                                                          COR1      311
     16 C1=C1*TM+QA(K)                                                       COR1      312
        DC=((-2.771E-5*TM+0.4198)*TM+103.51)*DENS+                           COR1      313
       2  2.1482E14/TM**4.2*DENS**2                                         COR1      314
        THCON1=C1+DC                                                         COR1      315
        THETA=(TM +273.15)/647.3                                             COR1      316
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      BETA=PB/100.                                                          COR1   317
      A1=(3.08E-4*BETA+3.46E-3)*14.86098521                                 COR1   318
60    B1=1.819700867E5*BETA**1.63/(1+(BETA/2.)**3.26)                       COR1   319
      D1=((5.E5*BETA**1.5+2.8E3)/B1-1)*0.206                                COR1   320
      THCON2=(A1*THETA**1.445/(1.-B1/ 4.761450262E5/THETA**7)**D1+          COR1   321
     2        BETA**4*EXP(-9.*3.458*(THETA-1.))/(1.+(BETA/2.75)**(-12))     COR1   322
     3      *(1.36E-2-3.55E-3*BETA*EXP(-3.458*(THETA-1.))))*1000.           COR1   323
65    IF(TEMP.GT.1031.) GO TO 118                                           COR1   324
      IF(TEMP.LE.662.) GO TO 118                                            COR1   325
      DO 19 I=1,6                                                           COR1   326
      IF(I.EQ.6) GO TO 18                                                   COR1   327
      IF(TM   .GT.TA(I)) GO TO 19                                           COR1   328
70    IF(PB.GE.PB1(I)) GO TO 17                                             COR1   329
      IF(PB.LE.PB2(I)) GO TO 18                                             COR1   330
      R1=(PB1(I)-PB)/5.                                                     COR1   331
      R2=(PB-PB2(I))/5.                                                     COR1   332
    165 CONDV=R1*THCON1+R2*THCON2                                           COR1   333
75    GO TO 195                                                             COR1   334
     17 CONDV=THCON2                                                        COR1   335
      GO TO 195                                                             COR1   336
     18 IF(TM   .LE.(TA(I-1)+5.).AND.PB.GE.PB2(I-1)) GO TO 185              COR1   337
    118 CONDV=THCON1                                                        COR1   338
80    GO TO 195                                                             COR1   339
    185 R1=(TM -TA(I-1))/5.                                                 COR1   340
      R2=((TA(I-1)+5.)-TM )/5.                                              COR1   341
      GO TO 165                                                             COR1   342
     19 CONTINUE                                                            COR1   343
85  195 GO TO (120 ,25,25,25,  90) NSET                                     COR1   344
     20 TS=TSL(P)                                                           COR1   345
      T(1)=TS                                                               COR1   346
      T(2)=734.                                                             COR1   347
      T(3)=754.                                                             COR1   348
90    T(4)=788.                                                             COR1   349
      THC(1)=GRS(TSV,1,THCD2,1,T(1),5,NRANGE)                               COR1   350
      DO 30 J=2,4                                                           COR1   351
      NSET=J                                                                COR1   352
      TEMP=T(J)                                                             COR1   353
95    GO TO 15                                                              COR1   354
     25 THC(J)=CONDV                                                        COR1   355
     30 CONTINUE                                                            COR1   356
      IF(TIN.GT.752.)GO TO 14                                               COR1   357
      IF(PB.LE.200..OR. TIN.GE.734.)GO TO 110                               COR1   358
100   T(4)=T(3)                                                             COR1   359
      T(3)=T(2)                                                             COR1   360
      T(2)=707.                                                             COR1   361
      THC(4)=THC(3)                                                         COR1   362
      THC(3)=THC(2)                                                         COR1   363
105   THC(2)=GRS(PV,1,THCD3,1,PB,4,NRANGE)                                  COR1   364
      GO TO 110                                                             COR1   365
     35 IF(TIN.GT.662.) GO TO 45                                            COR1   366
      NRET=1                                                                COR1   367
C     FUNCTION THCONL                                                       COR1   368
110   37 TR=(273.15+(TEMP-32.)/1.8)/273.15                                  COR1   369
      PS=PSL(TEMP)                                                          COR1   370
      DP=(P-PS)/14.503773773                                                COR1   371
      IF(DP.LT.0) DP=0                                                      COR1   372
      A=0                                                                   COR1   373
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      B=0                                                          COR1  374
      C=0                                                          COR1  375
      DO 42 I=1,5                                                  COR1  376
   42 A=A*TR+QB(I)                                                 COR1  377
      DO 43 I=6,9                                                  COR1  378
      B=B*TR+QB(I)                                                 COR1  379
   43 C=C*TR+QB(I+4)                                               COR1  380
      CONDV=(C*DP+B)*DP+A                                          COR1  381
      THCONL= CONDV                                                COR1  382
      GO TO (120 ,85,92,105) NRET                                  COR1  383
   45 T(1)=662.                                                    COR1  384
      T(2)=680.                                                    COR1  385
      T(3)=707.                                                    COR1  386
      T(4)=734.                                                    COR1  387
      IF(PB.GT.300.) GO TO 50                                      COR1  388
      IF(TIN-734.0) 80,14,14                                       COR1  389
   50 IF(PB.LE.400.0) GO TO 70                                     COR1  390
      IF(PB.GT.500.0) GO TO 60                                     COR1  391
      IF(TIN-797.0) 55,14,14                                       COR1  392
   55 T(4)=797.0                                                   COR1  393
      GO TO 80                                                     COR1  394
   60 IF(TIN-810.0) 65,14,14                                       COR1  395
   65 T(4)=810.0                                                   COR1  396
      GO TO 80                                                     COR1  397
   70 IF(TIN-752.0) 75,14,14                                       COR1  398
   75 T(4)=752.0                                                   COR1  399
   80 NRET=2                                                       COR1  400
      TEMP=T(1)                                                    COR1  401
      GO TO 37                                                     COR1  402
   85 THC(2)=GRS(PLV,1,THCD4,1,PB,9,NRANGE)                        COR1  403
      THC(3)=GRS(PLV,1,THCD5,1,PB,9,NRANGE)                        COR1  404
      THC(1)=THCONL                                                COR1  405
      NSET=5                                                       COR1  406
      TEMP=T(4)                                                    COR1  407
      GO TO 15                                                     COR1  408
   90 THC(4)=CONDV                                                 COR1  409
      IF(PB.GT.221.2) GO TO 110                                    COR1  410
      TS=TSL(P)                                                    COR1  411
      T(4)=TS                                                      COR1  412
      IF(TS.GT.T(2)) GO TO 95                                      COR1  413
      THC(3)=THC(1)                                                COR1  414
      T(3)=T(1)                                                    COR1  415
      T(2)=T(3)-20.0                                               COR1  416
      T(1)=T(2)-20.0                                               COR1  417
      NRET=3                                                       COR1  418
      TEMP=T(2)                                                    COR1  419
      GO TO 37                                                     COR1  420
   92 THC(2)=THCONL                                                COR1  421
      GO TO 100                                                    COR1  422
   95 T(3)=T(2)                                                    COR1  423
      T(2)=T(1)                                                    COR1  424
      T(1)=T(1)-20.                                                COR1  425
      THC(3)=THC(2)                                                COR1  426
      THC(2)=THC(1)                                                COR1  427
C     TSL ARRAY EQUALS TSV ARRAY                                   COR1  428
  100 THC(4)=GRS(TSV,1,THCD1,1,T(4),5,NRANGE)                      COR1  429
      NRET=4                                                       COR1  430
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                    TEMP=T(1)                                                  COR1      431
                    GO TO 37                                                   COR1      432
                200 CALL STER(5HCONDV,12,P,TIN)                                COR1      433
    175         105 THC(1)=THCONL                                              COR1      434
                110 CONDV =GRS(T,1,THC,1,TIN,4,NRANGE)                         COR1      435
                120 CONDV=CONDV*.5777893E-3                                    COR1      436
                    RETURN                                                     COR1      437
                    END                                                        COR1      438
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
11	CONDL	36	178
4	CONDV	1	

VARIABLES

		SN	TYPE	RELOCATION								
752	A		REAL		REFS	118	122	DEFINED	114	118		
10	AI1		REAL	COMCON	REFS	11						
0	ALPHA0		REAL	COMCON	REFS	11						
1	ALPHA1		REAL	COMCON	REFS	11						
734	A1		REAL		REFS	62	DEFINED	59				
753	B		REAL		REFS	120	122	DEFINED	115	120		
733	BETA		REAL		REFS	59	2*60	61	3*62	DEFINED	58	
735	B1		REAL		REFS	61	62	DEFINED	60			
754	C		REAL		REFS	121	122	DEFINED	116	121		
714	CONDV		REAL		REFS	96	123	150	177	DEFINED	74	76
						79	122	176	177			
726	C1		REAL		REFS	53	56	DEFINED	51	53		
730	DC		REAL		REFS	56	DEFINED	54				
725	DENS		REAL		REFS	2*54	DEFINED	50				
751	DP		REAL		REFS	113	2*122	DEFINED	112	113		
736	D1		REAL		REFS	62	DEFINED	61				
722	H	*	REAL		DEFINED	49						
32	HMAX		REAL	COMCON	REFS	11						
31	HMIN		REAL	COMCON	REFS	11						
33	HSMAX		REAL	COMCON	REFS	11						
34	H4MAX		REAL	COMCON	REFS	11						
740	I		INTEGER		REFS	68	69	70	71	72	73	2*78
						81	82	118	120	121	DEFINED	67	117
						119						
745	J		INTEGER		REFS	93	94	96	DEFINED	92		
727	K		INTEGER		REFS	53	DEFINED	52				
744	NRANGE		INTEGER		REFS	91	105	144	145	170	176	
746	NRET		INTEGER		REFS	124	DEFINED	108	141	159	171	
720	NSET		INTEGER		REFS	85	DEFINED	45	93	147		
0	P		REAL	F.P.	REFS	39	40	49	86	112	152	174
					DEFINED	1						
716	PB		REAL		REFS	43	44	58	70	71	72	73
						78	99	105	129	131	132	144	145
						151	DEFINED	39				
1076	PB1		REAL	ARRAY	REFS	15	70	72	DEFINED	31		
1103	PB2		REAL	ARRAY	REFS	15	71	73	78	DEFINED	32	
2	PCA		REAL	COMCON	REFS	11						

VARIABLES		SN	TYPE		RELOCATION							
1020	PLV		REAL	ARRAY		REFS	15	144	145	DEFINED	20	
15	PMAX		REAL		COMCON	REFS	11					
14	PMIN		REAL		COMCON	REFS	11					
750	PS		REAL			REFS	112	DEFINED	111			
16	PSMAX		REAL		COMCON	REFS	11					
1014	PV		REAL	ARRAY		REFS	15	105	DEFINED	19		
7	PVOT		REAL		COMCON	REFS	11					
6	PV010		REAL		COMCON	REFS	11					
13	P1		REAL		COMCON	REFS	11					
17	P3MIN		REAL		COMCON	REFS	11					
756	QA		REAL	ARRAY		REFS	15	53	DEFINED	26		
762	QB		REAL	ARRAY		REFS	15	118	120	121	DEFINED	27
741	R1		REAL			REFS	74	DEFINED	72	81		
742	R2		REAL			REFS	74	DEFINED	73	82		
723	S	*	REAL			REFS	49					
36	SMAX		REAL		COMCON	REFS	11					
35	SMIN		REAL		COMCON	REFS	11					
37	S3MIN		REAL		COMCON	REFS	11					
40	S4MAX		REAL		COMCON	REFS	11					
777	T		REAL	ARRAY		REFS	15	91	94	100	101	142 148
							154	156	157	158	160	164 165 166
							170	172	176	DEFINED	87	88 89 90
							100	101	102	125	126	127 128 134
							137	140	153	156	157	158 164 165
							166					
1071	TA		REAL	ARRAY		REFS	15	69	78	81	82	
						DEFINED	30					
12	TC		REAL		COMCON	REFS	11					
4	TCA		REAL		COMCON	REFS	11					
717	TEMP		REAL			REFS	48	49	65	66	110	111
						DEFINED	41	46	94	142	148	160 172
1003	THC		REAL	ARRAY		REFS	15	103	104	155	167	168 176
						DEFINED	91	96	103	104	105	144 145
							146	150	155	162	167	168 170 175
1031	THCD1		REAL	ARRAY		REFS	15	170	DEFINED	21		
1036	THCD2		REAL	ARRAY		REFS	15	91	DEFINED	22		
1043	THCD3		REAL	ARRAY		REFS	15	105	DEFINED	23		
1047	THCD4		REAL	ARRAY		REFS	15	144	DEFINED	24		
1060	THCD5		REAL	ARRAY		REFS	15	145	DEFINED	25		
755	THCONL		REAL			REFS	146	162	175	DEFINED	123	
731	THCON1		REAL			REFS	74	79	DEFINED	56		
737	THCON2		REAL			REFS	74	76	DEFINED	62		
732	THETA		REAL			REFS	4*62	DEFINED	57			
0	TIN		REAL		F.P.	REFS	40	41	46	98	99	107 130
							133	136	139	174	176	DEFINED 1
721	TM		REAL			REFS	53	3*54	57	69	78	81 82
						DEFINED	48					
23	TMAX		REAL		COMCON	REFS	11	40				
22	TMIN		REAL		COMCON	REFS	11					
747	TR		REAL			REFS	118	120	121	DEFINED	110	
743	TS		REAL			REFS	87	153	154	DEFINED	86	152
24	TSMAX		REAL		COMCON	REFS	11					
1007	TSV		REAL	ARRAY		REFS	15	91	170	DEFINED	18	
5	TZA		REAL		COMCON	REFS	11					
11	T1		REAL		COMCON	REFS	11					
25	T1MAX		REAL		COMCON	REFS	11					
26	T2MIN		REAL		COMCON	REFS	11					

VARIABLES	SN	TYPE	RELOCATION					
30	T3MAX	REAL	COMCON	REFS	11			
27	T3MIN	REAL	COMCON	REFS	11			
715	VAP	REAL		REFS	42	DEFINED	33	38
3	VCA	REAL	COMCON	REFS	11			
724	VOL	REAL		REFS	49	50		
21	V3MAX	REAL	COMCON	REFS	11			
20	V3MIN	REAL	COMCON	REFS	11			

EXTERNALS	TYPE	ARGS		REFERENCES					
EXP	REAL	1	LIBRARY	2*62					
GRS	REAL	7		91	105	144	145	170	176
HSS	REAL	4		49					
PSL	REAL	1		111					
STER		4		174					
TSL	REAL	1		86	152				

STATEMENT LABELS			DEF LINE	REFERENCES				
21	10		39	34				
37	14		45	98	2*130	2*133	2*136	2*139
42	15		48	95	149			
0	16		53	52				
206	17		76	70				
210	18		78	68	71			
227	19		84	67	69			
244	20		86	44				
263	25		96	3*85				
0	30		97	92				
306	35		107	42	43			
312	37		110	143	161	173		
0	42		118	117				
0	43		121	119				
364	45		125	107				
376	50		131	129				
0	55	INACTIVE	134	133				
407	60		136	132				
0	65	INACTIVE	137	136				
413	70		139	131				
0	75	INACTIVE	140	139				
417	80		141	130	135	138		
422	85		144	124				
433	90		150	85				
455	92		162	124				
457	95		164	154				
465	100		170	163				
477	105		175	124				
501	110		176	99	106	151		
217	118		79	65	66			
505	120		177	85	124			
202	165		74	83				
221	185		81	78				
232	195		85	75	77	80		
473	200		174	40				

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES		
57	16	K	52 53	4B	INSTACK		
166	19	* I	67 84	44B		ENTRIES	EXITS
260	30	* J	92 97	7B		ENTRIES	EXITS

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
331	42	I	117 118	48	INSTACK
340	43	I	119 121	68	INSTACK

COMMON BLOCKS	LENGTH
COMCON	33

STATISTICS

PROGRAM LENGTH	1112B	586
SCM LABELED COMMON LENGTH	41B	33

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      1              FUNCTION PRLIQ(P,T)                                              PRLIQ       2
                    CPRLI PRANDTL NUMBER OF COMPRESSED LIQUID VS P AND T              PRLIQ       3
                     C                                                                PRLIQ       4
                     C                                                                PRLIQ       5
      5              C     FIRST ARGUMENT IS PRESSURE                                 PRLIQ       6
                     C     SECOND ARGUMENT IS TEMPERATURE                             PRLIQ       7
                     C     RETURNS WITH PRANDTL NUMBER                                PRLIQ       8
                     C                                                                PRLIQ       9
                           PRLIQ=VISL(P,T)*1800.*(.08333333*(HPTL(P,T-4.)-HPTL(P,T+4.))  PRLIQ    10
     10                   1 +.6666666*(HPTL(P,T+2.)-HPTL(P,T-2.)))/CONDL(P,T)        PRLIQ      11
                           RETURN                                                     PRLIQ      12
                           END                                                        PRLIQ      13
```

SYMBOLIC REFERENCE MAP (R=2)

```
ENTRY POINTS      DEF LINE     REFERENCES
    4  PRLIQ           1        11

VARIABLES     SN  TYPE            RELOCATION
    0  P          REAL                 F.P.        REFS        6*9   DEFINED      1
  114  PRLIQ      REAL                             DEFINED      9
    0  T          REAL                 F.P.        REFS        6*9   DEFINED      1

EXTERNALS          TYPE   ARGS      REFERENCES
       CONDL       REAL      2            9
       HPTL        REAL      2          4*9
       VISL        REAL      2            9

STATISTICS
  PROGRAM LENGTH              115B      77
```

```
              FUNCTION PRSTM(P,T)                                             PRSTM       2
        CPRST PRANDTL NUMBER OF SUPERHEATED STEAM VS P AND T                  PRSTM       3
        C                                                                     PRSTM       4
        C                                                                     PRSTM       5
        C     FIRST ARGUMENT IS PRESSURE                                      PRSTM       6
        C     SECOND ARGUMENT IS TEMPERATURE                                  PRSTM       7
        C     RETURNS WITH PRANDTL NUMBER                                     PRSTM       8
        C                                                                     PRSTM       9
              PRSTM=VISV(P,T)*1800.*(.08333333*(HPTD(P,T-4.)-HPTD(P,T+4.))    PRSTM      10
             1 +.6666666*(HPTD(P,T+2.)-HPTD(P,T-2.)))/CONDV(P,T)              PRSTM      11
              RETURN                                                          PRSTM      12
              END                                                             PRSTM      13
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS	DEF LINE	REFERENCES
4 PRSTM	1	11

VARIABLES	SN	TYPE	RELOCATION				
0 P		REAL	F.P.	REFS	6*9	DEFINED	1
114 PRSTM		REAL		DEFINED	9		
0 T		REAL	F.P.	REFS	6*9	DEFINED	1

EXTERNALS	TYPE	ARGS	REFERENCES
CONDV	REAL	2	9
HPTD	REAL	2	4*9
VISV	REAL	2	9

STATISTICS

PROGRAM LENGTH 115B 77

```
      1              FUNCTION SIGMA(T)                                                  COR1      440
                     DIMENSION A(5)                                                     COR1      441
                     DATA A/.1160936807,.001121404688,-5.75280518E-06,1.28627465E-08,   COR1      442
                    1-1.14971929E-11/                                                   COR1      443
      5              SUM = 0.                                                           COR1      444
                     BETA = 0.83                                                        COR1      445
                     TF = 391.93 - T / 1.8                                              COR1      446
                     DO 5 N = 2,5                                                       COR1      447
                     SUM = SUM + A(N) * TF ** N                                         COR1      448
     10             5 CONTINUE                                                         COR1      449
                     SIGMA = .00006852*(A(1) * TF **2 / ( 1. + BETA * TF ) + SUM )      COR1      450
                     RETURN                                                             COR1      451
                     END                                                                COR1      452
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
4	SIGMA	1	12

VARIABLES

		SN	TYPE	RELOCATION						
44	A		REAL	ARRAY	REFS	2	9	11	DEFINED	3
41	BETA		REAL		REFS	11	DEFINED	6		
43	N		INTEGER		REFS	2*9	DEFINED	8		
37	SIGMA		REAL		DEFINED	11				
40	SUM		REAL		REFS	9	11	DEFINED	5	9
0	T		REAL	F.P.	REFS	7	DEFINED	1		
42	TF		REAL		REFS	9	2*11	DEFINED	7	

STATEMENT LABELS

		DEF LINE	REFERENCES
0	5	10	8

LOOPS

	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
14	5	* N	8 10	78	EXT REFS

STATISTICS

PROGRAM LENGTH	518	41

424128

Appendix 4.2G

EXPERIMENTAL DATA PLOT PROGRAM

The experimental data plot program is capable of plotting as many as 5000 data points for any measured or derived parameter. Up to two hundred (200) plots may be generated using this program provided data is stored in a format suitable for processing by the plot program (See Figure 4.2-6 of Text). The plot data file for the transient pump tests contains values for the parameters listed in Table 4.2-6 of the text. The experimental data plot program has the following features.

1. It can generate both time-plots and cross-plots.
2. Hard copy "star" plots are available if the X-axis values are positive.
3. Printed tabulations of plotted values are available and appear just before the star plots.
4. It is possible to plot more than one test parameter on the same graph sheet.
5. Experimental data can be joined either by solid lines or dashed lines as well as spotted using a 0.02" asterisk.
6. Least squares fit of the data may be obtained using a polynomial of specified order.

The description of the job control cards necessary for generating plots using the experimental data plot program and a listing of this program follow.

Job Control Cards for Experimental Data Plot Program

To obtain plots of the pump test facility blowdown data, the following job control cards must be used. (Entries start in first column unless noted).

Job Card (Example)	- NLMCJOO,STMFZ,T1OO,P4O,Sp.
Account Card (Example)	- ACCØUNT($1109948500000000000000065701400 CEXPLØTM.JACØB485$)
Plot Data File (Example)	- ATTACH(TAPE8,PFN,ID=JACØB)*
Plot Program Absolute	- ATTACH(TØLPZ,AA11099485EXPLØT77285ABS,ID=JACØB)
Execute Plot Program	- TØLPZ.
Rewind Drum Plot Input	- REWIND(DISK)
Drum Plot Translator	- ATTACH(PAA,PØP,ID=SYSLIBE)
Generate Drum Plot Instructions	- PAA.

7/8/9
PLØT DECK (See Instructions Below)
BLANK CARD
7/8/9
6/7/8/9

---

*PFN refers to reduced data permanent file name and JACØB refers to ID under which the permanent file is stored.

The plot deck for generating experimental data plots consists of the following cards.

Card 1

Variable Name	Format	Columns	Description
PLØTID	3A10	1-30	Title common to each plot; appears as the 1st line of box label

For each test parameter to be plotted, the following two cards must be supplied.

Card 2

Variable Name	Format	Columns	Description
SCALX(K)	E10.4	1-10	Scale of X-axis in sec/inch
SIZEX(K)	E10.4	11-20	Total length of X-axis
STRTIM(K)	E10.4	21-30	Lowest X-axis value
TPLØT(K)	E10.4	31-40	Time (X-axis) value at which actual data plotting is to be initiated

Card 3

Variable Name	Format	Columns	Description
J	I2	1-2	Plot type (See Table 4.2-6 of text)
KK	I3	3-5	How to plot? (See Plotting Operation Codes listed below)
LPLØT	I2	6-7	=0, plot alone or first of a set of plots to be on the same sheet ≠0, plot on same sheet employed for previous plot
NØDPAT(K)	I3	8-10	Plot number (see Table 4.2-6 of text)
NBØTXI(I,K) I = 1,3	3A10	11-40	Individual graph title (Second line of box label)
SCALY(K)	E10.2	41-50	Scale of Y-axis in units/ inch
SIZEY(K)	E10.2	51-60	Total length of Y-axis
STRTY(K)	E10.2	61-70	Lowest Y-axis value
KFLAG	I5	71-75	=0, use previous SCALX, SIZEX, STRTIM and TPLØT values for next plot

			("Card 2" should not be supplied.)
			≠0, New SCALX, SIZEX, STRTIM and TPLØT values ("Card 2" must be provided)
JFLAG	I5	76-80	≠1, Cross-plot using the parameter designated by the above plot number is not desired ("Card 5" must not be supplied.)
			=1, Cross-plot using the parameter designated by the above plot number is requested ("Card 5" must be supplied)

Card 4 (Optional, supply only if KK = -2)

Variable Name	Format	Columns	Description
IDFF	I5	1-5	Highest polynominal order
IDSS	I5	6-10	Lowest polynomial order

Card 5 (Optional, Supply only if JFLAG = 1, above)

Variable Name	Format	Columns	Description
JK	I5	1-5	Plot type of X-axis of Cross-plot (see Table 4.2-6 of text)
NCPX	I5	6-10	Channel number of X-axis of cross-plot (see Table 4.2-6 of text)
NBØXT(I,K) I = 1,3	3A10	11-40	Graph title pertaining to X-axis variable of cross-plot (third line of box label)
SCALX(K)	E10.4	41-50	Scale of X-axis in units/ inch
SIZEX(K)	E10.4	51-60	Total length of X-axis
STRTIM(K)	E10.4	61-70	Lowest X-axis value

Card 6 (Optional, Supply only if the cross-plot option was excercised)

Variable Name	Format	Columns	Description
JFLAG	I10	1-10	≠1, Additional cross-plots using previous Y-axis variable is not desired
			=1, Additional cross-plots using previous Y-axis variable is desired

For additional time-plots and cross plots new sets of cards 2 thru 6 must be supplied.

PLOTTING OPERATION CODE

KK	Description
1	Solid line connecting each data point
-1	Points spotted only using a 0.02" asterisk, no line
-2	Points spotted and least squares fit with a polynomial
-3	Linear curve fit and points spotted
4*	Dashed line connecting each data point
5*	Dot-dash patterned line connecting each data point
6*	Dash-X-dash patterned line connecting each data point
7*	Dash-triangle patterned line connecting each data point
8*	Dash-square-dash patterned line connecting each data point

* Patterned curves require a minimum of 0.25 inch between data point for successful pattern execution.

```
      PROGRAM CXPLOT(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,DISK,TAPE2=DI CXPLOT      2
     ASK,TAPE8,TAPE10)                                                  CXPLOT      3
C                                                                       CXPLOT      4
C CALL GRAPH(N,X,Y,NPS,XAX,YAX,XMARG,YMARG,LABX,NCX,LABY,NCY,           CXPLOT      5
C H,TFX,TFY,LFX,LFY,M1,M2,M3,XS,YS,K,NCOL,NSUP,                         CXPLOT      6
C LABOX,LABOX2,CAM,KODE,LOGSW,CYCX,CYCY)                                CXPLOT      7
C N=NO. OF DATA PTS. - X/Y= INDEPENDENT/DEPENDENT ARRAY                 CXPLOT      8
C NPS=PAPER SIZE - XAX/YAX= LENGTH OF X/Y AXIS                          CXPLOT      9
C XMARG/YMARG = SIZE OF X/Y MARGIN                                      CXPLOT     10
C LABX/LABY = ARRAY CONTAING X/Y MARGIN LABELING TEXT                   CXPLOT     11
C NCX/NCY = NO. OF CHAR. IN LABX/LABY                                   CXPLOT     12
C H(1)/H(2) = HEIGHT OF CHAR. FOR LABX/LABY                             CXPLOT     13
C TFX/TFY = TICK FREQ. ALONG X/YAXIS - LFX/LFY = TICK MARK FREQ X/Y     CXPLOT     14
C M1 = 1/0 = NEW GRAPH/GRAPH PREVIOUSLY DESCRIBED                       CXPLOT     15
C M2 = 1/0 = NEW PAPER/USE SAME PAPER                                   CXPLOT     16
C M3 = 1/0 = LAST CALL TO GRAPH/MORE PLOTTING FOLLOWS                   CXPLOT     17
C XS/YS = COORDINATES OF LOWER LEFT OF PERIMETER BOX                    CXPLOT     18
C K =0/-9 = AXIS + LABELING/SUPPRESS DECIMAL POINTS IN LABELING         CXPLOT     19
C =1/-1 = DRAW SOLID CURVE/SPOT DATA PTS.                               CXPLOT     20
C =2/-2 = SOLID CURVE + SPOTTING                                        CXPLOT     21
C   =3/-3 = DRAW GRID/LEAST SQUARES LINEAR FIT                          CXPLOT     22
C =4/-4 = DASH LINE/SPOTTED DASH POINTS                                 CXPLOT     23
C NCOL=1/2/3/4 = BLACK/RED/BLUE/BROWN INK                               CXPLOT     24
C NSUP=0/1= MESSAGES/ NO MESSAGES FROM GRAPH                            CXPLOT     25
C LABOX/LABOX2 = BOX LABELS                                             CXPLOT     26
      COMMON KFRM,A(5000),C(5000),B(2),X(5000),ARANGE(2),LAY(3),H(2),   MJ78194     1
     1 PLOTID(3),SCALX(40),SCALY(40) ,STRTIM(40),SIZEX(40),             CXPLOT     28
     2NBOXT(3,40),NBOXTI(3,40),SIZEY(40),NODPAT(40),STRTY(40),Y(2)      CXPLOT     29
      LEVEL 2,D,XX                                                      MJ78194     2
      DIMENSION D(5000), XX(5000)                                       MJ78194     3
      COMMON /LCMC/D,XX                                                 MJ78194     4
      DIMENSION LABX(3),LOY(30),XSOR(5),YSOR(5),LABOX(20),NOTE(3)       CXPLOT     30
      INTEGER PLOTID                                                    CXPLOT     31
      DIMENSION MFRM(9),TPLOT(40),NBOXTY(3)                             MJ78194     5
      EQUIVALENCE (ILABEL,C(1))                                         CXPLOT     34
      DATA (MFRM(I),I=1,9) /1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9/        CXPLOT     35
      DATA (XSOR(I),I=1,5) / 0.25,9.0,17.75,26.5,35.25 /                CXPLOT     36
      DATA (YSOR(I),I=1,3) /0.25,11.5,22.75/                            CXPLOT     37
      DATA (NOTE(I),I=1,3) /10HMORE PLOTS,10H PLEASE MO,10HUNT PAPER   / CXPLOT     38
      DATA(LABOX(I),I=1,11)/2HUP,3,18,30,1HC,18,30,1HC,18,30,1HC/       CXPLOT     39
      LABX(3) = 10H                                                     CXPLOT     40
      LOY( 1) = 10H PRESSURE,                                           CXPLOT     41
      LOY( 2) = 10H PSIA                                                CXPLOT     42
      LOY( 3) = 10HNORMALIZED                                           CXPLOT     43
      LOY( 4) = 10H VOL FLOW                                            CXPLOT     44
      LOY( 5) = 10H PUMP HEAD                                           CXPLOT     45
      LOY( 6) = 10H, PSI                                                CXPLOT     46
      LOY( 7) = 10HNORMALIZED                                           CXPLOT     47
      LOY( 8) = 10H PUMP HEAD                                           CXPLOT     48
      LOY( 9) =10H  DENSITY,                                            MJ77284     1
      LOY(10) = 10H LBM/FT3                                             MJ77284     2
      LOY(11) = 10HMOM FLUX,                                            CXPLOT     51
      LOY(12) = 10HLB/FT-SEC2                                           CXPLOT     52
      LOY(13) = 10H  VOID FRA                                           CXPLOT     53
      LOY(14) = 10HCTION                                                CXPLOT     54
      LOY(15) = 10HNORMALIZED                                           CXPLOT     55
      LOY(16) = 10H PMP SPEED                                           CXPLOT     56
```

```
      LOY(17) = 10HNORMALIZED                                                  CXPLOT     57
      LOY(18) = 10H  TORQUE                                                    CXPLOT     58
      LOY(19) = 10HPUMP ACCEL                                                  CXPLOT     59
      LOY(20) = 10H,RAD/SEC2                                                   CXPLOT     60
      LOY(21) = 10HTEMPERATUR                                                  CXPLOT     61
      LOY(22) = 10HE,DEGREE F                                                  CXPLOT     62
      LOY(23) = 10HMASS FLOW,                                                  CXPLOT     63
      LOY(24) = 10H LBM/SEC                                                    CXPLOT     64
      LOY(25) = 10HINTEGRATED                                                  CXPLOT     65
      LOY(26) = 10H MASS, LBM                                                  CXPLOT     66
      NOBOX=0 $ NCOL=1 $ NSUP=0 $ LFX=1 $ LFY=1                                CXPLOT     67
      REWIND 8                                                                 CXPLOT     68
      NPS = 10                                                                 CXPLOT     69
      XMARG = 1.4                                                              CXPLOT     70
      YMARG = 1.4                                                              CXPLOT     71
      H(1) = 0.15                                                              CXPLOT     72
      H(2) = 0.15                                                              CXPLOT     73
      M3 = 0                                                                   CXPLOT     74
      IDP = 0                                                                  CXPLOT     75
      NOBX = 0                                                                 CXPLOT     76
      XS = -8.50                                                               CXPLOT     77
      NMAX=5000                                                                GM78206     1
      NBX = 40                                                                 CXPLOT     79
      M = 1                                                                    CXPLOT     80
      IFLAG=0                                                                  CXPLOT     81
      JFLAG=0                                                                  CXPLOT     82
      KJ=0                                                                     MJ77214     2
C                                                                              CXPLOT     83
C   GENERAL INFO FOR ALL PLOTS                                                 CXPLOT     84
C                                                                              CXPLOT     85
      READ(5,2)(PLOTID(I),I=1,3)                                               CXPLOT     86
    2 FORMAT(8A10)                                                             CXPLOT     87
      K=1                                                                      CXPLOT     88
   80 CONTINUE                                                                 CXPLOT     89
 2001 READ(5,3)SCALX(K),SIZEX(K),STRTIM(K),TPLOT(K)                            CXPLOT     90
    3 FORMAT(4E10.3)                                                           CXPLOT     91
      IF (SCALX(K) .EQ. 0.0) GO TO 100                                         CXPLOT     92
      LABX(1) = 10H   TIME IN                                                  CXPLOT     93
      LABX(2) = 10H SEC                                                        CXPLOT     94
   84 CONTINUE                                                                 CXPLOT     95
      IF(JFLAG.NE.1) GO TO 1000                                                CXPLOT     96
      TPLOT(K)=0.0                                                             CXPLOT     97
      READ(5,2002)JK,NCPX,(NBOXT(I,K),I=1,3),SCALX(K),SIZEX(K),STRTIM(K)       CXPLOT     98
      WRITE(6,2002)JK,NCPX,(NBOXT(I,K),I=1,3),SCALX(K),SIZEX(K),STRTIM(K       CXPLOT     99
     1)                                                                        CXPLOT    100
 2002 FORMAT(2I5,3A10,3E10.4)                                                  CXPLOT    101
      WRITE(6,104) (NBOXT(I,K),I=1,3),SCALX(K),SIZEX(K),STRTIM(K),JFLAG        CXPLOT    102
  104 FORMAT(3A10,3E10.3,I5)                                                   CXPLOT    103
      STRTY(K)=STRTYY                                                          MJ77214     3
      SCALY(K)=SCALYY                                                          MJ77214     4
      SIZEY(K)=SIZEYY                                                          MJ77214     5
      NBOXTI(1,K)=NBOXTY(1)                                                    MJ77214     6
      NBOXTI(2,K)=NBOXTY(2)                                                    MJ77214     7
      NBOXTI(3,K)=NBOXTY(3)                                                    MJ77214     8
      PLTWHY=SCALY(K)*SIZEY(K)                                                 CXPLOT    110
      Y(1)=STRTY(K)                                                            CXPLOT    111
      Y(2)=STRTY(K)+PLTWHY                                                     CXPLOT    112
```

```
            DO 7 I=1,NPT                                                      CXPLOT     113
          7 A(I)=D(I)                                                         CXPLOT     114
       1000 LAY(3)= 10H* 10**                                                 CXPLOT     115
            WRITE(6,103)PLOTID,SCALX(K),SIZEX(K),STRTIM(K),TPLOT(K)           CXPLOT     116
        103 FORMAT(1H1,10X,"GENERAL PLOT TITLE-",3A10,/,20X," X-SCALE, "      CXPLOT     117
          $"SECONDS/INCH = ",E10.4,", FOR ",E10.4," INCHES, STARTING AT ",    CXPLOT     118
          $E10.4," SEC.  TPLOT = ",E10.4)                                     CXPLOT     119
            PLTSEC = SCALX(K)*SIZEX(K)                                        CXPLOT     120
            B(1)=STRTIM(K)                                                    CXPLOT     121
            B(2) = B(1) + PLTSEC                                              CXPLOT     122
            BUFFERIN(8,0)(C(1),C(NMAX))                                       CXPLOT     123
            IF(UNIT(8))11,11,11                                               CXPLOT     124
         11 CONTINUE                                                          CXPLOT     125
            IF(JFLAG.NE.1) GO TO 60                                           CXPLOT     126
            WRITE(6,110)NSTART,NSTOP,NCPX,JK,IFLAG                            CXPLOT     127
        110 FORMAT(4X,5I10)                                                   CXPLOT     128
            WRITE(6,107)PLTWHY,STRTY(K),SCALY(K),SIZEY(K),(Y(I),I=1,2)        CXPLOT     129
            CALL XCPLOT(NSTART,NSTOP,IFLAG,NCPX,B,X,KJ)                       CXPLOT     130
            GO TO 1007                                                        CXPLOT     131
C           WRITE(6,60) (C(I),I=1,20)                                         CXPLOT     132
C60         FORMAT(//"***",A10,10F7.3/5X,9F7.3)                               CXPLOT     133
         60 NPT=0                                                             CXPLOT     134
            NTOT = C(2)                                                       CXPLOT     135
            NWORD = C(3)                                                      CXPLOT     136
            DO 6 I=1,NTOT                                                     CXPLOT     137
            IF(ABS(C(I+7)).LT.TPLOT(K)) GO TO 6                               CXPLOT     138
            IF(C(I+7).LT.B(1))GO TO 6                                         CXPLOT     139
             IF(C(I+7).GT.B(2))GO TO 79                                       CXPLOT     140
            IF(NPT.EQ.0)NSTART = I + 7                                        CXPLOT     141
            NPT = NPT + 1                                                     CXPLOT     142
            XX(NPT)=C(I+7)                                                    CXPLOT     143
          6 CONTINUE                                                          CXPLOT     144
C                                                                             CXPLOT     145
         79 CONTINUE                                                          CXPLOT     146
            STRTIM(K)=0.0                                                     CXPLOT     147
       1007 LABOX(12)=PLOTID(1)                                               CXPLOT     148
            LABOX(13) = PLOTID(2)                                             CXPLOT     149
            LABOX(14) = PLOTID(3)                                             CXPLOT     150
            IF(JFLAG.NE.1) GO TO 1001                                         CXPLOT     151
            LABOX(18)=NBOXT(1,K)                                              CXPLOT     152
            LABOX(19)=NBOXT(2,K)                                              CXPLOT     153
            LABOX(20)=NBOXT(3,K)                                              CXPLOT     154
            WRITE(6,111)(LABOX(I),I=18,20),(NBOXT(I,K),I=1,3)                 CXPLOT     155
            LABX(1)=LOY(2*JK-1)                                               MJ77214      9
            LABX(2)=LOY(2*JK)                                                 MJ77214     10
            READ (5,200) JFLAG                                                MJ77214     11
        200 FORMAT(I10)                                                       MJ77214     12
            GO TO 1002                                                        CXPLOT     156
       1001 LABOX(19) = 10H  PLOT NO.                                         MJ77284      3
            IIABEL = ILABEL                                                   CXPLOT     158
C                                                                             CXPLOT     159
C     LOOP FOR READING IN VALUES TO BE PLOTTED                                CXPLOT     160
C                                                                             CXPLOT     161
            NSTOP=NSTART+NPT-1                                                CXPLOT     162
            KFRH = K                                                          CXPLOT     163
            READ(5,201)J,KK,LPLOT,NODPAT(K),(NBOXTI(I,K),I=1,3),SCALY(K),     CXPLOT     164
           $SIZEY(K),STRTY(K),KFLAG,JFLAG                                     CXPLOT     165
```

```
                WRITE(6,202)J,KK,LPLOT,NODPAT(K),(NBOXTI(I,K),I=1,3),SCALY(K),    MJ77284    4
               $SIZEY(K),STRTY(K),KFLAG,JFLAG                                     CXPLOT   167
                STRTYY=STRTY(K)                                                   MJ77214   13
175             SCALYY=SCALY(K)                                                   MJ77214   14
                SIZEYY=SIZEY(K)                                                   MJ77214   15
                NBOXTY(1)=NBOXTI(1,K)                                             MJ77214   16
                NBOXTY(2)=NBOXTI(2,K)                                             MJ77214   17
                NBOXTY(3)=NBOXTI(3,K)                                             MJ77214   18
180             IF(NODPAT(K).GT.(NWORD))STOP                                      CXPLOT   168
                KKK = KK                                                          CXPLOT   169
                IF(J.EQ.0)GO TO   100                                             CXPLOT   170
                PLTWHY = SCALY(K) * SIZEY(K)                                      CXPLOT   171
                Y(1) = STRTY(K)                                                   CXPLOT   172
185             Y(2)=STRTY(K)+PLTWHY                                              CXPLOT   173
                LAY(1) = LOY(2*J-1)                                               CXPLOT   174
                LAY(2)=LOY(2*J)                                                   CXPLOT   175
              201 FORMAT(I2,I3,I2,I3,3A10,3E10.2,2I5)                             CXPLOT   176
              202 FORMAT(5X,I2,I3,I2,I3,3A10,3E10.2,2I5)                          MJ77284    5
190             4 CONTINUE                                                        CXPLOT   177
C               WRITE(6,61) (C(I),I=1,20)                                         CXPLOT   178
C61             FORMAT(//"******",A10,10F7.3/5X,9F7.3)                            CXPLOT   179
                BUFFERIN(8,0)(C(1),C(NMAX))                                       CXPLOT   180
                IF(UNIT(8))12,13,12                                               CXPLOT   181
195            13 CONTINUE                                                        CXPLOT   182
C               WRITE(6,62) (C(I),I=1,20)                                         CXPLOT   183
C62             FORMAT(//"**********",A10,10F7.3/5X,9F7.3)                        CXPLOT   184
                KJ = 0                                                            CXPLOT   185
                IF(IFLAG .EQ. 1)        GO TO 100                                 CXPLOT   186
200             IFLAG=1                                                           CXPLOT   187
                 REWIND 8                                                         CXPLOT   188
                BUFFERIN(8,0)(C(1),C(NMAX))                                       CXPLOT   189
                IF(UNIT(8))4,14,4                                                 CXPLOT   190
               14 CONTINUE                                                        CXPLOT   191
205             STOP                                                              CXPLOT   192
               12 CONTINUE                                                        CXPLOT   193
                KJ = KJ + 1                                                       CXPLOT   194
C               WRITE(6,104) C(1)                                                 CXPLOT   195
C104            FORMAT(///,5X,"******",A10,"******")                              CXPLOT   196
210             IF (KJ .EQ. 200) STOP                                             CXPLOT   197
                IF(KJ.NE.NODPAT(K))GO TO 4                                        CXPLOT   198
                IFLAG=0                                                           CXPLOT   199
                DO 5 I = NSTART,NSTOP                                             CXPLOT   200
                II = I - NSTART + 1                                               CXPLOT   201
215             X(II) = XX(II)                                                    CXPLOT   202
                IF(C(I).GT.Y(2))C(I) = Y(2)                                       CXPLOT   203
                IF(C(I).LT.Y(1))C(I) = Y(1)                                       CXPLOT   204
                A(II)=C(I)                                                        CXPLOT   205
               5 D(II)=A(II)                                                      CXPLOT   206
220             C                                                                 CXPLOT   207
                B(1) = 0.0                                                        CXPLOT   208
                B(2) = PLTSEC                                                     CXPLOT   209
                LABOX(18)=ILABEL                                                  MJ77214   19
                SCALXX=SCALX(K)                                                   MJ77214   20
225             SIZEXX=SIZEX(K)                                                   MJ77214   21
                STRTIMX=STRTIM(K)                                                 MJ77214   22
                TPLOTX=TPLOT(K)                                                   MJ77214   23
                CALL CONVRT(KJ,LABOX(20))                                         MJ77214   24
```

```
      C                                                                      CXPLOT    210
230   C                                                                      CXPLOT    211
       1002 LABOX(1)=2HUP                                                    CXPLOT    212
            LABOX(15)= NBOXTI(1,K)                                           CXPLOT    213
            LABOX(16)= NBOXTI(2,K)                                           CXPLOT    214
            LABOX(17)= NBOXTI(3,K)                                           CXPLOT    215
235         WRITE(6,106) (LABOX(I),I=15,17)                                  CXPLOT    216
        106 FORMAT(3A10)                                                     CXPLOT    217
            IDP=1                                                            MJ77214    25
            WRITE(6,111) (LABOX(I),I=15,20)                                  CXPLOT    230
        111 FORMAT(4X,6A10)                                                  CXPLOT    231
240         STRK=7777.                                                       CXPLOT    232
            STRK=AMIN1(STRK,STRTIM(K))                                       CXPLOT    233
            M1 = 1                                                           CXPLOT    234
            NCY = 20                                                         CXPLOT    235
            NCX=20                                                           CXPLOT    236
245         IF(LPLOT.NE.0)GO TO 29                                           CXPLOT    237
            NOBX =NOBX +1                                                    CXPLOT    238
            IF(NOBX.EQ.1) M2 = 1                                             CXPLOT    239
            IF(NOBX.LE.4)GO TO 28                                            GM062778    1
            NOBX = 1                                                         CXPLOT    241
250         XS=-17.75                                                        GM062778    2
            M2 =1                                                            CXPLOT    243
         28 CONTINUE                                                         CXPLOT    244
            XMIN=B(1)                                                        CXPLOT    245
            XMAX=B(2)                                                        CXPLOT    246
255         PLTWHY    = SCALY(K)  *SIZEY(K)                                  CXPLOT    247
            Y(1)=AMAX1(0.0,STRTY(K))                                         CXPLOT    248
            Y(2) =AMAX1(PLTWHY,STRTY(K)+PLTWHY)                              CXPLOT    249
            WRITE(6,107)PLTWHY,STRTY(K),SCALY(K),SIZEY(K),(Y(I),I=1,2)       CXPLOT    250
        107 FORMAT(3X,6E10.3)                                                CXPLOT    251
260         XAX = SIZEX(K)                                                   CXPLOT    252
            YAX = SIZEY(K)                                                   CXPLOT    253
            IF(MOD(NOBX,2)) 81,82,81                                         CXPLOT    254
         82 YS =YSOR(2)                                                      CXPLOT    255
            GO TO 83                                                         CXPLOT    256
265         81 XS=XS+18.                                                     GM062778    3
            YS= YSOR(1)                                                      CXPLOT    258
         83 CONTINUE                                                         CXPLOT    259
      C K=0 ,SET UP  K=3 ,DRAW GRID  K=1 ,PLOT CURVE                         CXPLOT    260
      C-BOX AND BOX TITLES ONLY                                              CXPLOT    261
270         KK =0                                                            CXPLOT    262
            TFX=PLTSEC/SIZEX(K)                                              CXPLOT    263
            TFY=PLTWHY/SIZEY(K)                                              CXPLOT    264
            IF(STRTY(K).LT.0.0.OR.STRTIM(K).LT.0.0) TFX=0.0                  CXPLOT    265
            IF(STRTY(K).LT.0.0.OR.STRTIM(K).LT.0.0) TFY=0.0                  CXPLOT    266
275         IF(STRTY(K).GE.0.0.AND.STRTIM(K).GE.0.0) KK=3                    CXPLOT    267
            WRITE(6,102)NPT,B,NPS,XAX,YAX,XMARG,YMARG,LABX,NCX,LAY,NCY,H,    CXPLOT    268
           $ TFX,TFY,LFX,LFY,M1,M2,M3,XS,YS,KK,NCOL,NSUP,LABOX,CAM,Y         CXPLOT    269
         102 FORMAT(I5,2E12.3,I5,4E12.3,3A10,I5,2A10,/,A10,/,                CXPLOT    270
           $                                        I5,4E12.3,5I5,2E12.3,    CXPLOT    271
280        $3I5,/,13A10,/,1X,7A10,3E13.3)                                    MJ77284     6
            CALL GRAPH(2,B,Y,NPS,XAX,YAX,XMARG,YMARG,LABX,NCX,LAY ,NCY ,     CXPLOT    273
           1           H,TFX,TFY,LFX,LFY,M1,M2,M3,XS,YS,KK,NCOL,NSUP,       CXPLOT    274
           2           LABOX,4HNONE,0.0,0.0,-9,0.0,0.0 )                     CXPLOT    275
      C-WRITE X-SCALE, VERTICLE SCALE  ,SUPPRESS BOX LABX,LABY               CXPLOT    276
285         IF(STRTY(K).GE.0.0.AND.STRTIM(K).GE.0.0) GO TO 29                CXPLOT    277
```

```
                M2 = 0                                                          CXPLOT    278
                KK = 3                                                          CXPLOT    279
                LABOX(1) = 0                                                    CXPLOT    280
                NCX = NCY = 0                                                   CXPLOT    281
290             TFX=PLTSEC/SIZEX(K)                                             CXPLOT    282
                TFY =0.0                                                        CXPLOT    283
                WRITE(6,102)NPT,B,NPS,XAX,YAX,XMARG,YMARG,LABX,NCX,LAY,NCY,H,   CXPLOT    284
               $ TFX,TFY,LFX,LFY,M1,M2,M3,XS,YS,KK,NCOL,NSUP,LABOX,CAM,Y        CXPLOT    285
                CALL GRAPH(2,B,Y,NPS,XAX,YAX,XMARG,YMARG,LABX,NCX,LAY ,NCY ,    CXPLOT    286
295            1           H,TFX,TFY,LFX,LFY,M1,M2,M3,XS,YS,KK,NCOL,NSUP,      CXPLOT    287
               2           LABOX,4HNONE,0.0,0,-9,0.0,0.0 )                     CXPLOT    288
          C WRITE Y-SCALE, HORIZONTAL SCALE                                     CXPLOT    289
                Y(1) = STRTY(K)                                                 CXPLOT    290
                Y(2) = PLTWHY    * STRTY(K)                                     CXPLOT    291
300             TFX =0.0                                                        CXPLOT    292
                TFY = PLTWHY   /SIZEY(K)                                        CXPLOT    293
                CALL GRAPH(2,B,Y,NPS,XAX,YAX,XMARG,YMARG,LABX,NCX,LAY ,NCY ,    CXPLOT    294
               1           H,TFX,TFY,LFX,LFY,M1,M2,M3,XS,YS,KK,NCOL,NSUP,      CXPLOT    295
               2           LABOX,4HNONE,0.0,0,-9,0.0,0.0 )                     CXPLOT    296
305       C CURVE LOOP                          9                               CXPLOT    297
             29 CONTINUE                                                        CXPLOT    298
                CAM = 0.0                                                       CXPLOT    299
             31 LABOX(1)=0                                                      CXPLOT    300
                M1 = M2 = 0                                                     CXPLOT    301
310             KK = KKK                                                        CXPLOT    302
                WRITE(6,26) (X(II),A(II),II=1,NPT)                              CXPLOT    303
             26 FORMAT(4X,12E10.3)                                              CXPLOT    304
                WRITE(6,102)NPT,B,NPS,XAX,YAX,XMARG,YMARG,LABX,NCX,LAY,NCY,H,   CXPLOT    305
               $ TFX,TFY,LFX,LFY,M1,M2,M3,XS,YS,KK,NCOL,NSUP,LABOX,CAM,Y        CXPLOT    306
315             CALL GRAPH(NPT , X, A,NPS,XAX,YAX,XMARG,YMARG,LABX,NCX,LAY, NCY,CXPLOT    307
               1           H,TFX,TFY,LFX,LFY,M1,M2,M3,XS,YS,KK,NCOL,NSUP,      CXPLOT    308
               2           LABOX,4HNONE,CAM,0,-9,0.0,0.0 )                     CXPLOT    309
                J1 = J                                                          CXPLOT    310
                IF(KK.EQ.1)GO TO 24                                             CXPLOT    311
320             DO 25 IFRM=1,NPT                                                CXPLOT    312
             25 CALL SPOT(X(IFRM),A(IFRM),0,0.02,0,0,0,1H*)                     CXPLOT    313
             24 CONTINUE                                                        CXPLOT    314
                IF(B(1).LT.0.0) GO TO 50                                        CXPLOT    315
                CALL SPLOT(NPT,X,A,J1)                                          CXPLOT    316
325          50 CONTINUE                                                        CXPLOT    317
                REWIND 8                                                        CXPLOT    318
                KJ=0                                                            CXPLOT    319
                K = K + 1                                                       CXPLOT    320
                IF(K.EQ.41) K=1                                                 CXPLOT    321
330             IF(KFLAG.EQ.0) GO TO 85                                         CXPLOT    324
                GO TO 80                                                        CXPLOT    325
             85 SCALX(K)=SCALXX                                                 CXPLOT    326
                SIZEX(K)=SIZEXX                                                 CXPLOT    327
                STRTIM(K)=STRTIMX                                               CXPLOT    328
335             TPLOT(K)=TPLOTX                                                 CXPLOT    329
                GO TO 84                                                        CXPLOT    330
            100 CONTINUE                                                        CXPLOT    331
                CALL AREA (XS   ,22.75,8.0,0.6,0,0,0,0)                         CXPLOT    332
                CALL SYMBL(0.375,0.125,90,0.25,30,0,0,PLOTID)                   CXPLOT    333
340             CALL RESET(0,0,0,0,0,0,0,0)                                     CXPLOT    334
                CALL ENDPL(0,0,0,0,0,0,0,0)                                     CXPLOT    335
            101 STOP                                                            CXPLOT    336
```

425006

END CXPLOT 337

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

126 I 11 THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS DEF LINE REFERENCES
133 CXPLOT 1

VARIABLES		SN	TYPE	RELOCATION								
1	A		REAL	ARRAY / /	REFS	26	219	311	315	321	324	
					DEFINED	116	218					
35233	ARANGE		REAL	ARRAY / /	REFS	26						
23421	B		REAL	ARRAY / /	REFS	26	124	132	141	142	253	254
					276	281	292	294	302	313	323	
					DEFINED	123	124	221	222			
11611	C		REAL	ARRAY / /	REFS	26	35	137	138	140	141	142
					145	216	217	218	DEFINED	2*125	2*193	2*202
					216	217						
2153	CAM		REAL		REFS	276	292	313	315	DEFINED	307	
0	D		REAL	ARRAY LCMC	REFS	29	30	31	116	DEFINED	219	
35240	H		REAL	ARRAY / /	REFS	26	276	281	292	294	302	313
					315	DEFINED	73	74				
2106	I		INTEGER		REFS	88	100	101	104	2*116	131	140
					141	142	143	145	2*157	170	172	214
					2*216	2*217	218	235	238	258		
					DEFINED	88	100	101	104	115	131	139
					2*157	170	172	213	235	238	258	
2075	IDP		INTEGER		DEFINED	76	237					
2103	IFLAG		INTEGER		REFS	129	132	199	DEFINED	82	200	212
2155	IFRM		INTEGER		REFS	2*321	DEFINED	320				
2132	II		INTEGER		REFS	2*215	218	2*219	2*311	DEFINED	214	311
2124	IIABEL	*	INTEGER		DEFINED	164						
11611	ILABEL		INTEGER	/ /	REFS	35	164	223				
2125	J		INTEGER		REFS	172	182	186	187	318		
					DEFINED	170						
2104	JFLAG		INTEGER		REFS	98	104	128	153	172		
					DEFINED	83	160	170				
2110	JK		INTEGER		REFS	101	129	158	159	DEFINED	100	
2154	JJ		INTEGER		REFS	324	DEFINED	318				
2107	K		INTEGER		REFS	4*92	94	99	4*100	4*101	4*104	106
					107	108	109	110	111	2*112	113	114
					4*118	2*122	123	3*131	140	149	154	155
					156	157	169	5*170	5*172	174	175	176
					177	178	179	180	2*183	184	185	211
					224	225	226	227	232	233	234	241
					2*255	256	257	3*258	260	261	271	272
					2*273	2*274	2*275	2*285	290	298	299	301

VARIABLES	SN		TYPE		RELOCATION	
2130	KFLAG		INTEGER			
0	KFRM		INTEGER		/ /	
2105	KJ		INTEGER			
2126	KK		INTEGER			
2131	KKK		INTEGER			
2231	LABOX		INTEGER	ARRAY		
2156	LABX		INTEGER	ARRAY		
35235	LAY		INTEGER	ARRAY	/ /	
2067	LFX		INTEGER			
2070	LFY		INTEGER			
2161	LOY		INTEGER	ARRAY		
2127	LPLOT		INTEGER			
2102	M	*	INTEGER			
2260	MFRM		INTEGER	ARRAY		
2140	M1		INTEGER			
2143	M2		INTEGER			
2074	M3		INTEGER			
35505	NBOXT		INTEGER	ARRAY	/ /	
35675	NBOXTI		INTEGER	ARRAY	/ /	
2341	NBOXTY		INTEGER	ARRAY		
2101	NBX	*	INTEGER			
2065	NCOL		INTEGER			
2111	NCPX		INTEGER			
2142	NCX		INTEGER			
2141	NCY		INTEGER			
2100	NMAX		INTEGER			
2064	NOBOX	*	INTEGER			
2076	NOBX		INTEGER			
36135	NODPAT		INTEGER	ARRAY	/ /	
2255	NOTE		INTEGER	ARRAY		
2071	NPS		INTEGER			

328 329 332 333 334 335
DEFINED 90 328 329
REFS 172 330 DEFINED 170
REFS 26 DEFINED 169
REFS 132 207 210 211 228
DEFINED 84 198 207 327
REFS 172 181 276 281 292 294 302
313 315 319 DEFINED 170 270 275 287
310
REFS 310 DEFINED 181
REFS 32 157 228 235 238 276 281
292 294 302 313 315 DEFINED 40 150
151 152 154 155 156 163 223 231
232 233 234 288 308
REFS 32 276 281 292 294 302 313
315 DEFINED 41 95 96 158 159
REFS 26 276 281 292 294 302 313
315 DEFINED 117 186 187
REFS 276 281 292 294 302 313 315
DEFINED 68
REFS 276 281 292 294 302 313 315
DEFINED 68
REFS 32 158 159 186 187
DEFINED 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56
57 58 59 60 61 62 63 64
65 66 67
REFS 172 245 DEFINED 170
DEFINED 81
REFS 34 DEFINED 36
REFS 276 281 292 294 302 313 315
DEFINED 242 309
REFS 276 281 292 294 302 313 315
DEFINED 247 251 286 309
REFS 276 281 292 294 302 313 315
DEFINED 75
REFS 26 101 104 154 155 156 157
DEFINED 100
REFS 26 172 177 178 179 232 233
234 DEFINED 109 110 111 170
REFS 34 109 110 111 DEFINED 177 178
179
DEFINED 80
REFS 276 281 292 294 302 313 315
DEFINED 68
REFS 101 129 132 DEFINED 100
REFS 276 281 292 294 302 313 315
DEFINED 244 289
REFS 276 281 292 294 302 313 315
DEFINED 243 289
REFS 125 193 202 DEFINED 79
DEFINED 68
REFS 246 247 248 262 DEFINED 77 246
249
REFS 26 172 180 211 DEFINED 170
REFS 32 DEFINED 39
REFS 276 281 292 294 302 313 315

425008

VARIABLES	SN	TYPE	RELOCATION		
2116	NPT	INTEGER			
2120	NSTART	INTEGER			
2121	NSTOP	INTEGER			
2066	NSUP	INTEGER			
2122	NTOT	INTEGER			
2123	NWORD	INTEGER			
35242	PLOTID	INTEGER	ARRAY	/ /	
2117	PLTSEC	REAL			
2115	PLTWHY	REAL			
35245	SCALX	REAL	ARRAY	/ /	
2133	SCALXX	REAL			
35315	SCALY	REAL	ARRAY	/ /	
2113	SCALYY	REAL			
35435	SIZEX	REAL	ARRAY	/ /	
2134	SIZEXX	REAL			
36065	SIZEY	REAL	ARRAY	/ /	
2114	SIZEYY	REAL			
2137	STRK	REAL			
35365	STRTIM	REAL	ARRAY	/ /	
2135	STRTIMX	REAL			
36205	STRTY	REAL	ARRAY	/ /	
2112	STRTYY	REAL			
2151	TFX	REAL			
2152	TFY	REAL			
2271	TPLOT	REAL	ARRAY		
2136	TPLOTX	REAL			
23423	X	REAL	ARRAY	/ /	
2146	XAX	REAL			
2072	XMARG	REAL			
2145	XMAX	* REAL			
2144	XMIN	* REAL			
2077	XS	REAL			
2217	XSOR	REAL	ARRAY		
11610	XX	REAL	ARRAY	LCMC	
36255	Y	REAL	ARRAY	/ /	

DEFINED 70
REFS 115 143 144 145 168 276 292
311 313 315 320 324 DEFINED 136 144
REFS 129 132 168 213 214
DEFINED 143
REFS 129 132 213 DEFINED 168
REFS 276 281 292 294 302 313 315
DEFINED 68
REFS 139 DEFINED 137
REFS 180 DEFINED 138
REFS 26 33 118 150 151 152 339
DEFINED 88
REFS 124 222 271 290 DEFINED 122
REFS 114 131 185 2*257 258 272 299
301 DEFINED 112 183 255
REFS 26 94 101 104 118 122 224
DEFINED 92 100 332
REFS 332 DEFINED 224
REFS 26 112 131 172 175 183 255
258 DEFINED 107 170
REFS 107 DEFINED 175
REFS 26 101 104 118 122 225 260
271 290 DEFINED 92 100 333
REFS 333 DEFINED 225
REFS 26 112 131 172 176 183 255
258 261 272 301 DEFINED 108 170
REFS 108 DEFINED 176
REFS 241 DEFINED 240 241
REFS 26 101 104 118 123 226 241
273 274 275 285 DEFINED 92 100 149
334
REFS 334 DEFINED 226
REFS 26 113 114 131 172 174 184
185 256 257 258 273 274 275 285
298 299 DEFINED 106 170
REFS 106 DEFINED 174
REFS 276 281 292 294 302 313 315
DEFINED 271 273 290 300
REFS 276 281 292 294 302 313 315
DEFINED 272 274 291 301
REFS 34 118 140 227 DEFINED 92 99
335
REFS 335 DEFINED 227
REFS 26 132 311 315 321 324
DEFINED 215
REFS 276 281 292 294 302 313 315
DEFINED 260
REFS 276 281 292 294 302 313 315
DEFINED 71
DEFINED 254
DEFINED 253
REFS 265 276 281 292 294 302 313
315 338 DEFINED 78 250 265
REFS 32 DEFINED 37
REFS 29 30 31 215 DEFINED 145
REFS 26 131 2*216 2*217 258 276 281
292 294 302 313 DEFINED 113 114 184

VARIABLES	SN	TYPE	RELOCATION								
				185	256	257	298	299			
2147	YAX	REAL		REFS	276	281	292	294	302	313	315
				DEFINED	261						
2073	YMARG	REAL		REFS	276	281	292	294	302	313	315
				DEFINED	72						
2150	YS	REAL		REFS	276	281	292	294	302	313	315
				DEFINED	263	266					
2224	YSOR	REAL	ARRAY	REFS	32	263	266	DEFINED	38		

FILE NAMES		MODE									
40	DISK										
8	INPUT										
20	OUTPUT										
100	TAPE10										
40	TAPE2										
0	TAPE5	FMT	READS	88	92	100	160	170			
20	TAPE6	FMT	WRITES	101	104	118	129	131	157	172	235
				238	258	276	292	311	313		
60	TAPE8	BUF	READS	125	193	202	MOTION	69	201	326	

EXTERNALS	TYPE	ARGS	REFERENCES			
AREA		8	338			
CONVRT		2	228			
ENDPL		8	341			
GRAPH		32	281	294	302	315
RESET		8	340			
SPLOT		4	324			
SPOT		8	321			
SYMBL		8	339			
UNIT	REAL	1	126	194	203	
XCPLOT		7	132			

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES	
ABS	REAL	1	INTRIN	140	
AMAX1	REAL	8	INTRIN	256	257
AMIN1	REAL	8	INTRIN	241	
MOD	INTEGER	2	INTRIN	262	

STATEMENT LABELS			DEF LINE	REFERENCES		
1353	2	FMT	89	88		
1365	3	FMT	93	92		
532	4		190	2*203	211	
0	5		219	213		
412	6		146	139	140	141
8	7		116	115		
8	11	INACTIVE	127	3*126		
554	12		206	2*194		
8	13	INACTIVE	195	194		
0	14	INACTIVE	204	203		
1028	24		322	319		
0	25		321	320		
1742	26	FMT	312	311		
651	28		252	248		
760	29		306	245	285	
8	31	INACTIVE	308			
1023	50		325	323		
366	69		136	128		

STATEMENT LABELS			DEF LINE	REFERENCES		
415	79		148	142		
222	80		91	331		
700	81		265	2*262		
0	82	INACTIVE	263	262		
703	83		267	264		
236	84		97	336		
1033	85		332	330		
1041	100		337	94	182	199
0	101	INACTIVE	342			
1663	102	FMT	278	276	292	313
1440	103	FMT	119	118		
1425	104	FMT	105	104		
1603	106	FMT	236	235		
1623	107	FMT	259	131	258	
1474	110	FMT	130	129		
1611	111	FMT	239	157	238	
1520	200	FMT	161	160		
1555	201	FMT	188	170		
1561	202	FMT	189	172		
324	1000		117	98		
444	1001		163	153		
620	1002		231	162		
417	1007		150	133		
0	2001	INACTIVE	92			
1412	2002	FMT	103	100	101	

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES	
328	7		I	115 116	38	INSTACK	
373	6	*	I	139 146	228	OPT	EXITS
570	5		I	213 219	158	OPT	
767		*	II	311 311	108		EXT REFS
1011	25	*	IFRH	320 321	78		EXT REFS

COMMON BLOCKS	LENGTH
/ /	15535
LCMC	10000 LCM

STATISTICS

PROGRAM LENGTH	22358	1181
BUFFER LENGTH	1218	81
SCM BLANK COMMON LENGTH	362578	15535
LCM LABELED COMMON LENGTH	234208	10000

```
      1              SUBROUTINE XCPLOT(NSTART,NSTOP,IFLAG,NCPX,B,X,KJ)                XCPLOT     2
                     DIMENSION X(1),B(1),C(5000)                                      MJ78194    6
                103  NMAX=2000                                                        XCPLOT     4
                     BUFFERIN(8,0) (C(1),C(NMAX))                                     XCPLOT     5
      5              IF(UNIT(8)) 101,102,101                                          XCPLOT     6
                102  CONTINUE                                                         XCPLOT     7
                     KJ=0                                                             XCPLOT     8
                     IF(IFLAG.EQ.1) GO TO 100                                         XCPLOT     9
                     IFLAG=1                                                          XCPLOT    10
     10              REWIND 8                                                         XCPLOT    11
                     BUFFERIN(8,0) (C(1),C(NMAX))                                     XCPLOT    12
                     IF(UNIT(8)) 103,104,103                                          XCPLOT    13
                104  CONTINUE                                                         XCPLOT    14
                100  STOP                                                             XCPLOT    15
     15         101  CONTINUE                                                         XCPLOT    16
                     KJ=KJ+1                                                          XCPLOT    17
                     IF(KJ.EQ.200) STOP                                               XCPLOT    18
                     IF(KJ.NE.NCPX) GO TO 103                                         XCPLOT    19
                     IFLAG=0                                                          XCPLOT    20
     20              DO 105 I=NSTART,NSTOP                                            XCPLOT    21
                     II=I-NSTART+1                                                    XCPLOT    22
                     IF(C(I).GT.B(2)) C(I)=B(2)                                       XCPLOT    23
                     IF(C(I).LT.B(1)) C(I)=B(1)                                       XCPLOT    24
                105  X(II)=C(I)                                                       XCPLOT    25
     25              RETURN                                                           XCPLOT    26
                     END                                                              XCPLOT    27
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

22 I 8 ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
22 I 8 ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS DEF LINE REFERENCES
3 XCPLOT 1 25

VARIABLES	SN	TYPE		RELOCATION								
0	B	REAL	ARRAY	F.P.	REFS	2	2*22	2*23	DEFINED	1		
114	C	REAL	ARRAY		REFS	2	22	23	24	DEFINED	2*4	2*11
						22	23					
112	I	INTEGER			REFS	21	2*22	2*23	24	DEFINED	20	
0	IFLAG	INTEGER		F.P.	REFS	8	DEFINED	1	9	19		
113	II	INTEGER			REFS	24	DEFINED	21				
0	KJ	INTEGER		F.P.	REFS	16	17	18	DEFINED	1	7	16
0	NCPX	INTEGER		F.P.	REFS	18	DEFINED	1				
111	NMAX	INTEGER			REFS	4	11	DEFINED	3			
0	NSTART	INTEGER		F.P.	REFS	20	21	DEFINED	1			
0	NSTOP	INTEGER		F.P.	REFS	20	DEFINED	1				
0	X	REAL	ARRAY	F.P.	REFS	2	DEFINED	1	24			

425012

```
FILE NAMES        MODE
      TAPE8     BUF                    READS        4         11      MOTION       10

EXTERNALS          TYPE    ARGS        REFERENCES
      UNIT      REAL        1               5         12

STATEMENT LABELS                 DEF LINE   REFERENCES
   40  100                           14          8
   41  101                           15         2*5
    0  102         INACTIVE           6          5
   16  103                            3         2*12        18
    0  104         INACTIVE          13         12
    0  105                           24         20

LOOPS  LABEL     INDEX       FROM-TO     LENGTH     PROPERTIES
   57  105       I             20 24       13B          OPT

STATISTICS
  PROGRAM LENGTH              11742B    5090
```

```
      SUBROUTINE SPLOT(NPOINT,RAD,SS,JTITLE)                            SPLOT      2
      COMMON KFRM,A(5000),C(5000),B(2),X(5000),ARANGE(2),LAY(3),M(2),   MJ78194    7
     1 PLOTID(3),SCALX(40),SCALY(40) ,STRTIM(40),SIZEX(40),             SPLOT      4
     2NBOXT(3,40),NBOXTI(3,40),SIZEY(40),NODPAT(40),STRTY(40),Y(2)      SPLOT      5
      INTEGER PLOTID                                                    SPLOT      6
      INTEGER COL, CHAR, PLUS, BLANK, ASTRIK                            SPLOT      7
      DIMENSION RAD(400),SS(400),COL(101)                               SPLOT      8
      DIMENSION YLAB(198)                                               SPLOT      9
      DATA(YLAB(J),J=1,18)/7*1H ,                                       SPLOT     10
     1                    1HP,1HO,1HW,1HE,1HR,                         SPLOT     11
     2                     6*1H /                                      SPLOT     12
      DATA(YLAB(J),J=19,36) /3*1H ,                                     SPLOT     13
     $   1HV,1HO,1HI,1HD,1H ,1HF,1HR,1HA,1HC,1HT,1HI,1HD,1HN,           SPLOT     14
     $        2*1H /                                                    SPLOT     15
      DATA(YLAB(J),J=37,54)/ 5*1H ,                                     SPLOT     16
     1                    1HP,1HR,1HE,1HS,1HS,1HU,1HR,1HE,             SPLOT     17
     2                     5*1H /                                      SPLOT     18
      DATA(YLAB(J),J=55,72)/ 5*1H ,                                     SPLOT     19
     1                    1HF,1HL,1HD,1HW,1H ,1HR,1HA,1HT,1HE,         SPLOT     20
     2                     4*1H /                                      SPLOT     21
      DATA(YLAB(J),J=73,90  )/ 6*1H ,                                   SPLOT     22
     1                      1HQ,1HU,1HA,1HL,1HI,1HT,1HY,               SPLOT     23
     2                       5*1H /                                    SPLOT     24
      DATA(YLAB(J),J= 91,108)/ 4*1H ,                                   SPLOT     25
     1                    1HM,1HE,1HA,1HT,1H ,1HF,1HL,1HU,1HX,         SPLOT     26
     2                       5*1H /                                    SPLOT     27
      DATA(YLAB(J),J=109,126)/4*1H ,                                    SPLOT     28
     1                    1HC,1HL,1HA,1HD,1H ,1HT,1HE,1HM,1HP,         SPLOT     29
     3                     5*1H /                                      SPLOT     30
      DATA(YLAB(J),J=127,144)/3*1H ,                                    SPLOT     31
     1                    1HF,1H.,1H ,1HP,1H..1H ,1HD,1HE,1HN,1HS,     SPLOT     32
     1                    1HI,1HT,1HY,                                 SPLOT     33
     3                    2*1H /                                       SPLOT     34
      DATA(YLAB(J),J=145,162)/2*1H ,                                    SPLOT     35
     1                     1HD,1HE,1HL,1HT,1HA,1H ,1HP,1HR,1HE,         SPLOT     36
     2                     1HS,1HS,1HU,1HR,1HE,                         SPLOT     37
     3                     2*1H /                                       SPLOT     38
      DATA(YLAB(J),J=163,180)/4*1H ,                                    SPLOT     39
     1                    IR2,1H-,1HP,1HN,1H ,1HE,1HN,1HT,1HM,         SPLOT     40
     3                     5*1H /                                      SPLOT     41
      DATA(YLAB(J),J=181,198)/4*1H ,                                    SPLOT     42
     1                    1HF,1H.,1HP,1H..1H ,1HE,1HN,1HT,1HM,         SPLOT     43
     1                    5*1H  /                                      SPLOT     44
      DATA PLUS, MINUS, BLANK, ASTRIK /                                 SPLOT     45
     1     1H+ , 1H- , 1H , 1H*    /                                    SPLOT     46
      KT = 2                                                            SPLOT     47
      SUPS          = -1.0E+35                                          SPLOT     48
      SSOLD         = 1.0E+35                                           SPLOT     49
      DO 99 ICH=1,NPOINT                                                SPLOT     50
      SUPS          = AMAX1(SUPS,SS(ICH))                               SPLOT     51
   99 SSOLD         = AMIN1(SSOLD,SS(ICH))                              SPLOT     52
      IF(SUPS.GT.SSOLD) GO TO 102                                       SPLOT     53
      WRITE(6,200) SUPS                                                 SPLOT     54
      RETURN                                                            SPLOT     55
  200 FORMAT(//,1X,*ALL Y VALUES=*,E12.5,                               SPLOT     56
     1 *YOU DONT REALLY WANT A PLOT DO YOU*,//)                         SPLOT     57
  102 CONTINUE                                                          SPLOT     58
```

425014

```
      DO 100 JCH=1,NPOINT                                                SPLOT     59
    100 SS(JCH)       = SS(JCH)-SSOLD                                    SPLOT     60
60    CALL GRTITLE(JTITLE,RAD,NPOINT)                                    SPLOT     61
      NOSY = NPOINT                                                      SPLOT     62
      RMAX = RAD(NOSY)                                                   SPLOT     63
      JAVA = JAVA                                                        SPLOT     64
      DO 20 JAVA=2,NOSY                                                  SPLOT     65
65    LORIN = JAVA - 1                                                   SPLOT     66
      KNAPP = KNAPP                                                      SPLOT     67
      DO 18 KNAPP=JAVA,NOSY                                              SPLOT     68
      IF (SS(KNAPP)-SS(LORIN)) 18,18,11                                  SPLOT     69
   11 ATEMP = SS(LORIN)                                                  SPLOT     70
70    SS(LORIN) = SS(KNAPP)                                              SPLOT     71
      SS(KNAPP) = ATEMP                                                  SPLOT     72
      ATEMP = RAD(LORIN)                                                 SPLOT     73
      RAD(LORIN) = RAD(KNAPP)                                            SPLOT     74
      RAD(KNAPP) = ATEMP                                                 SPLOT     75
75    18 CONTINUE                                                        SPLOT     76
      IF(SS(LORIN)/SS(1)-.01) 21,20,20                                   SPLOT     77
   20 CONTINUE                                                           SPLOT     78
      JMAX = NOSY                                                        SPLOT     79
      GO TO 22                                                           SPLOT     80
80    21 JMAX = JAVA - 1                                                 SPLOT     81
   22 CONTINUE                                                           SPLOT     82
      SMAX          = SS(1)                                              SPLOT     83
      JNEXT = 1                                                          SPLOT     84
      MASER = MASER                                                      SPLOT     85
85    DO 42 MASER=1,51                                                   SPLOT     86
      ATEMP = MASER                                                      SPLOT     87
      COL(1) = PLUS                                                      SPLOT     88
      COL(101) = PLUS                                                    SPLOT     89
      IF(MASER-1) 26,26,24                                               SPLOT     90
90    24 IF(MASER-51) 28,26,28                                           SPLOT     91
   26 CHAR =  MINUS                                                      SPLOT     92
      GO TO 30                                                           SPLOT     93
   28 CHAR = BLANK                                                       SPLOT     94
      NORMAL = NORMAL                                                    SPLOT     95
95    30 DO 32 NORMAL=2,100                                              SPLOT     96
   32 COL(NORMAL) = CHAR                                                 SPLOT     97
      IF(JMAX-JNEXT) 40,34,34                                            SPLOT     98
   34 DO 38 JAVA=JNEXT,JMAX                                              SPLOT     99
      IF(50.*SS(JAVA)/SS(1)-50.5+ATEMP) 39,36,36                         SPLOT    100
100   36 BTEMP = 100.*RAD(JAVA)/RMAX+1.5                                 SPLOT    101
      NORMAL = BTEMP                                                     SPLOT    102
   38 COL(NORMAL) = ASTRIK                                               SPLOT    103
   39 JNEXT = JAVA                                                       SPLOT    104
   40 SPR           =  SMAX*(1.02-ATEMP/50.) +SSOLD                      SPLOT    105
105   KLOCA         = 1                                                  SPLOT    106
      IF(MASER.GE.16.AND.MASER.LE.33) KLOCA = (JTITLE-1)*18+MASER-15     SPLOT    107
      WRITE(6,44)    YLAB(KLOCA),SPR,(COL(NORMAL),NORMAL=1,101)          SPLOT    108
   42 CONTINUE                                                           SPLOT    109
   44 FORMAT(1H,A1,1X,E12.5,1X,101A1)                                    SPLOT    110
110   46 WRITE (6,48)                                                    SPLOT    111
   48 FORMAT(1H ,15X,1H0,8X,2H10,8X,2H20,8X,2H30,8X,2H40,8X,2H50,8X,2H60 SPLOT    112
     1,8X,2H70,8X,2H80,8X,2H90,8X,3H100)                                 SPLOT    113
      LINES = 2                                                          SPLOT    114
      KT = 2                                                             SPLOT    115
```

```
 115              WRITE(6,49)                                                        SPLOT      116
               49 FORMAT(/,53X,*TIME (PER CENT)*)                                    SPLOT      117
                  RETURN                                                             SPLOT      118
                  END                                                                SPLOT      119


      SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS     DEF LINE     REFERENCES
   3 SPLOT           1          54        117

VARIABLES      SN  TYPE             RELOCATION
    1 A            REAL        ARRAY      / /         REFS        2
35233 ARANGE       REAL        ARRAY      / /         REFS        2
  226 ASTRIK       INTEGER                            REFS        6       102    DEFINED       44
  324 ATEMP        REAL                               REFS       71        74         99      104    DEFINED       69       72
                                                        86
23421 B            REAL        ARRAY      / /         REFS        2
  225 BLANK        INTEGER                            REFS        6        93    DEFINED       44
  332 BTEMP        REAL                               REFS      101   DEFINED        100
11611 C            REAL        ARRAY      / /         REFS        2
  311 CHAR         INTEGER                            REFS        6        96    DEFINED       91       93
  336 COL          INTEGER     ARRAY                  REFS        6         7        107  DEFINED       87       88       96
                                                       102
35240 H            REAL        ARRAY      / /         REFS        2
  315 ICH          INTEGER                            REFS       50        51    DEFINED       49
  321 JAVA         INTEGER                            REFS       63        65         67       80       99      100      103
                                                    DEFINED      63        64         98
  316 JCH          INTEGER                            REFS     2*59   DEFINED         58
  325 JMAX         INTEGER                            REFS       97        98    DEFINED       78       80
  327 JNEXT        INTEGER                            REFS       97        98    DEFINED       83      103
    0 JTITLE       INTEGER                F.P.        REFS       60       106    DEFINED        1
    0 KFRH         INTEGER               / /          REFS        2
  334 KLOCA        INTEGER                            REFS      107   DEFINED        105      106
  323 KNAPP        INTEGER                            REFS       66        68         70       71       73       74
                                                    DEFINED      66        67
  312 KT           INTEGER                          DEFINED      46       114
35235 LAY          INTEGER     ARRAY      / /         REFS        2
  335 LINES      * INTEGER                          DEFINED     113
  322 LORIN        INTEGER                            REFS       68        69         70       72       73       76
                                                    DEFINED      65
  330 MASER        INTEGER                            REFS       84        86         89       90    3*106
                                                    DEFINED      84        85
  224 MINUS        INTEGER                            REFS       91   DEFINED         44
35505 NBOXT        INTEGER     ARRAY      / /         REFS        2
35675 NBOXTI       INTEGER     ARRAY      / /         REFS        2
36135 NODPAT       INTEGER     ARRAY      / /         REFS        2
  331 NORMAL       INTEGER                            REFS       94        96        102      107  DEFINED       94       95
                                                       101      107
  317 NOSY         INTEGER                            REFS       62        64         67       78  DEFINED       61
    0 NPOINT       INTEGER                F.P.        REFS       49        58         60       61  DEFINED        1
35242 PLOTID       INTEGER     ARRAY      / /         REFS        2         5
  223 PLUS         INTEGER                            REFS        6        87         88  DEFINED       44
    0 RAD          REAL        ARRAY      F.P.        REFS        7        60         62       72       73      100
```

425016

VARIABLES	SN	TYPE	RELOCATION								
				DEFINED	1	73	74				
320	RMAX	REAL		REFS	100	DEFINED	62				
35245	SCALX	REAL	ARRAY / /	REFS	2						
35315	SCALY	REAL	ARRAY / /	REFS	2						
35435	SIZEX	REAL	ARRAY / /	REFS	2						
36065	SIZEY	REAL	ARRAY / /	REFS	2						
326	SMAX	REAL		REFS	104	DEFINED	82				
333	SPR	REAL		REFS	107	DEFINED	104				
0	SS	REAL	ARRAY F.P.	REFS	7	50	51	59	2*68	69	70
				2*76	82	2*99	DEFINED	1	59	70	71
314	SSOLD	REAL		REFS	51	52	59	104	DEFINED	48	51
35365	STRTIM	REAL	ARRAY / /	REFS	2						
36205	STRTY	REAL	ARRAY / /	REFS	2						
313	SUPS	REAL		REFS	50	52	53	DEFINED	47	50	
23423	X	REAL	ARRAY / /	REFS	2						
36255	Y	REAL	ARRAY / /	REFS	2						
503	YLAB	REAL	ARRAY	REFS	8	107	DEFINED	9	12	15	18
				21	24	27	30	34	38	41	

FILE NAMES	MODE					
TAPE6	FMT	WRITES	53	107	110	115

EXTERNALS	TYPE	ARGS	REFERENCES
GRTITLE		3	60

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES
AMAX1	REAL	0	INTRIN	50
AMIN1	REAL	0	INTRIN	51

STATEMENT LABELS			DEF LINE	REFERENCES	
0	11	INACTIVE	69	68	
101	18		75	67	2*68
0	20		77	64	2*76
114	21		80	76	
116	22		81	79	
0	24	INACTIVE	90	89	
127	26		91	2*89	90
131	28		93	2*90	
133	30		95	92	
0	32		96	95	
0	34	INACTIVE	98	2*97	
0	36	INACTIVE	100	2*99	
0	38		102	98	
163	39		103	99	
165	40		104	97	
0	42		108	85	
251	44	FMT	109	107	
0	46	INACTIVE	110		
260	48	FMT	111	110	
274	49	FMT	116	115	
0	99		51	49	
0	100		59	58	
42	102		57	52	
233	200	FMT	55	53	

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES		
26	99		ICH	49 51	6B	INSTACK		
46	100		JCH	58 59	3B	INSTACK		
64	20	*	JAVA	64 77	26B		EXITS	NOT INNER
74	18		KNAPP	67 75	6B	INSTACK		
121	42	*	MASER	85 108	70B		EXT REFS	NOT INNER
136	32		NORMAL	95 96	3B	INSTACK		
145	38	*	JAVA	98 102	16B	OPT	EXITS	

COMMON BLOCKS	LENGTH
/ /	15535

STATISTICS

PROGRAM LENGTH	10318	537
SCM BLANK COMMON LENGTH	362578	15535

425018

```
      SUBROUTINE GRTITLE(JTITLE,TIME,NUPP)                                  GRTITLE     2
      COMMON KFRH,A(5000),C(5000),B(2),X(5000),ARANGE(2),LAY(3),H(2),       MJ78194     8
     1 PLOTID(3),SCALX(40),SCALY(40) ,STRTIM(40),SIZEX(40),                 GRTITLE     4
     2NBOXT(3,40),NBOXTI(3,40),SIZEY(40),NODPAT(40),STRTY(40),Y(2)          GRTITLE     5
      INTEGER PLOTID                                                        GRTITLE     6
      DIMENSION YTITLE(3,11),TIME(1)                                        GRTITLE     7
      DATA(YTITLE(I),I=1,33)/10H          ,10H PRESSURE ,10H(PSIA)     ,   GRTITLE     8
     1                  10H          ,10HNORMALIZED,10H VOL FLOW ,         GRTITLE     9
     1                       10H          ,10H PUMP HEAD,10H (PSI)     ,   GRTITLE    10
     2                       10H          ,10HNORMALIZED,10H PUMP HEAD,    GRTITLE    11
     7                       10H          ,10HSP VOLUME ,10H(FT3/LBM) ,    GRTITLE    12
     1                  10H          ,10HM FLUX (LB,10HM/FT-SEC2),         GRTITLE    13
     1                  10H          ,10H  VOID FRA,10HCTION      ,        GRTITLE    14
     1                  10H          ,10HNORMALIZED,10H PMP SPEED,         GRTITLE    15
     8                       10H          ,10HNORMALIZED,10H TORQUE    ,   GRTITLE    16
     1                  10H          ,10HPUMP ACCL ,10H(RAD/SEC2),         GRTITLE    17
     1                  10H          ,10H   RAW  DA,10HTA         /        GRTITLE    18
      WRITE(6,3)(PLOTID(I),I=1,3)                                           GRTITLE    19
      WRITE(6,4)(NBOXTI(I,KFRH  ),I=1,3),KFRH                               GRTITLE    20
     3 FORMAT(1H1,//,42X,3A10)                                              GRTITLE    21
     4 FORMAT(/,42X,3A10,I5)                                                GRTITLE    22
      WRITE(6,1) (YTITLE(I,JTITLE),I=1,3)                                   GRTITLE    23
      WRITE(6,2)  TIME(1),TIME(NUPP)                                        GRTITLE    24
     1 FORMAT(    22X,3A10,* VS. PERCENT OF TIME INTERVAL*)                 GRTITLE    25
     2 FORMAT(27X,*INITIAL TIME=*,F12.5,* END TIME=*,F12.5)                 GRTITLE    26
      RETURN                                                                GRTITLE    27
      END                                                                   GRTITLE    28
```

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS

		DEF LINE	REFERENCES
3	GRTITLE	1	26

VARIABLES

		SN	TYPE		RELOCATION								
1	A		REAL	ARRAY	/ /	REFS	2						
35233	ARANGE		REAL	ARRAY	/ /	REFS	2						
23421	B		REAL	ARRAY	/ /	REFS	2						
11611	C		REAL	ARRAY	/ /	REFS	2						
35240	H		REAL	ARRAY	/ /	REFS	2						
76	I		INTEGER			REFS	18	19	22	DEFINED	18	19	22
0	JTITLE		INTEGER		F.P.	REFS	22	DEFINED	1				
0	KFRH		INTEGER		/ /	REFS	2	2*19					
35235	LAY		INTEGER	ARRAY	/ /	REFS	2						
35505	NBOXT		INTEGER	ARRAY	/ /	REFS	2						
35675	NBOXTI		INTEGER	ARRAY	/ /	REFS	2	19					
36135	NODPAT		INTEGER	ARRAY	/ /	REFS	2						
0	NUPP		INTEGER		F.P.	REFS	23	DEFINED	1				
35242	PLOTID		INTEGER	ARRAY	/ /	REFS	2	5	18				
35245	SCALX		REAL	ARRAY	/ /	REFS	2						
35315	SCALY		REAL	ARRAY	/ /	REFS	2						
35435	SIZEX		REAL	ARRAY	/ /	REFS	2						
36065	SIZEY		REAL	ARRAY	/ /	REFS	2						
35365	STRTIM		REAL	ARRAY	/ /	REFS	2						

VARIABLES	SN	TYPE	RELOCATION						
36205	STRTY	REAL	ARRAY	/ /	REFS	2			
0	TIME	REAL	ARRAY	F.P.	REFS	6	2*23	DEFINED	1
23423	X	REAL	ARRAY	/ /	REFS	2			
36255	Y	REAL	ARRAY	/ /	REFS	2			
77	YTITLE	REAL	ARRAY		REFS	6	22	DEFINED	7

FILE NAMES	MODE					
TAPE6	FMT	WRITES	18	19	22	23

STATEMENT LABELS			DEF LINE	REFERENCES
62	1	FMT	24	22
78	2	FMT	25	23
43	3	FMT	20	18
46	4	FMT	21	19

COMMON BLOCKS	LENGTH
/ /	15535

STATISTICS		
PROGRAM LENGTH	1408	96
SCM BLANK COMMON LENGTH	362578	15535

```
      SUBROUTINE CONVRT(JK,JKH)                                          CONVRT     2
CONVRT ACCEPTS INTERERS UP T  999 AND RETURNS UP TP 3 CHAR HOLL           CONVRT     3
C                                                                        CONVRT     4
      DIMENSION IJ(5),IH(10),IK(5)                                       CONVRT     5
      DATA(IH(I),I=1,10)/1H0,1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9/        CONVRT     6
      JKH=0                                                              CONVRT     7
      K1 = 1H                                                            CONVRT     8
      JL = ALOG10(FLOAT(JK))                                             CONVRT     9
      IF(JL.LT.1) GO TO 25                                               CONVRT    10
      JN=JL+1                                                            CONVRT    11
      IF(JL.GT.3) GO TO 31                                               CONVRT    12
      GO TO (1,2,3),JL                                                   CONVRT    13
    1 IJ(1)  =  JK/10                                                    CONVRT    14
      ISUM = IJ(1) * 10                                                  CONVRT    15
      IJ(2) = JK- ISUM                                                   CONVRT    16
    5 DO 20 K=1,JN                                                       CONVRT    17
      N6=-(K-1)*6                                                        CONVRT    18
      N3=-N6                                                             CONVRT    19
      DO 10 N1=1,10                                                      CONVRT    20
      ND  =  N1 - 1                                                      CONVRT    21
      NSAVE  =  N1                                                       CONVRT    22
      IF( IJ(K) .EQ. ND) GO TO 15                                        CONVRT    23
   10 CONTINUE                                                           CONVRT    24
   15 IJ(K)  =  IH(NSAVE)                                                CONVRT    25
      IK(K)=IJ(K).AND.MASK(6)                                            CONVRT    26
      JS=SHIFT(IK(K),N6).AND..NOT.MASK(N3)                               CONVRT    27
      JKH=JKH.OR.JS                                                      CONVRT    28
C      PRINT 22, JKH,JKH                                                 CONVRT    29
 22   FORMAT(2X,022,A10)                                                 CONVRT    30
   20 CONTINUE                                                           CONVRT    31
      RETURN                                                             CONVRT    32
    2 IJ(1)  =  JK/100                                                   CONVRT    33
      ISUM  =  IJ(1) * 100                                               CONVRT    34
      IJ(2)  =  (JK - ISUM) / 10                                         CONVRT    35
      ISUM  =  ISUM + IJ(2) * 10                                         CONVRT    36
      IJ(3)  =  JK - ISUM                                                CONVRT    37
      GO TO 5                                                            CONVRT    38
   30 FORMAT( 10A1)                                                      CONVRT    39
   40 FORMAT( 5X,A10)                                                    CONVRT    40
    3 CONTINUE                                                           CONVRT    41
      IJ(1) = JK/1000                                                    CONVRT    42
      ISUM= IJ(1) *1000                                                  CONVRT    43
      JK=JK-ISUM                                                         CONVRT    44
      IJ(2)  =  JK/100                                                   CONVRT    45
      ISUM  =  IJ(2) * 100                                               CONVRT    46
      IJ(3)  =  (JK - ISUM) / 10                                         CONVRT    47
      ISUM  =  ISUM + IJ(3) * 10                                         CONVRT    48
      IJ(4)  =  JK - ISUM                                                CONVRT    49
      GO TO 5                                                            CONVRT    50
   25 DO 35 K=1,9                                                        CONVRT    51
      IF(JK.EQ.K) GO TO 36                                               CONVRT    52
   35 CONTINUE                                                           CONVRT    53
      K= 0                                                               CONVRT    54
      JKH=IH(1)                                                          CONVRT    55
      RETURN                                                             CONVRT    56
   36 JKH=IH(K+1)                                                        CONVRT    57
      RETURN                                                             CONVRT    58
```

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```
                31  PRINT 32                                                        CONVRT     59
                32  FORMAT(36H0 * ARGUMENT TOO LARGE FOR CONVRT *      )            CONVRT     60
     60             RETURN                                                          CONVRT     61
                    END                                                             CONVRT     62
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

12 I AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS		DEF LINE	REFERENCES									
3	CONVRT	1	31	55	57	60						

VARIABLES	SN	TYPE		RELOCATION									
176	IH	INTEGER	ARRAY		REFS	4	24	54	56	DEFINED	5		
171	IJ	INTEGER	ARRAY		REFS	4	14	22	25	33	35	42	
					45	47	DEFINED	13	15	24	32	34	
					36	41	44	46	48				
218	IK	INTEGER	ARRAY		REFS	4	26	DEFINED	25				
161	ISUM	INTEGER			REFS	15	34	35	36	43	46	47	
					48	DEFINED	14	33	35	42	45	47	
0	JK	INTEGER		F.P.	REFS	8	13	15	32	34	36	41	
					43	44	46	48	51	DEFINED	1	43	
8	JKH	INTEGER		F.P.	REFS	27	DEFINED	1	6	27	54	56	
157	JL	INTEGER			REFS	9	10	11	12	DEFINED	8		
160	JN	INTEGER			REFS	16	DEFINED	10					
178	JS	INTEGER			REFS	27	DEFINED	26					
162	K	INTEGER			REFS	17	22	24	2*25	26	51	56	
					DEFINED	16	50	53					
156	K1	* INTEGER			DEFINED	7							
166	ND	INTEGER			REFS	22	DEFINED	20					
167	NSAVE	INTEGER			REFS	24	DEFINED	21					
165	N1	INTEGER			REFS	20	21	DEFINED	19				
164	N3	INTEGER			REFS	26	DEFINED	18					
163	N6	INTEGER			REFS	18	26	DEFINED	17				

FILE NAMES	MODE		
OUTPUT	FMT	WRITES	58

EXTERNALS	TYPE	ARGS		REFERENCES
ALOG10	REAL	1	LIBRARY	8

INLINE FUNCTIONS	TYPE	ARGS		DEF LINE	REFERENCES	
FLOAT	REAL	1	INTRIN		8	
MASK	NO TYPE	1	INTRIN		25	26
SHIFT	NO TYPE	2	INTRIN		26	

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STATEMENT LABELS				DEF LINE	REFERENCES	
36	1			13	12	
72	2			32	12	
103	3			40	12	
43	5			16	37	49
0	10			23	19	
57	15			24	22	
0	20			30	16	
135	22	FMT	NO REFS	29		
117	25			50	9	
140	30	FMT	NO REFS	38		
132	31			58	11	
147	32	FMT		59	58	
0	35			52	50	
127	36			56	51	
142	40	FMT	NO REFS	39		

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	
44	20	* K	16 30	26B		NOT INNER
50	10	* N1	19 23	78	INSTACK	EXITS
120	35	* K	50 52	48	INSTACK	EXITS

STATISTICS

PROGRAM LENGTH	221B	145

425023

Appendix 4.2H

TRANSIENT CONVERSION CONSTANT FILES

CAL 246

```
100=        6 13 14 21 22 30 31
110=        5  5  6 10 28 40
120=        8 40  8  9 23 24 33 27 38
130=        1 11
140=        4  1  2 26 29
150=        2  4  3
160=        1 12
170=        9 15 16 17 18 19 20 34 35 36
180=     1  6  8  9
190= 15.598 15.124 14.416 16.446 16.000
200=   50.000 49.856 15.906 15.990 15.800 50.
210=       -0.000
220=       00.000 00.000 00.000 00.000
230=       00.000 00.000 00.000 00.000
240=       00.000
250=        -.112002E+05  .762538E+04  .193547E-02  .000000E+00
260=   .000000E+00  .000000E+00  .426678E+04
270=         .110287E+05  .838199E+04 -.301785E-02  .000000E+00
280=   .000000E+00  .000000E+00  .192072E+04
290=        -.210327E+00  .000000E+00  .349157E+01  .000000E+00
300=   .000000E+00  .000000E+00  .166766E+01
310=        -.102264E+00  .000000E+00  .339740E+01  .000000E+00
320=   .000000E+00  .000000E+00  .147453E+01
330=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
340=   .000000E+00  .000000E+00  .212629E+00
350=         .600000E+01  .119867E+00  .233609E+02  .119918E-02
360=   .000000E+00  .000000E+00  .211714E+00
370=        -.975000E+01  .928953E-01  .313164E+01 -.103816E-04
380=   .276094E-04  .100000E+01  .112353E+00
390=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
400=   .151235E-04  .100000E+01  .895181E-01
410=         .000000E+00  .108053E+00  .395959E+00 -.822648E-04
420=   .397189E-06  .100000E+01  .245581E-01
430=         .000000E+00 -.910085E+00  .238685E+02 -.596623E-02
440=   .000000E+00  .000000E+00  .281617E+01
450=         .000000E+00  .119416E+03 -.500000E+00  .000000E+00
460=   .000000E+00  .000000E+00  .122500E+01
470=         .000000E+00  .100000E+03  .000000E+00  .100000E+01
480=   .000000E+00  .000000E+00  .500000E+01
490=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
500=   .000000E+00  .000000E+00  .200000E+01
510=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
520=   .000000E+00  .000000E+00  .200000E+01
530=         .323211E+03 -.706046E+02 -.113214E+02  .114757E+02
540=   .000000E+00  .000000E+00  .620000E-02
```

```
 550=        .229189E+03 -.505677E+02  .123619E+01  .923197E+01
 560=   .000000E+00  .000000E+00  .600070E-02
 570=        .761968E+03 -.159263E+03 -.251696E+02  .221986E+02
 580=   .000000E+00  .000000E+00  .211000E-01
 590=        .276378E+03 -.608650E+02 -.408810E+00  .120236E+02
 600=   .000000E+00  .000000E+00  .136000E-01
 610=        .270634E+03 -.592212E+02 -.940661E+01  .883336E+01
 620=   .000000E+00  .000000E+00  .530000E-02
 630=        .840955E+03 -.174589E+03 -.319922E+02  .215178E+02
 640=   .000000E+00  .000000E+00  .144000E-01
 650=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 660=   .000000E+00  .000000E+00  .200000E+01
 670=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 680=   .000000E+00  .000000E+00  .200000E+01
 690=        .125000E+03 -.462861E-03  .394517E-01  .211469E-08
 700=   .483871E-06  .100000E+01  .125054E-02
 710=        .000000E+00 -.580747E-02  .156941E+00 -.440003E-05
 720=   .132133E-05  .100000E+01  .766303E-02
 730=        .126000E+03 -.264691E-02  .154023E+00  .276724E-05
 740=   .000000E+00  .000000E+00  .000000E+00
 750=        .118407E+05  .115439E+05 -.107558E-02  .000000E+00
 760=   .000000E+00  .000000E+00  .388647E+04
 770=       -.975000E+01 -.452136E+00  .313969E+01  .000000E+00
 780=   .000000E+00  .100000E+01  .707739E+00
 790=        .500000E+01 -.171052E-01  .234816E+02  .175872E-03
 800=   .000000E+00  .000000E+00  .521966E+01
 810=       -.208223E+05  .168104E+05  .000000E+00  .000000E+00
 820=   .000000E+00  .000000E+00  .000000E+00
 830=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 840=   .000000E+00  .000000E+00  .200000E+01
 850=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 860=   .000000E+00  .000000E+00  .200000E+01
 870=        .781250E+00  .000000E+00  .000000E+00  .000000E+00
 880=   .000000E+00  .000000E+00  .200000E+01
 890=        .000000E+00 -.540396E-01  .418270E+00  .617830E-05
 900=   .507573E-05  .100000E+01  .138846E+01
 910=        .954405E+02 -.304717E+02  .258026E+02 0.
 920=   .000000E+00  .000000E+00  .374000E-01
 930=        .139675E+03 -.352381E+02  .192194E+02 0.
 940=   .000000E+00  .000000E+00  .115000E-01
 950=        .193781E+03 -.470585E+02  .717779E+01 0.
 960=   .000000E+00  .000000E+00  .141000E-01
 970=       -.975000E+01 -.452136E+00  .313969E+01  .000000E+00
 980=   .000000E+00  .100000E+01  .707739E+00
 990=        .000000E+00 -.741056E-02  .393187E+00 -.532904E-05
1000=   .355183E-05  .100000E+01  .000000E+00
```

CAL 252

```
100=        6 13 14 21 22 30 31
110=        5  5  6 10 28 40
120=        8 40  8  9 23 24 33 27 38
130=        1 11
140=        4  1  2 26 29
150=        2  4  3
160=        1 12
170=        9 15 16 17 18 19 20 34 35 36
180=     1  6  8  9 10 11
190= 15.456 15.060 14.977 15.912 16.000
200=   50.000 49.861 15.898 16.014 15.748 50.
210=       -0.000
220=       00.000 00.000 00.000 00.000
230=       00.000 00.000 00.000 00.000
240=       00.000
250=        -.112002E+05  .762538E+04  .193547E-02  .000000E+00
260=   .000000E+00  .000000E+00  .426678E+04
270=         .110287E+05  .838199E+04 -.301785E-02  .000000E+00
280=   .000000E+00  .000000E+00  .192072E+04
290=        -.210327E+00  .000000E+00  .349157E+01  .000000E+00
300=   .000000E+00  .000000E+00  .166766E+01
310=        -.102264E+00  .000000E+00  .339740E+01  .000000E+00
320=   .000000E+00  .000000E+00  .147453E+01
330=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
340=   .000000E+00  .000000E+00  .212629E+00
350=         .500000E+01  .119867E+00  .233609E+02  .119918E-02
360=   .000000E+00  .000000E+00  .211714E+00
370=        -.975000E+01  .928953E-01  .313164E+01 -.103816E-04
380=   .276094E-04  .100000E+01  .112353E+00
390=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
400=   .151235E-04  .100000E+01  .895181E-01
410=         .000000E+00  .108053E+00  .395959E+00 -.822648E-04
420=   .397189E-06  .100000E+01  .245581E-01
430=         .000000E+00 -.910085E+00  .238685E+02 -.596623E-02
440=   .000000E+00  .000000E+00  .281617E+01
450=         .000000E+00  .119416E+03 -.500000E+00  .000000E+00
460=   .000000E+00  .000000E+00  .122500E+01
470=         .000000E+00  .100000E+03  .000000E+00  .100000E+01
480=   .000000E+00  .000000E+00  .500000E+01
490=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
500=   .000000E+00  .000000E+00  .200000E+01
510=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
520=   .000000E+00  .000000E+00  .200000E+01
530=         .328211E+03 -.706046E+02 -.113214E+02  .114757E+02
540=   .000000E+00  .000000E+00  .620000E-02
```

```
 550=        .229189E+03 -.505677E+02  .123619E+01  .923197E+01
 560=    .000000E+00  .000000E+00  .600000E-02
 570=        .751968E+03 -.159263E+03 -.251696E+02  .221986E+02
 580=    .000000E+00  .000000E+00  .211000E-01
 590=        .276378E+03 -.608650E+02 -.408810E+00  .120236E+02
 600=    .000000E+00  .000000E+00  .136000E-01
 610=        .270634E+03 -.592212E+02 -.940661E+01  .883336E+01
 620=    .000000E+00  .000000E+00  .530000E-02
 630=        .840955E+03 -.174589E+03 -.319922E+02  .215178E+02
 640=    .000000E+00  .000000E+00  .144000E-01
 650=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 660=    .000000E+00  .000000E+00  .200000E+01
 670=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 680=    .000000E+00  .000000E+00  .200000E+01
 690=        .125000E+03 -.462861E-03  .394517E-01  .211469E-08
 700=    .483871E-06  .100000E+01  .125054E-02
 710=        .000000E+00 -.580747E-02  .156941E+00 -.440003E-06
 720=    .132133E-05  .100000E+01  .766303E-02
 730=        .126000E+03 -.264691E-02  .154023E+00  .276724E-05
 740=    .000000E+00  .000000E+00  .000000E+00
 750=        .118407E+05  .115439E+05 -.107558E-02  .000000E+00
 760=    .000000E+00  .000000E+00  .388647E+04
 770=       -.975000E+01 -.452136E+00  .313969E+01  .000000E+00
 780=    .000000E+00  .100000E+01  .707739E+00
 790=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
 800=    .000000E+00  .000000E+00  .521966E+01
 810=       -.208223E+05  .168104E+05 0.           .000000E+00
 820=    .000000E+00  .000000E+00  .000000E+00
 830=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 840=    .000000E+00  .000000E+00  .200000E+01
 850=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 860=    .000000E+00  .000000E+00  .200000E+01
 870=        .781250E+00  .000000E+00  .000000E+00  .000000E+00
 880=    .000000E+00  .000000E+00  .200000E+01
 890=        .000000E+00 -.540394E-01  .418270E+00  .617830E-05
 900=    .507573E-05  .100000E+01  .138846E+01
 910=        .954405E+02 -.304717E+02  .258026E+02 0.
 920=    .000000E+00  .000000E+00  .374000E-01
 930=        .133675E+03 -.352381E+02  .192194E+02 0.
 940=    .000000E+00  .000000E+00  .115000E-01
 950=        .133781E+03 -.470585E+02  .717779E+01 0.
 960=    .000000E+00  .000000E+00  .141000E-01
 970=       -.975000E+01 -.452136E+00  .313969E+01  .000000E+00
 980=    .000000E+00  .100000E+01  .707739E+00
 990=        .000000E+00 -.741056E-02  .393187E+00 -.532904E-05
1000=    .355183E-05  .100000E+01  .000000E+00
```

CAL 475

```
100=        6 13 14 21 22 30 31
110=        5  5  6 10 28 40
120=        8  7  8  9 23 24 33 27 38
130=        1 11
140=        3  1  2 26 40
150=        2  4  3
160=        1 12
170=        9 15 16 17 18 19 20 34 35 36
180=     1  6  8  9 10 11
190= 15.381 16.029 14.404 16.051 16.000
200=   50.286 49.805 15.889 15.987 15.508 50.
210=      -0.000
220=      00.000 00.000  0.000 00.000
230=       0.018  0.020 00.000 00.000
240=      00.000
250=       -.112002E+05  .762538E+04  .193547E-02  .000000E+00
260=   .000000E+00  .000000E+00  .426678E+04
270=        .110287E+05  .838199E+04 -.301785E-02  .000000E+00
280=   .000000E+00  .000000E+00  .192072E+04
290=       -.210327E+00  .000000E+00  .349157E+01  .000000E+00
300=   .000000E+00  .000000E+00  .166766E+01
310=       -.102264E+00  .000000E+00  .339740E+01  .000000E+00
320=   .000000E+00  .000000E+00  .147453E+01
330=        .500000E+01 -.288955E+00  .231508E+02  .267766E-02
340=   .000000E+00  .000000E+00  .212629E+00
350=        .500000E+01 -.587139E-01  .233839E+02  .136798E-02
360=   .000000E+00  .000000E+00  .200538E+00
370=       -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
380=   .314705E-05  .100000E+01  .112353E+00
390=       -.975000E+01  .257486E-01  .499235E+01  .171706E-04
400=   .151235E-04  .100000E+01  .895181E-01
410=        .000000E+00  .108053E+00  .395959E+00 -.822648E-04
420=   .397189E-06  .100000E+01  .245581E-01
430=        .000000E+00 -.910085E+00  .238685E+02 -.596623E-02
440=   .000000E+00  .000000E+00  .281617E+01
450=        .000000E+00  .119416E+03 -.500000E+00  .000000E+00
460=   .000000E+00  .000000E+00  .122500E+01
470=        .000000E+00  .100000E+03  .000000E+00  .100000E+01
480=   .000000E+00  .000000E+00  .500000E+01
490=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
500=   .000000E+00  .000000E+00  .200000E+01
510=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
520=   .000000E+00  .000000E+00  .200000E+01
530=        .328211E+03 -.706046E+02 -.113214E+02  .114757E+02
540=   .000000E+00  .000000E+00  .620000E-02
```

```
550=        .229189E+03 -.505677E+02  .123619E+01  .923197E+01
560=   .000000E+00  .000000E+00  .600000E-02
570=        .761968E+03 -.159263E+03 -.251696E+02  .221986E+02
580=   .000000E+00  .000000E+00  .211000E-01
590=        .276378E+03 -.608650E+02 -.408810E+00  .120236E+02
600=   .000000E+00  .000000E+00  .136000E-01
610=        .270634E+03 -.592212E+02 -.940661E+01  .883336E+01
620=   .000000E+00  .000000E+00  .530000E-02
630=        .840955E+03 -.174589E+03 -.319922E+02  .215178E+02
640=   .000000E+00  .000000E+00  .144000E-01
650=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
660=   .000000E+00  .000000E+00  .200000E+01
670=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
680=   .000000E+00  .000000E+00  .200000E+01
690=        .682000E+02 -.462861E-03  .394517E-01  .211469E-08
700=   .483871E-06 -.100000E+01  .125054E-02
710=        .000000E+00 -.580747E-02  .156941E+00 -.440003E-06
720=   .132133E-05  .100000E+01  .766303E-02
730=        .125000E+03 -.264691E-02  .154023E+00  .276724E-05
740=   .000000E+00  .000000E+00  .000000E+00
750=        .118407E+05  .115439E+05 -.107558E-02  .000000E+00
760=   .000000E+00  .000000E+00  .388647E+04
770=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
780=   .491312E-04  .100000E+01  .484888E+00
790=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
800=   .000000E+00  .000000E+00  .111429E+00
810=        .000000E+00  .171399E+00  .232378E+02  .330077E-02
820=   .000000E+00  .000000E+00  .000000E+00
830=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
840=   .000000E+00  .000000E+00  .200000E+01
850=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
860=   .000000E+00  .000000E+00  .200000E+01
870=        .791250E+00  .000000E+00  .000000E+00  .000000E+00
880=   .000000E+00  .000000E+00  .200000E+01
890=        .000000E+00 -.540394E-01  .418270E+00  .617830E-05
900=   .507573E-05  .100000E+01  .138846E+01
910=        .954405E+02 -.304717E+02  .258026E+02 0.
920=   .000000E+00  .000000E+00  .374000E-01
930=        .139675E+03 -.352381E+02  .192194E+02 0.
940=   .000000E+00  .000000E+00  .115000E-01
950=        .193781E+03 -.470585E+02  .717779E+01 0.
960=   .000000E+00  .000000E+00  .141000E-01
970=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
980=   .491312E-04  .100000E+01  .707739E+00
990=        .000000E+00 -.741056E-02  .393187E+00 -.532904E-05
1000=  .355183E-05  .100000E+01  .000000E+00
1010=      -.393000E+00  .996470E+00 -.111300E+01  .100130E+01
1020=  0.          0.          0.
```

CAL 497

```
100=        6 13 14 40 22 30 31
110=        5  5  6 40 28 40
120=        8  7  8  9 23 24 33 27 40
130=        1 11
140=        3  1  2 26 40
150=        2  4  3
160=        1 12
170=        9 15 16 17 18 19 20 34 10 21
180=     1  6  8  9 10 11
190= 15.347 15.976 16.000 16.015 16.000
200=   50.259 49.813 15.891 15.983 15.496 50.
210=       -0.000
220=       00.000 00.000 0.000 00.000
230=        0.001  0.000  0.000  0.000
240=       00.000
250=         -.112002E+05  .762538E+04  .193547E-02  .000000E+00
260=   .000000E+00  .000000E+00  .482677E+04
270=         .110287E+05  .838199E+04 -.301785E-02  .000000E+00
280=   .000000E+00  .000000E+00  .652947E+04
290=         .199339E+01  .000000E+00  .312088E+01  .000000E+00
300=   .000000E+00  .000000E+00  .266211E+01
310=         .188269E+01  .000000E+00  .315384E+01  .000000E+00
320=   .000000E+00  .000000E+00  .271213E+01
330=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
340=   .000000E+00  .000000E+00  .212629E+00
350=         .500000E+01 -.587139E-01  .233839E+02  .136798E-02
360=   .000000E+00  .000000E+00  .200538E+00
370=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
380=   .314705E-05  .100000E+01  .112353E+00
390=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
400=   .151235E-04  .100000E+01  .895181E-01
410=         .000000E+00  .108053E+00  .395959E+00 -.822648E-04
420=   .397189E-06  .100000E+01  .245581E-01
430=         .111965E+03 -.283181E+02  .222152E+02 0.
440=   .000000E+00  .000000E+00  .115000E-01
450=         .000000E+00  .119416E+03 -.500000E+00  .000000E+00
460=   .000000E+00  .000000E+00  .122500E+01
470=         .000000E+00  .100000E+03  .000000E+00  .100000E+01
480=   .000000E+00  .000000E+00  .500000E+01
490=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
500=   .000000E+00  .000000E+00  .200000E+01
510=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
520=   .000000E+00  .000000E+00  .200000E+01
530=         .253543E+03 -.559196E+02  .130459E+01  .115774E+02
540=   .000000E+00  .000000E+00  .620000E-02
```

```
 550=        .210253E+03 -.469282E+02  .414719E+01  .918577E+01
 560=   .000000E+00  .000000E+00  .600000E-02
 570=        .581777E+03 -.125968E+03 -.643061E+01  .221378E+02
 580=   .000000E+00  .000000E+00  .211000E-01
 590=        .249754E+03 -.553683E+02  .423239E+01  .122327E+02
 600=   .000000E+00  .000000E+00  .136000E-01
 610=        .203499E+03 -.454623E+02  .470999E+01  .897324E+01
 620=   .000000E+00  .000000E+00  .530000E-02
 630=        .712207E+03 -.151467E+03 -.204622E+02  .216069E+02
 640=   .000000E+00  .000000E+00  .144000E-01
 650=        .179663E+03 -.434424E+02  .825539E+01 0.
 660=   .000000E+00  .000000E+00  .141000E-01
 670=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 680=   .000000E+00  .000000E+00  .200000E+01
 690=        .682800E+02 -.462861E-03  .394517E-01  .211469E-08
 700=   .483871E-06 -.100000E+01  .125054E-02
 710=        .000000E+00 -.580747E-02  .156941E+00 -.440003E-06
 720=   .132133E-05  .100000E+01  .766303E-02
 730=        .126000E+03 -.264691E-02  .154023E+00  .276724E-05
 740=   .000000E+00  .000000E+00  .000000E+00
 750=        .113407E+05  .115439E+05 -.107558E-02  .000000E+00
 760=   .000000E+00  .000000E+00  .175562E+04
 770=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
 780=   .491312E-04  .100000E+01  .484888E+00
 790=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
 800=   .000000E+00  .000000E+00  .111429E+00
 810=        .000000E+00  .171399E+00  .232378E+02  .380077E-02
 820=   .000000E+00  .000000E+00  .000000E+00
 830=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 840=   .000000E+00  .000000E+00  .200000E+01
 850=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 860=   .000000E+00  .000000E+00  .200000E+01
 870=        .781250E+00  .000000E+00  .000000E+00  .000000E+00
 880=   .000000E+00  .000000E+00  .200000E+01
 890=        .000000E+00 -.540394E-01  .418270E+00  .617830E-05
 900=   .507573E-05  .100000E+01  .138846E+01
 910=        .815984E+02 -.250188E+02  .267052E+02 0.
 920=   .000000E+00  .000000E+00  .374000E-01
 930=        .111965E+03 -.283181E+02  .222152E+02 0.
 940=   .000000E+00  .000000E+00  .115000E-01
 950=        .179663E+03 -.434424E+02  .825539E+01 0.
 960=   .000000E+00  .000000E+00  .141000E-01
 970=       -.975000E+01 -.452136E+00  .313969E+01  .000000E+00
 980=   .000000E+00  .100000E+01  .707739E+00
 990=        .000000E+00 -.741056E-02  .393187E+00 -.532904E-05
1000=   .355183E-05  .100000E+01  .000000E+00
1010=       -.910889E+00  .995166E+00 -.262000E+00  .100020E+01
1020=  0.           0.           0.
```

CAL 676

```
100=        6 13 14 21 40 30 31
110=        5  5  6 10 28 29
120=        8  7  8 40 23 24 33 37 38
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 20 34 35 36
180=     1  6  8  9 10 11
190= 15.064 15.852 14.406 16.061 15.064
200=   50.317 49.770 16.000 16.013 15.454 50.
210=       -0.000
220=       00.000 00.000 0.000 00.000
230=        0.001  0.000  0.000  0.000
240=       00.000
250=        -.112002E+05  .762538E+04  .193547E-02  .000000E+00
260=   .000000E+00  .000000E+00  .140416E+04
270=        .110287E+05  .838199E+04 -.301785E-02  .000000E+00
280=   .000000E+00  .000000E+00  .147096E+04
290=        .000000E+00  .000000E+00  .584328E+01  .000000E+00
300=   .000000E+00  .000000E+00  .832851E+01
310=        .000000E+00  .000000E+00  .493782E+01  .000000E+00
320=   .000000E+00  .000000E+00  .231144E+01
330=        .600000E+01 -.238955E+00  .231508E+02  .267766E-02
340=   .000000E+00  .000000E+00  .759657E-01
350=        .600000E+01 -.587139E-01  .233839E+02  .136798E-02
360=   .000000E+00  .000000E+00  .603705E-01
370=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
380=   .314705E-05  .100000E+01  .417339E+00
390=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
400=   .151235E-04  .100000E+01  .895181E-01
410=        .000000E+00  .000000E+00  .467682E+01  .000000E+00
420=   .000000E+00  .000000E+00  .152450E+01
430=        .000000E+00 -.910085E+00  .238685E+02 -.596623E-02
440=   .000000E+00  .000000E+00  .281617E+01
450=        .000000E+00  .119416E+03 -.880000E+00  .000000E+00
460=   .000000E+00  .000000E+00  .350333E+01
470=        .000000E+00  .100000E+03  .000000E+00  .100000E+01
480=   .000000E+00  .000000E+00  .500000E+01
490=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
500=   .000000E+00  .000000E+00  .200000E+01
510=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
520=   .000000E+00  .000000E+00  .200000E+01
530=        .308134E+03 -.673186E+02 -.554441E+01  .116360E+02
540=   .000000E+00  .000000E+00  .620000E-02
```

```
 550=        .247792E+03 -.544558E+02 -.309541E+01  .921426E+01
 560=   .000000E+00  .000000E+00  .600000E-02
 570=        .639711E+03 -.136398E+03 -.103400E+02  .219621E+02
 580=   .000000E+00  .000000E+00  .711000E-01
 590=        .337476E+03 -.733546E+02 -.101826E+02  .117108E+02
 600=   .000000E+00  .000000E+00  .136000E-01
 610=        .526143E+02 -.109141E+02  .339410E+02  .350297E+01
 620=   .000000E+00  .000000E+00  .530000E-02
 630=        .139635E+03 -.357128E+02  .443004E+02  .200855E+02
 640=   .000000E+00  .000000E+00  .144000E-01
 650=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 660=   .000000E+00  .000000E+00  .200000E+01
 670=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
 680=   .000000E+00  .000000E+00  .404632E+01
 690=        .682800E+02 -.462861E-03  .394517E-01  .211469E-08
 700=   .483871E-06 -.100000E+01  .125054E-02
 710=        .000000E+00 -.580747E-02  .156961E+00 -.440003E-06
 720=   .132133E-05  .100000E+01  .818772E+00
 730=        .126000E+03 -.264691E-02  .154023E+00  .276724E-05
 740=   .000000E+00  .000000E+00  .000000E+00
 750=        .118407E+05  .115439E+05 -.107558E-02  .000000E+00
 760=   .000000E+00  .000000E+00  .165925E+04
 770=       -.381371E+04  .108223E+05 -.907352E-04  .000000E+00
 780=   .000000E+00  .000000E+00  .269921E+04
 790=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
 800=   .000000E+00  .000000E+00  .111429E+00
 810=        .000000E+00  .171399E+00  .232378E+02  .380077E-02
 820=   .000000E+00  .000000E+00  .330880E+00
 830=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 840=   .000000E+00  .000000E+00  .200000E+01
 850=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 860=   .000000E+00  .000000E+00  .200000E+01
 870=        .154667E+01  .000000E+00  .000000E+00  .000000E+00
 880=   .000000E+00  .000000E+00  .200000E+01
 890=        .000000E+00 -.540394E-01  .418270E+00  .617830E-05
 900=   .507573E-05  .100000E+01  .138846E+01
 910=        .100934E+03 -.314983E+02  .263919E+02 0.
 920=   .000000E+00  .000000E+00  .374000E-01
 930=        .126237E+03 -.322973E+02  .191842E+02 0.
 940=   .000000E+00  .000000E+00  .115000E-01
 950=        .185319E+03 -.444359E+02  .607499E+01 0.
 960=   .000000E+00  .000000E+00  .141000E-01
 970=       -.975000E+01 -.589705E-01  .479337E+01 -.797413E-04
 980=   .491312E-04  .100000E+01  .213038E+00
 990=        .000000E+00 -.741056E-02  .393187E+00 -.532904E-05
1000=   .355183E-05  .100000E+01  .000000E+00
1010=        .530000E+00  .997370E+00 -.300000E-01  .999160E+00
1020=  0.           0.           0.
```

426010

CAL 701

```
100=        6 13  14 21  40 30  31
110=        5  5   6 10  28 29
120=        8  7   8 40  23 24  33 37  38
130=        1 11
140=        4  1   2 26  27
150=        4  4   3  9  40
160=        1 12
170=        9 15  16 17  18 19  20 34  35 36
180=     1  6  8   9 10 11
190= 15.088 15.809 14.408 15.999 14.846
200=   50.323 49.790 16.000 16.005 15.543 50.
210=       -0.000
220=       00.000 00.000 0.000 00.000
230=        0.001  0.000  0.000  0.000
240=       00.000
250=        -.112002E+05  .762538E+04  .193547E-02  .000000E+00
260=    .000000E+00  .000000E+00  .128613E+04
270=         .110287E+05  .838199E+04 -.301785E-02  .000000E+00
280=    .000000E+00  .000000E+00  .217978E+04
290=         .000000E+00  .000000E+00  .584328E+01  .000000E+00
300=    .000000E+00  .000000E+00  .109053E+02
310=         .000000E+00  .000000E+00  .493782E+01  .000000E+00
320=    .000000E+00  .000000E+00  .174974E+01
330=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
340=    .000000E+00  .000000E+00  .759657E-01
350=         .600000E+01 -.587139E-01  .233839E+02  .136798E-02
360=    .000000E+00  .000000E+00  .603705E-01
370=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
380=    .314705E-05  .100000E+01  .417339E+00
390=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
400=    .151235E-04  .100000E+01  .895181E-01
410=         .000000E+00  .000000E+00  .467682E+01  .000000E+00
420=    .000000E+00  .000000E+00  .819164E+00
430=         .000000E+00 -.148083E+01  .240031E+02 -.272187E-02
440=    .000000E+00  .000000E+00  .281617E+01
450=         .000000E+00  .119416E+03 -.900000E+00  .000000E+00
460=    .000000E+00  .000000E+00  .350333E+01
470=         .000000E+00  .100000E+03  .000000E+00  .100000E+01
480=    .000000E+00  .000000E+00  .500000E+01
490=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
500=    .000000E+00  .000000E+00  .200000E+01
510=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
520=    .000000E+00  .000000E+00  .200000E+01
530=         .276579E+03 -.611072E+02  .974590E+00  .123829E+02
540=    .000000E+00  .000000E+00  .620000E-02
```

```
 550=        .242858E+03 -.534981E+02 -.259341E+01  .934227E+01
 560=   .000000E+00  .000000E+00  .630000E-02
 570=        .680234E+03 -.143806E+03 -.130946E+02  .222056E+02
 580=   .000000E+00  .000000E+00  .211000E-01
 590=        .316509E+03 -.692539E+02 -.681281E+01  .118701E+02
 600=   .000000E+00  .000000E+00  .136000E-01
 610=        .524333E+02 -.108427E+02  .344746E+02  .354877E+01
 620=   .000000E+00  .000000E+00  .530000E-02
 630=        .929339E+02 -.249714E+02  .477434E+02  .142340E+02
 640=   .000000E+00  .000000E+00  .144000E-01
 650=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 660=   .000000E+00  .000000E+00  .200000E+01
 670=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
 680=   .000000E+00  .000000E+00  .404632E+01
 690=        .682800E+02 -.462861E-03  .394517E-01  .211469E-08
 700=   .483871E-06 -.100000E+01  .125054E-02
 710=        .000000E+00 -.580747E-02  .156941E+00 -.440003E-06
 720=   .132133E-05  .100000E+01  .018772E+00
 730=        .126000E+03 -.264691E-02  .154023E+00  .276724E-05
 740=   .000000E+00  .000000E+00  .000000E+00
 750=        .113407E+05  .115439E+05 -.107558E-02  .000000E+00
 760=   .000000E+00  .000000E+00  .100869E+04
 770=       -.381371E+04  .108223E+05 -.907352E-04  .000000E+00
 780=   .000000E+00  .000000E+00  .298944E+04
 790=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
 800=   .000000E+00  .000000E+00  .111429E+00
 810=        .000000E+00  .171399E+00  .232378E+02  .380077E-02
 820=   .000000E+00  .000000E+00  .330880E+00
 830=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 840=   .000000E+00  .000000E+00  .200000E+01
 850=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 860=   .000000E+00  .000000E+00  .200000E+01
 870=        .154667E+01  .154667E+01  .154667E+01  .154667E+01
 880=   .000000E+00  .000000E+00  .200000E+01
 890=        .000000E+00 -.540394E-01  .418270E+00  .617830E-05
 900=   .507573E-05  .100000E+01  .138845E+01
 910=        .869768E+02 -.280607E+02  .273844E+02 0.
 920=   .000000E+00  .000000E+00  .374000E-01
 930=        .147938E+03 -.376389E+02  .163924E+02 0.
 940=   .000000E+00  .000000E+00  .115000E-01
 950=        .199570E+03 -.478481E+02  .445319E+01 0.
 960=   .000000E+00  .000000E+00  .141000E-01
 970=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
 980=   .491312E-04  .100000E+01  .213038E+00
 990=        .000000E+00 -.741056E-02  .393187E+00 -.532904E-05
1000=   .355183E-05  .100000E+01  .000000E+00
1010=       -.155500E+01  .100573E+01 -.139000E+00  .999755E+00
1020= 0.           0.           0.
```

CAL 846

```
100=        6 13 14 21 40 30 31
110=        5  5  6 40 28 29
120=        8  7  8 40 23 24 33 38 37
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 20 34 35 36
180=     1  6  8  9 10 11
190= 14.803 16.427 16.000 16.091 14.806
200=   50.260 49.800 16.000 16.024 15.471 49.
210=       -0.000
220=       00.000 00.000 0.000 00.000
230=        0.001  0.000  0.000  0.000
240=       00.000
250=        -.112002E+05  .762538E+04  .193547E-02  .000000E+00
260=    .000000E+00  .000000E+00  .113785E+04
270=         .119287E+05  .838199E+04 -.301785E-02  .000000E+00
280=    .000000E+00  .000000E+00  .860388E+03
290=         .000000E+00  .000000E+00  .584328E+01  .000000E+00
300=    .000000E+00  .000000E+00  .506682E+00
310=         .000000E+00  .000000E+00  .493782E+01  .000000E+00
320=    .000000E+00  .000000E+00  .860446E+00
330=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
340=    .000000E+00  .000000E+00  .759657E-01
350=         .600000E+01 -.587139E-01  .233839E+02  .136798E-02
360=    .000000E+00  .000000E+00  .603705E-01
370=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
380=    .314705E-05  .100000E+01  .417339E+00
390=        -.975000E+00  .257486E-01  .499235E+01  .171706E-04
400=    .151235E-04  .100000E+01  .895181E-01
410=         .000000E+00  .000000E+00  .467682E+01  .000000E+00
420=    .000000E+00  .000000E+00  .827581E+00
430=         .000000E+00 -.148083E+01  .240031E+02 -.272187E-02
440=    .000000E+00  .000000E+00  .281617E+01
450=         .000000E+00  .119416E+03 -.870000E+00  .000000E+00
460=    .000000E+00  .000000E+00  .819800E+00
470=         .000000E+00  .100000E+03  .000000E+00  .100000E+01
480=    .000000E+00  .000000E+00  .500000E+01
490=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
500=    .000000E+00  .000000E+00  .200000E+01
510=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
520=    .000000E+00  .000000E+00  .200000E+01
530=         .165666E+03 -.390679E+02  .230664E+02  .123829E+02
540=    .000000E+00  .000000E+00  .620000E-02
```

```
 550=        .148247E+03 -.344090E+02  .183228E+02  .934227E+01
 560=   .000000E+00  .000000E+00  .600030E-02
 570=        .408860E+03 -.942807E+02  .202082E+02  .222056E+02
 580=   .000000E+00  .000000E+00  .211000E-01
 590=        .183549E+03 -.427203E+02  .189222E+02  .118701E+02
 600=   .000000E+00  .000000E+00  .136000E-01
 610=        .961128E+02 -.235778E+02  .284040E+02  .354877E+01
 620=   .000000E+00  .000000E+00  .530000E-02
 630=        .432415E+03 -.103320E+03  .167726E+02  .142340E+02
 640=   .000000E+00  .000000E+00  .144000E-01
 650=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 660=   .000000E+00  .000000E+00  .200000E+01
 670=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
 680=   .000000E+00  .000000E+00  .344288E+00
 690=        .682800E+02 -.462861E-03  .394517E-01  .211469E-08
 700=   .483871E-06 -.100000E+01  .125054E-02
 710=        .000000E+00 -.580747E-02  .156941E+00 -.440003E-06
 720=   .132133E-05  .100000E+01  .018772E+00
 730=        .126000E+03 -.264691E-02  .154023E+00  .276724E-05
 740=   .000000E+00  .000000E+00  .000000E+00
 750=        .118407E+05  .115439E+05 -.107558E-02  .000000E+00
 760=   .000000E+00  .000000E+00  .249853E+04
 770=       -.381371E+04  .108223E+05 -.907352E-04  .000000E+00
 780=   .000000E+00  .000000E+00  .155953E+04
 790=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
 800=   .000000E+00  .000000E+00  .111429E+00
 810=        .000000E+00  .171399E+00  .232378E+02  .380077E-02
 820=   .000000E+00  .000000E+00  .330880E+00
 830=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 840=   .000000E+00  .000000E+00  .200000E+01
 850=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 860=   .000000E+00  .000000E+00  .200000E+01
 870=        .154667E+01  .000000E+00  .000000E+00  .000000E+00
 880=   .000000E+00  .000000E+00  .200000E+01
 890=        .000000E+00 -.540394E-01  .418270E+00  .617830E-05
 900=   .507573E-05  .100000E+01  .138846E+01
 910=        .157440E+03 -.332767E+02  .274432E+02 0.
 920=   .000000E+00  .000000E+00  .374000E-01
 930=        .123961E+03 -.322351E+02  .194852E+02 0.
 940=   .000000E+00  .000000E+00  .115000E-01
 950=        .176450E+03 -.435420E+02  .817019E+01 0.
 960=   .000000E+00  .000000E+00  .141000E-01
 970=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
 980=   .491312E-04  .100000E+01  .000000E+00
 990=        .000000E+00 -.741056E-02  .393187E+00 -.532904E-05
1000=   .355183E-05  .100000E+01  .213038E+00
1010=       -.136000E+01  .998470E+00 -.340000E+00  .999226E+00
1020=  0.           0.          0.
1030=  0.           0.          0.          0.000 0.000
```

CAL1156

```
100=        5 13 14 30 31 33
110=        5  5  6 24 28 29
120=        6  7  8 21 38 37 10
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 20 34 35 36
180=        1 32
190=     1  6  8  9 10 11
200= 14.504 15.966 15.594 16.063 15.468
210=   50.245 49.798 15.961 38.308 16.160 15.829
220=        0.000
230=        0.000  0.000  0.000  0.000
240=        0.000  0.000  0.000  0.000
250=        0.003
260=       16.044
270=          .559088E+04  .609773E+04  .919017E-03  .000000E+00
280=   .000000E+00  .000000E+00  .506167E+04
290=          .138397E+05  .645779E+04 -.259157E-02  .000000E+00
300=   .000000E+00  .000000E+00  .834928E+04
310=          .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=   .000000E+00  .000000E+00  .302208E+01
330=          .000000E+00  .000000E+00  .493782E+01  .000000E+00
340=   .000000E+00  .000000E+00  .552455E+01
350=          .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360=  0.             0.             .450000E+00
370=          .600000E+01 -.587139E-01  .233839E+02  .136798E-02
380=  0.             0.             .900000E-01
390=         -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=   .314705E-05  .100000E+01  .307500E+00
410=         -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=   .151235E-04  .100000E+01  .075000E+00
430=          .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=   .000000E+00  .000000E+00  .587384E+01
450=          .000000E+00 -.255897E-02  .547839E-01 -.468086E-06
460=   .637735E-06  .100000E+01  .404250E-02
470=          0.             .119542E+03  .452000E+00 0.
480=  0.             0.             .819800E+00
490=          0.             .100000E+03 0.             .100000E+01
500=  0.             0.             .500000E+01
510=          0.          0.             0.          0.
520=  0.             0.             .200000E+01
530=          0.          0.             0.          0.
540=  0.             0.             .200000E+01
```

```
550=        .310772E+03 -.696444E+02 -.108638E+02  .115036E+02
560=  0.          0.              .620000E-02
570=        .226498E+03 -.573851E+02 -.240361E+01  .944093E+01
580=  0.          0.              .600000E-02
590=        .758264E+03 -.162113E+03 -.214654E+02  .227338E+02
600=  0.          0.              .211000E-01
610=        .367793E+03 -.813411E+02 -.122448E+02  .118022E+02
620=  0.          0.              .136000E-01
630=        .250160E+03 -.594545E+02 -.520076E+01  .861198E+01
640=  0.          0.              .530000E-02
650=        .127026E+03 -.368440E+02  .364346E+02  .214572E+02
660=  0.          0.              .144000E-01
670=        .000000E+00 -.276842E-01  .394041E+00  .301402E-05
680=   .327670E-05  .100000E+01  .135000E+00
690=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
700=   .000000E+00  .000000E+00  .436448E+01
710=        0.          0.          0.          0.
720=  0.          0.              .200000E+01
730=        .600000E+01  .161725E+00  .229975E+02  .284105E-02
740=   .000000E+00  .000000E+00  .202500E+00
750=        .682000E+02 -.462861E-03  .394517E-01  .211469E-08
760=   .483871E-06 -.100000E+01  .450000E-01
770=       -.182713E+04  .147514E+05 -.519576E-02  .000000E+00
780=   .000000E+00  .000000E+00  .884631E+04
790=        .247254E+05  .125238E+05 -.628446E-02  .000000E+00
800=   .000000E+00  .000000E+00  .102557E+05
810=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
820=   .000000E+00  .000000E+00  .900000E-01
830=        .000000E+00  .171399E+00  .232378E+02  .380077E-02
840=   .000000E+00  .000000E+00  .202500E+00
850=        0.          0.          0.          0.
860=  0.          0.              .200000E+01
870=        0.          0.          0.          0.
880=  0.          0.              .200000E+01
890=        .154667E+01 0.          0.          0.
900=  0.          0.          0.
910=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
920=   .000000E+00  .000000E+00  .200000E+01
930=        .791130E+02 -.253743E+02  .277750E+02 0.
940=  0.          0.              .374000E-01
950=        .142841E+03 -.367192E+02  .170858E+02 0.
960=  0.          0.              .115000E-01
970=        .318209E+03 -.808198E+02 -.333161E+01 0.
980=  0.          0.              .141000E-01
990=        .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .100000E+01  .076930E+00
1010=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
1020=   .491312E-04  .100000E+01  .324000E+00
1030=        .488281E+00  .996800E+00  .814697E+00  .100108E+01
1040=   .000000E+00  .000000E+00  .000000E+00
```

CAL1179

```
100=        5 13 14 30 31 33
110=        5  5  6 24 28 40
120=        6  7  8 21 38 37 10
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 20 34 35 29
180=        1 32
190=     1  6  3  9 10 11
200= 14.702 15.843 15.579 15.078 16.000
210=   50.281 49.803 15.958 38.304 16.167 15.827
220=        0.000
230=        0.000  0.000  0.000  0.000
240=        0.000  0.000  0.000  0.000
250=        0.003
260=       16.044
270=         .559088E+04  .609773E+04  .919017E-03  .000000E+00
280=   .000000E+00  .000000E+00  .506167E+04
290=         .133397E+05  .645779E+04 -.259157E-02  .000000E+00
300=   .000000E+00  .000000E+00  .834928E+04
310=         .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=   .000000E+00  .000000E+00  .302208E+01
330=         .000000E+00  .000000E+00  .493782E+01  .000000E+00
340=   .000000E+00  .000000E+00  .552455E+01
350=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360=  0.          0.          .450000E+00
370=         .600000E+01 -.587139E-01  .233839E+02  .136798E-02
380=  0.          0.          .900000E-01
390=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=   .314705E-05  .100000E+01  .307500E+00
410=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=   .151235E-04  .100000E+01  .075000E+00
430=         .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=   .000000E+00  .000000E+00  .587384E+01
450=         .000000E+00 -.255897E-02  .547839E-01 -.468086E-06
460=   .637735E-06  .100000E+01  .404250E-02
470=        0.          .119542E+03  .050000E+00 0.
480=  0.          0.          .819800E+00
490=        0.          .100000E+03 0.          .100000E+01
500=  0.          0.          .500000E+01
510=        0.          0.          0.          0.
520=  0.          0.          .200000E+01
530=        0.          0.          0.          0.
540=  0.          0.          .200000E+01
```

426017

```
550=        .311198E+03 -.597772E+02 -.112572E+02  .115590E+02
560=  0.          0.          .520000E-02
570=        .254551E+03 -.644796E+02 -.592981E+01  .934389E+01
580=  0.          0.          .600000E-02
590=        .609467E+03 -.132752E+03 -.672461E+01  .227618E+02
600=  0.          0.          .211000E-01
610=        .408235E+03 -.895193E+02 -.175954E+02  .115831E+02
620=  0.          0.          .136000E-01
630=        .232308E+03 -.560908E+02 -.305321E+01  .871794E+01
640=  0.          0.          .530000E-02
650=        .205268E+03 -.573036E+02  .288542E+02  .218515E+02
660=  0.          0.          .144000E-01
670=        .000000E+00 -.276842E-01  .394041E+00  .301402E-05
680=   .327670E-05  .100000E+01  .135000E+00
690=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
700=   .000000E+00  .000000E+00  .436448E+01
710=        0.          0.          0.          0.
720=  0.          0.          .200000E+01
730=        .600000E+01  .161725E+00  .229975E+02  .284105E-02
740=   .000000E+00  .000000E+00  .202500E+00
750=        .682000E+02 -.462861E-03  .394517E-01  .211469E-08
760=   .483871E-06 -.100000E+01  .450000E-01
770=       -.192713E+04  .147514E+05 -.519576E-02  .000000E+00
780=   .000000E+00  .000000E+00  .884631E+04
790=        .247254E+05  .125238E+05 -.628446E-02  .000000E+00
800=   .000000E+00  .000000E+00  .102557E+05
810=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
820=   .000000E+00  .000000E+00  .900000E-01
830=        .310602E+03 -.794722E+02 -.264721E+01  0.
840=   .000000E+00  .000000E+00  .141000E-01
850=        0.          0.          0.          0.
860=  0.          0.          .200000E+01
870=        0.          0.          0.          0.
880=  0.          0.          .200000E+01
890=        .154667E+01  0.          0.          0.
900=  0.          0.          0.
910=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
920=   .000000E+00  .000000E+00  .200000E+01
930=        .944551E+02 -.300091E+02  .263746E+02  0.
940=  0.          0.          .374000E-01
950=        .136647E+03 -.355273E+02  .180532E+02  0.
960=   .000000E+00  .000000E+00  .115000E-01
970=        .129279E-01  .458373E+02  .000000E+00  .000000E+00
980=  0.          0.          .141000E-01
990=        .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .100000E+01  .076930E+00
1010=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
1020=   .491312E-04  .100000E+01  .324000E+00
1030=        .112280E+01  .994840E+00  .151074E+01  .999518E+00
1040=   .000000E+00  .000000E+00  .000000E+00
```

CALI211

```
100=        5 13 14 30 31 33
110=        5  5  6 24 28 40
120=        6  7  8 21 38 37 10
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 20 34 35 29
180=        1 32
190=     1  6  8  9 10 11
200= 14.736 15.982 15.674 16.094 16.000
210=    50.268 49.785 15.910 38.257 16.070 15.817
220=        0.000
230=        0.000  0.000  0.000  0.000
240=        0.000  0.000  0.000  0.000
250=        0.003
260=       16.044
270=          .328044E+04  .588815E+04  .111561E-02  .000000E+00
280=    .000000E+00  .000000E+00  .506167E+04
290=          .112296E+05  .679003E+04 -.251384E-02  .000000E+00
300=    .000000E+00  .000000E+00  .834928E+04
310=          .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=    .000000E+00  .000000E+00  .302208E+01
330=          .000000E+00  .000000E+00  .493782E+01  .000000E+00
340=    .000000E+00  .000000E+00  .552455E+01
350=          .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360=  0.            0.            .450000E+00
370=          .500000E+01 -.587139E-01  .233839E+02  .136798E-02
380=  0.            0.            .900000E-01
390=         -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=    .314705E-05  .100000E+01  .307500E+00
410=         -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=    .151235E-04  .100000E+01  .075000E+00
430=          .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=    .000000E+00  .000000E+00  .587384E+01
450=          .000000E+00 -.255897E-02  .547839E-01 -.458086E-06
460=    .637735E-06  .100000E+01  .404250E-02
470=          0.            .119542E+03  .272000E+00 0.
480=  0.            0.            .819800E+00
490=          0.            .100000E+03 0.            .100000E+01
500=  0.            0.            .500000E+01
510=          0.          0.            0.          0.
520=  0.            0.            .200000E+01
530=          0.          0.            0.          0.
540=  0.            0.            .200000E+01
```

426019

```
 550=        .307719E+03 -.670220E+02 -.981981E+01  .116674E+02
 560=  0.            0.             .620000E-02
 570=        .246699E+03 -.556382E+02 -.344061E+01  .947667E+01
 580=  0.            0.             .600000E-02
 590=        .644303E+03 -.139414E+03 -.996541E+01  .231624E+02
 600=  0.            0.             .211000E-01
 610=        .418600E+03 -.903000E+02 -.196300E+02  .119156E+02
 620=  0.            0.             .136000E-01
 630=        .242000E+03 -.567950E+02 -.383500E+01  .877912E+01
 640=  0.            0.             .530000E-02
 650=        .159550E+03 -.447500E+02  .375050E+02  .215984E+02
 660=  0.            0.             .144000E-01
 670=        .000000E+00 -.276842E-01  .394041E+00  .301402E-05
 680=   .327670E-05  .100000E+01  .135000E+00
 690=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
 700=   .000000E+00  .000000E+00  .436448E+01
 710=        0.          0.          0.          0.
 720=  0.            0.             .200000E+01
 730=        .500000E+01  .161725E+00  .229975E+02  .284105E-02
 740=   .000000E+00  .000000E+00  .202500E+00
 750=        .682000E+02 -.462861E-03  .394517E-01  .211469E-08
 760=   .483871E-06 -.100000E+01  .450000E-01
 770=       -.372934E+05  .118357E+05  .201159E-03  .000000E+00
 780=   .000000E+00  .000000E+00  .312329E+04
 790=        .290553E+05  .126283E+05 -.660213E-02  .000000E+00
 800=   .000000E+00  .000000E+00  .102557E+05
 810=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
 820=   .000000E+00  .000000E+00  .900000E-01
 830=        .302465E+03 -.776101E+02 -.202561E+01  0.
 840=   .000000E+00  .000000E+00  .141000E-01
 850=        0.          0.          0.          0.
 860=  0.            0.             .200000E+01
 870=        0.          0.          0.          0.
 880=  0.            0.             .200000E+01
 890=        .154667E+01 0.          0.          0.
 900=  0.            0.          0.
 910=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 920=   .000000E+00  .000000E+00  .200000E+01
 930=        .125850E+03 -.401548E+02  .255916E+02  0.
 940=  0.            0.             .374000E-01
 950=        .167751E+03 -.428908E+02  .139512E+02  0.
 960=   .000000E+00  .000000E+00  .115000E-01
 970=        .129279E-01  .458373E+02  .000000E+00  .000000E+00
 980=  0.            0.             .141000E-01
 990=        .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .100000E+01  .076930E+00
1010=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
1020=   .491312E-04  .100000E+01  .324000E+00
1030=        .201489E+01  .991178E+00  .148438E+01  .998232E+00
1040=   .000000E+00  .000000E+00  .000000E+00
```

CAL1267

```
100=        5 13 14 30 31 40
110=        5  5  6 24 28 40
120=        6  7  8 21 38 37 10
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 20 34 35 29
180=        1 32
190=     1  6  8  9 10 11
200= 14.701 16.106 15.484 16.058 16.000
210=   50.240 49.785 15.907 39.300 16.069 15.827
220=        0.000
230=        0.000  0.000  0.000  0.000
240=        0.000  0.000  0.000  0.000
250=        0.003
260=       16.044
270=         .355956E+04  .740234E+04  .207143E-02  .000000E+00
280=   .000000E+00  .000000E+00  .506167E+04
290=         .125216E+05  .647681E+04 -.293035E-02  .000000E+00
300=   .000000E+00  .000000E+00  .834928E+04
310=         .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=   .000000E+00  .000000E+00  .302208E+01
330=         .000000E+00  .000000E+00  .493782E+01  .000000E+00
340=   .000000E+00  .000000E+00  .552455E+01
350=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360=  0.           0.           .450000E+00
370=         .600000E+01 -.587139E-01  .233839E+02  .136798E-02
380=  0.           0.           .900000E-01
390=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=   .314705E-05  .100000E+01  .307500E+00
410=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=   .151235E-04  .100000E+01  .075000E+00
430=         .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=   .000000E+00  .000000E+00  .587384E+01
450=         .000000E+00 -.255897E-02  .547839E-01 -.468086E-06
460=   .637735E-06  .100000E+01  .404250E-02
470=        0.           .119542E+03  .020000E+00 0.
480=  0.           0.           .819800E+00
490=        0.           .100000E+03 0.           .100000E+01
500=  0.           0.           .500000E+01
510=        0.         0.           0.           0.
520=  0.           0.           .200000E+01
530=        0.         0.           0.           0.
540=  0.           0.           .200000E+01
```

426021

```
550=        .335916E+03 -.728004E+02 -.150278E+02  .114709E+02
560=  0.            0.              .620000E-02
570=        .243280E+03 -.572463E+02 -.401861E+01  .944438E+01
580=  0.            0.              .600000E-02
590=        .857063E+03 -.179507E+03 -.319832E+02  .228743E+02
600=  0.            0.              .211000E-01
610=        .429017E+03 -.911037E+02 -.216608E+02  .116811E+02
620=  0.            0.              .136000E-01
630=        .251804E+03 -.574557E+02 -.461861E+01  .878598E+01
640=  0.            0.              .530000E-02
650=        .113835E+03 -.321563E+02  .461580E+02  .207526E+02
660=  0.            0.              .144000E-01
670=        .000000E+00 -.276842E-01  .394041E+00  .331402E-05
680=   .327670E-05  .100000E+01  .135000E+00
690=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
700=   .000000E+00  .000000E+00  .436448E+01
710=        0.          0.          0.          0.
720=  0.            0.              .200000E+01
730=        .600000E+01  .161725E+00  .229975E+02  .284105E-02
740=   .000000E+00  .000000E+00  .202500E+00
750=        .682000E+02 -.462861E-03  .394517E-01  .211469E-08
760=   .483871E-06 -.100000E+01  .450000E-01
770=       -.377034E+05  .116009E+05 -.125518E-03  .000000E+00
780=   .000000E+00  .000000E+00  .312329E+04
790=        .323134E+05  .129848E+05 -.582748E-02  .000000E+00
800=   .000000E+00  .000000E+00  .102557E+05
810=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
820=   .000000E+00  .000000E+00  .900000E-01
830=        .358719E+03 -.912324E+02 -.603121E+01  0.
840=   .000000E+00  .000000E+00  .141000E-01
850=        0.          0.          0.          0.
860=  0.            0.              .200000E+01
870=        0.          0.          0.          0.
880=  0.            0.              .200000E+01
890=        .154667E+01  0.          0.          0.
900=  0.            0.          0.
910=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
920=   .000000E+00  .000000E+00  .200000E+01
930=        .139414E+03 -.434946E+02  .230626E+02  0.
940=  0.            0.              .374000E-01
950=        .146667E+03 -.385558E+02  .172045E+02  0.
960=   .000000E+00  .000000E+00  .115000E-01
970=        .124870E-01  .440376E+02  .000000E+00  .000000E+00
980=  0.            0.              .141000E-01
990=        .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .100000E+01  .076930E+00
1010=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
1020=   .491312E-04  .100000E+01  .324000E+00
1030=        .201489E+01  .991178E+00  .732666E+00  .100015E+01
1040=   .000000E+00  .000000E+00  .000000E+00
```

CAL1319

```
100=        5 13 14 30 31 40
110=        5  5  6 24 38 40
120=        6  7  8 20 28 37 40
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 10 34 35 29
180=        1 32
190=     1  6  8  9 10 11
200= 14.674 16.047 15.592 16.092 16.000
210=   50.242 49.765 15.946 38.297 16.028 16.000
220=       0.000
230=       0.000  0.000  0.000  0.000
240=       0.000  0.000  0.000  0.000
250=       0.003
260=      16.044
270=        .310038E+04  .730311E+04  .161511E-02  .000000E+00
280=   .000000E+00  .000000E+00  .506157E+04
290=        .123512E+05  .647923E+04 -.310062E-02  .000000E+00
300=   .000000E+00  .000000E+00  .834928E+04
310=        .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=   .000000E+00  .000000E+00  .302208E+01
330=        .000000E+00  .000000E+00  .493782E+01  .000000E+00
340=   .000000E+00  .000000E+00  .552455E+01
350=        .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360=  0.           0.           .450000E+00
370=        .600000E+01 -.587139E-01  .233839E+02  .136798E-02
380=  0.           0.           .900000E-01
390=       -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=   .314705E-05  .100000E+01  .307500E+00
410=       -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=   .151235E-04  .100000E+01  .075000E+00
430=        .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=   .000000E+00  .000000E+00  .587384E+01
450=        .147837E+02 -.153722E+02  .466230E+02  .222497E+02
460=  0.           0.           .144000E-01
470=       0.           .119542E+03 -.100000E+00 0.
480=  0.           0.           .819800E+00
490=       0.           .100000E+03 0.           .100000E+01
500=  0.           0.           .500000E+01
510=       0.        0.           0.           0.
520=  0.           0.           .200000E+01
530=       0.        0.           0.           0.
540=  0.           0.           .200000E+01
```

426023

```
 550=        .327918E+03 -.720283E+02 -.135540E+02  .115286E+02
 560=  0.             0.             .620000E-02
 570=        .242564E+03 -.598674E+02 -.455501E+01  .916608E+01
 580=  0.             0.             .600000E-02
 590=        .761449E+03 -.166498E+03 -.205814E+02  .232847E+02
 600=  0.             0.             .211000E-01
 610=        .380078E+03 -.817819E+02 -.147652E+02  .116310E+02
 620=  0.             0.             .136000E-01
 630=        .252015E+03 -.568536E+02 -.562121E+01  .842629E+01
 640=  0.             0.             .530000E-02
 650=        .000000E+00 -.276842E-01  .394041E+00  .301402E-05
 660=   .327670E-05  .100000E+01  .135000E+00
 670=        .000000E+00  .108053E+00  .395959E+00 -.822648E-04
 680=   .397189E-06  .100000E+01  .135000E+00
 690=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
 700=   .000000E+00  .000000E+00  .436448E+01
 710=        0.           0.           0.           0.
 720=  0.             0.             .200000E+01
 730=        .600000E+01  .161725E+00  .229975E+02  .284105E-02
 740=   .000000E+00  .000000E+00  .202500E+00
 750=        .532000E+02 -.462861E-03  .394517E-01  .211469E-08
 760=   .483871E-06 -.100000E+01  .450000E-01
 770=       -.401001E+05  .112583E+05 -.124870E-07  .000000E+00
 780=   .000000E+00  .000000E+00  .312329E+04
 790=        .315744E+05  .128348E+05 -.611123E-02  .000000E+00
 800=   .000000E+00  .000000E+00  .102557E+05
 810=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
 820=   .491312E-04  .100000E+01  .324000E+00
 830=        .387648E+03 -.967078E+02 -.981601E+01  0.
 840=   .000000E+00  .000000E+00  .141000E-01
 850=        0.           0.           0.           0.
 860=  0.             0.             .200000E+01
 870=        0.           0.           0.           0.
 880=  0.             0.             .200000E+01
 890=        .154667E+01  0.           0.           0.
 900=  0.             0.           0.
 910=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 920=   .000000E+00  .000000E+00  .200000E+01
 930=        .171966E+03 -.503833E+02  .213174E+02  0.
 940=  0.             0.             .374000E-01
 950=        .137068E+03 -.364569E+02  .175590E+02  0.
 960=   .000000E+00  .000000E+00  .115000E-01
 970=        .124870E-01  .440376E+02  .000000E+00  .000000E+00
 980=  0.             0.             .141000E-01
 990=        .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .108000E+01  .076930E+00
1010=        .500000E+01 -.171052E-01  .234816E+02  .175872E-03
1020=   .000000E+00  .000000E+00  .900000E-01
1030=        .201489E+01  .991178E+00  .139478E+01  .998774E+00
1040=   .000000E+00  .000000E+00  .000000E+00
```

CAL1351

```
100=        5 13 14 30 31 40
110=        5  5  6 24 38 40
120=        6  7  8 20 28 37 40
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 10 34 35 29
180=        1 32
190=     1  6  8  9 10 11
200= 14.691 16.225 15.613 16.157 16.000
210=   50.269 43.778 15.921 38.291 16.033 16.000
220=        0.000
230=        0.000  0.000  0.000  0.000
240=        0.000  0.000  0.000  0.000
250=        0.003
260=       16.044
270=         .313244E+04  .694728E+04  .167183E-02  .000000E+00
280=    .000000E+00  .000000E+00  .506167E+04
290=         .123992E+05  .652651E+04 -.284863E-02  .000000E+00
300=    .000000E+00  .000000E+00  .834928E+04
310=         .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=    .000000E+00  .000000E+00  .302208E+01
330=         .000000E+00  .000000E+00  .493782E+01  .000000E+00
340=    .000000E+00  .000000E+00  .552455E+01
350=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360=  0.            0.            .450000E+00
370=         .600000E+01 -.587139E-01  .233839E+02  .136798E-02
380=  0.            0.            .900000E-01
390=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=    .314705E-05  .100000E+01  .307500E+00
410=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=    .151235E-04  .100000E+01  .075000E+00
430=         .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=    .000000E+00  .000000E+00  .587384E+01
450=         .137822E+02 -.154035E+02  .463858E+02  .214017E+02
460=  0.            0.            .144000E-01
470=        0.            .119542E+03  .180000E+00 0.
480=  0.            0.            .819800E+00
490=        0.            .100000E+03 0.            .100000E+01
500=  0.            0.            .500000E+01
510=        0.            0.            0.            0.
520=  0.            0.            .200000E+01
530=        0.            0.            0.            0.
540=  0.            0.            .200000E+01
```

426025

```
550=        .314360E+03 -.690658E+02 -.113308E+02  .115235E+02
560=  0.            0.           .620000E-02
570=        .215402E+03 -.547094E+02 -.129041E+01  .942283E+01
580=  0.            0.           .600000E-02
590=        .998199E+03 -.211121E+03 -.398952E+02  .228947E+02
600=  0.            0.           .211000E-01
610=        .419097E+03 -.891991E+02 -.201688E+02  .115401E+02
620=  0.            0.           .136000E-01
630=        .235885E+03 -.538320E+02 -.259421E+01  .878867E+01
640=  0.            0.           .530000E-02
650=        .000000E+00 -.276842E-01  .394041E+00  .301402E-05
660=   .327670E-05  .100000E+01  .135000E+00
670=        .000000E+00  .108053E+00  .395959E+00 -.822648E-04
680=   .397189E-06  .100000E+01  .135000E+00
690=        .000000E+00  .000000E+00  .455259E+01  .000000E+00
700=   .000000E+00  .000000E+00  .436448E+01
710=        0.           0.           0.           0.
720=  0.            0.           .200000E+01
730=        .600000E+01  .161725E+00  .229575E+02  .284105E-02
740=   .000000E+00  .000000E+00  .202500E+00
750=        .682000E+02 -.462861E-03  .394517E-01  .211469E-08
760=   .483871E-06 -.100000E+01  .450000E-01
770=       -.433984E+05  .117419E+05 -.138321E-02  .000000E+00
780=   .000000E+00  .000000E+00  .312329E+04
790=        .259051E+05  .131848E+05 -.479221E-02  .000000E+00
800=   .000000E+00  .000000E+00  .102557E+05
810=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
820=   .491312E-04  .100000E+01  .324000E+00
830=        .330384E+03 -.857752E+02 -.358881E+01  0.
840=   .000000E+00  .000000E+00  .141000E-01
850=        0.           0.           0.           0.
860=  0.            0.           .200000E+01
870=        0.           0.           0.           0.
880=  0.            0.           .200000E+01
890=        .154667E+01  0.           0.           0.
900=  0.            0.           0.
910=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
920=   .000000E+00  .000000E+00  .200000E+01
930=        .934599E+02 -.291303E+02  .283132E+02  0.
940=  0.            0.           .374000E-01
950=        .158757E+03 -.421937E+02  .153028E+02  0.
960=   .000000E+00  .000000E+00  .115000E-01
970=        .124870E-01  .440376E+02  .000000E+00  .000000E+00
980=  0.            0.           .141000E-01
990=        .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .100000E+01  .076930E+00
1010=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
1020=   .000000E+00  .000000E+00  .900000E-01
1030=        .201489E+01  .991178E+00  .462647E+00  .100047E+01
1040=   .000000E+00  .000000E+00  .000000E+00
```

CAL1380

```
100=        5 13  14 40  31 40
110=        5  5   6 24  38 40
120=        6  7   8 20  28 37 40
130=        1 11
140=        4  1   2 26  27
150=        4  4   3  9  22
160=        1 12
170=        9 15  16 17  18 19  10 34 35 29
180=        1 32
190=     1  6  8   9 10 11
200= 14.692 15.965 15.470 16.031 16.000
210=   50.285 49.773 15.983 38.283 16.042 16.000
220=        0.000
230=        0.000   0.000   0.000   0.000
240=        0.000   0.000   0.000   0.000
250=        0.003
260=       16.044
270=         .163414E+04  .219069E+04  .378641E-02  .000000E+00
280=   .000000E+00  .000000E+00  .506167E+04
290=         .398250E+04  .213838E+04 -.295315E-02  .000000E+00
300=   .000000E+00  .000000E+00  .834928E+04
310=         .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=   .000000E+00  .000000E+00  .302208E+01
330=         .000000E+00  .000000E+00  .606555E+01  .000000E+00
340=   .000000E+00  .000000E+00  .552455E+01
350=         .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360= 0.             0.             .450000E+00
370=         .600000E+01 -.587139E-01  .233839E+02  .136798E-02
380= 0.             0.             .900000E-01
390=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=   .314705E-05  .100000E+01  .307500E+00
410=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=   .151235E-04  .100000E+01  .075000E+00
430=         .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=   .000000E+00  .000000E+00  .587384E+01
450=         .164196E+04 -.327835E+03 -.761830E+02  .217087E+02
460= 0.             0.             .144000E-01
470=        0.             .250129E+02 -.119128E+02 0.
480= 0.             0.             .819800E+00
490=        0.             .100000E+03 0.             .100000E+01
500= 0.             0.             .500000E+01
510=        0.          0.             0.          0.
520= 0.             0.             .200000E+01
530=        0.          0.             0.          0.
540= 0.             0.             .200000E+01
```

426027

```
 550=         .306821E+03 -.670772E+02 -.103542E+02  .115197E+02
 560=  0.            0.             .620000E-02
 570=         .241847E+03 -.542106E+02 -.205801E+01  .945016E+01
 580=  0.            0.             .600000E-02
 590=         .752794E+03 -.160995E+03 -.223332E+02  .228778E+02
 600=  0.            0.             .211000E-01
 610=         .939386E+03 -.184061E+03 -.827858E+02  .117110E+02
 620=  0.            0.             .136000E-01
 630=         .227064E+03 -.515478E+02 -.484100E-01  .889373E+01
 640=  0.            0.             .530000E-02
 650=         .000000E+00 -.276842E-01  .394041E+00  .301402E-05
 660=   .327670E-05  .100000E+01  .135000E+00
 670=         .000000E+00  .108053E+00  .395959E+00 -.822648E-04
 680=   .397189E-06  .100000E+01  .135000E+00
 690=         .000000E+00  .000000E+00  .455259E+01  .000000E+00
 700=   .000000E+00  .000000E+00  .436448E+01
 710=         0.            0.            0.            0.
 720=  0.            0.             .200000E+01
 730=         .600000E+01  .151725E+00  .229975E+02  .284105E-02
 740=   .000000E+00  .000000E+00  .202500E+00
 750=         .682000E+02 -.462861E-03  .394517E-01  .211469E-08
 760=   .483871E-06 -.100000E+01  .450000E-01
 770=         .611180E+04  .255710E+04 -.272045E-02  .000000E+00
 780=   .000000E+00  .000000E+00  .312329E+04
 790=         .264645E+04  .197535E+04  .166091E-02  .000000E+00
 800=   .000000E+00  .000000E+00  .102557E+05
 810=        -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
 820=   .491312E-04  .100000E+01  .324000E+00
 830=         .349574E+03 -.905944E+02 -.497861E+01  0.
 840=   .000000E+00  .000000E+00  .141000E-01
 850=         0.            0.            0.            0.
 860=  0.            0.             .200000E+01
 870=         0.            0.            0.            0.
 880=  0.            0.             .200000E+01
 890=         .154667E+01  0.            0.            0.
 900=  0.            0.            0.
 910=         .000000E+00  .000000E+00  .000000E+00  .000000E+00
 920=   .000000E+00  .000000E+00  .200000E+01
 930=         .794102E+02 -.253032E+02  .295612E+02  0.
 940=  0.            0.             .374000E-01
 950=         .174465E+03 -.470374E+02  .146136E+02  0.
 960=   .000000E+00  .000000E+00  .115000E-01
 970=         .124870E-01  .440376E+02  .000000E+00  .000000E+00
 980=  0.            0.             .141000E-01
 990=         .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .100000E+01  .076930E+00
1010=         .600000E+01 -.171052E-01  .234816E+02  .175872E-03
1020=   .000000E+00  .000000E+00  .900000E-01
1030=         .201489E+01  .991178E+00  .783447E+00  .100130E+01
1040=   .000000E+00  .000000E+00  .000000E+00
```

CAL1465

```
100=        5 13 14 30 31 40
110=        5  5  6 24 38 40
120=        6  7  8 20 28 37 40
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 10 34 35 29
180=        1 32
190=     1  6  8  9 10 11
200= 14.818 15.013 15.558 15.087 16.000
210=   50.318 49.797 15.957 38.263 16.054 16.000
220=       0.000
230=       0.000  0.000  0.000  0.000
240=       0.000  0.000  0.000  0.000
250=       0.003
260=      16.044
270=        .187004E+05  .730833E+04 -.196404E-02  .000000E+00
280=  .000000E+00  .000000E+00  .506167E+04
290=        .148658E+04  .104038E+05  .742525E-03  .000000E+00
300=  .000000E+00  .000000E+00  .834928E+04
310=        .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=  .000000E+00  .000000E+00  .302208E+01
330=        .000000E+00  .000000E+00  .660014E+01  .000000E+00
340=  .000000E+00  .000000E+00  .552455E+01
350=        .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360=  0.            0.            .450000E+00
370=        .600000E+01 -.587139E-01  .233839E+02  .136798E-02
380=  0.            0.            .900000E-01
390=       -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=   .314705E-05  .100000E+01  .307500E+00
410=       -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=   .151235E-04  .100000E+01  .075000E+00
430=        .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=   .000000E+00  .000000E+00  .587384E+01
450=        .116226E+03 -.348962E+02  .361956E+02  .212420E+02
460=  0.            0.            .144000E-01
470=        0.            .119542E+03  .180000E+00 0.
480=  0.            0.            .819800E+00
490=        0.            .100000E+03 0.            .100000E+01
500=  0.            0.            .500000E+01
510=        0.          0.            0.          0.
520=  0.            0.            .200000E+01
530=        0.          0.            0.          0.
540=  0.            0.            .200000E+01
```

426029

```
 550=        .328413E+03 -.715385E+02 -.136214E+02  .114561E+02
 560=  0.          0.                .620000E-02
 570=        .236026E+03 -.578262E+02 -.346401E+01  .938421E+01
 580=  0.          0.                .600000E-02
 590=        .193109E+04 -.411719E+03 -.708760E+02  .238722E+02
 600=  0.          0.                .211000E-01
 610=        .422777E+03 -.902718E+02 -.206290E+02  .115451E+02
 620=  0.          0.                .136000E-01
 630=        .240502E+03 -.551533E+02 -.371061E+01  .866902E+01
 640=  0.          0.                .530000E-02
 650=        .000000E+00 -.276842E-01  .394041E+00  .301402E-05
 660=   .327670E-05  .100000E+01  .135000E+00
 670=        .000000E+00  .108053E+00  .395959E+00 -.822648E-04
 680=   .397189E-06  .100000E+01  .135000E+00
 690=        .000000E+00  .000000E+00  .511152E+01  .000000E+00
 700=   .000000E+00  .000000E+00  .436448E+01
 710=        0.          0.          0.          0.
 720=  0.          0.                .200000E+01
 730=        .600000E+01  .151725E+00  .229975E+02  .284105E-02
 740=   .000000E+00  .000000E+00  .202500E+00
 750=        .532000E+02 -.462861E-03  .394517E-01  .211469E-08
 760=   .483871E-06 -.100000E+01  .450000E-01
 770=       -.185097E+05  .992046E+04 -.718660E-03  .000000E+00
 780=   .000000E+00  .000000E+00  .312329E+04
 790=        .293410E+05  .105827E+05 -.782529E-02  .000000E+00
 800=   .000000E+00  .000000E+00  .102557E+05
 810=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
 820=   .491312E-04  .100000E+01  .324000E+00
 830=        .160976E+03 -.479283E+02  .961339E+01  0.
 840=   .000000E+00  .000000E+00  .141000E-01
 850=        0.          0.          0.          0.
 860=  0.          0.                .200000E+01
 870=        0.          0.          0.          0.
 880=  0.          0.                .200000E+01
 890=        .154667E+01  0.          0.          0.
 900=  0.          0.          0.
 910=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 920=   .000000E+00  .000000E+00  .200000E+01
 930=        .651371E+02 -.209047E+02  .304148E+02  0.
 940=  0.          0.                .374000E-01
 950=        .525380E+03 -.137493E+03 -.394181E+01  0.
 960=   .000000E+00  .000000E+00  .115000E-01
 970=        .124870E-01  .440376E+02  .000000E+00  .000000E+00
 980=  0.          0.                .141000E-01
 990=        .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .100000E+01  .076930E+00
1010=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
1020=   .000000E+00  .000000E+00  .900000E-01
1030=        .364917E+01  .993204E+00  .258398E+01  .997579E+00
1040=   .000000E+00  .000000E+00  .000000E+00
```

CAL1511

```
100=        5 13 14 30 31 40
110=        5  5  6 24 38 40
120=        6  7  8 20 28 37 40
130=        1 11
140=        4  1  2 26 27
150=        4  4  3  9 22
160=        1 12
170=        9 15 16 17 18 19 10 34 35 29
180=        1 32
190=     1  6  8  9 10 11
200= 14.360 15.929 15.514 15.987 16.000
210=   50.330 49.859 15.958 38.277 16.057 16.000
220=        0.000
230=        0.000  0.000  0.000  0.000
240=        0.000  0.000  0.000  0.000
250=        0.003
260=       16.044
270=          .763320E+02  .382663E+04  .148547E-02  .000000E+00
280=    .000000E+00  .000000E+00  .891348E+03
290=          .252298E+04  .256003E+04  .120459E-02  .000000E+00
300=    .000000E+00  .000000E+00  .565519E+03
310=          .000000E+00  .000000E+00  .584328E+01  .000000E+00
320=    .000000E+00  .000000E+00  .302208E+01
330=          .000000E+00  .000000E+00  .660014E+01  .000000E+00
340=    .000000E+00  .000000E+00  .552455E+01
350=          .600000E+01 -.288955E+00  .231508E+02  .267766E-02
360=  0.            0.              .450000E+00
370=          .600000E+01 -.587139E-01  .233839E+02  .136798E-02
380=  0.            0.              .900000E-01
390=        -.975000E+01  .301437E-01  .124863E+02 -.275905E-04
400=    .314705E-05  .100000E+01  .307500E+00
410=        -.975000E+01  .257486E-01  .499235E+01  .171706E-04
420=    .151235E-04  .100000E+01  .075000E+00
430=          .000000E+00  .000000E+00  .467682E+01  .000000E+00
440=    .000000E+00  .000000E+00  .587384E+01
450=          .107748E+03 -.330783E+02  .358802E+02  .209834E+02
460=  0.            0.              .144000E-01
470=        0.            .119542E+03 -.140000E+00 0.
480=  0.            0.              .819800E+00
490=        0.            .100000E+03 0.            .100000E+01
500=  0.            0.              .500000E+01
510=        0.          0.            0.          0.
520=  0.            0.              .200000E+01
530=        0.          0.            0.          0.
540=  0.            0.              .200000E+01
```

```
 550=        .311739E+03 -.687410E+02 -.110402E+02  .115389E+02
 560=  0.          0.          .620000E-02
 570=        .215918E+03 -.544205E+02 -.133841E+01  .951399E+01
 580=  0.          0.          .600000E-02
 590=        .551195E+03 -.178189E+03 -.958001E+01  .222827E+02
 600=  0.          0.          .211000E-01
 610=        .433604E+03 -.924571E+02 -.218770E+02  .114558E+02
 620=  0.          0.          .136000E-01
 630=        .250924E+03 -.569624E+02 -.505261E+01  .883613E+01
 640=  0.          0.          .530000E-02
 650=        .000000E+00 -.276842E-01  .394041E+00  .301402E-05
 660=   .327670E-05  .100000E+01  .135000E+00
 670=        .000000E+00  .108053E+00  .395959E+00 -.822648E-04
 680=   .397189E-06  .100000E+01  .135000E+00
 690=        .000000E+00  .000000E+00  .511152E+01  .000000E+00
 700=   .000000E+00  .000000E+00  .436448E+01
 710=        0.          0.          0.          0.
 720=  0.          0.          .200000E+01
 730=        .600000E+01  .161725E+00  .229975E+02  .284105E-02
 740=   .000000E+00  .000000E+00  .202500E+00
 750=        .682000E+02 -.462861E-03  .394517E-01  .211469E-08
 760=   .483871E-06 -.100000E+01  .450000E-01
 770=        .139817E+04  .179005E+04 -.165461E-02  .000000E+00
 780=   .000000E+00  .000000E+00  .282057E+04
 790=        .244902E+04  .214411E+04 -.170451E-02  .000000E+00
 800=   .000000E+00  .000000E+00  .170362E+04
 810=       -.975000E+01 -.689705E-01  .479337E+01 -.797413E-04
 820=   .491312E-04  .100000E+01  .324000E+00
 830=        .148093E+03 -.445023E+02  .989699E+01  0.
 840=   .000000E+00  .000000E+00  .141000E-01
 850=        0.          0.          0.          0.
 860=  0.          0.          .200000E+01
 870=        0.          0.          0.          0.
 880=  0.          0.          .200000E+01
 890=        .154667E+01  0.          0.          0.
 900=  0.          0.          0.
 910=        .000000E+00  .000000E+00  .000000E+00  .000000E+00
 920=   .000000E+00  .000000E+00  .200000E+01
 930=        .853813E+02 -.271632E+02  .284276E+02  0.
 940=  0.          0.          .374000E-01
 950=        .869126E+02 -.287112E+02  .223804E+02  0.
 960=   .000000E+00  .000000E+00  .115000E-01
 970=        .124870E-01  .440376E+02  .000000E+00  .000000E+00
 980=  0.          0.          .141000E-01
 990=        .000000E+00  .925882E-02  .156529E+01  .306213E-04
1000=   .166379E-04  .100000E+01  .076930E+00
1010=        .600000E+01 -.171052E-01  .234816E+02  .175872E-03
1020=   .000000E+00  .000000E+00  .900000E-01
1030=       -.104981E-01  .998293E+00  .653809E+00  .100057E+01
1040=   .000000E+00  .000000E+00  .000000E+00
1050=   .000000E+00  .000000E+00  .000000E+00
```