COMPLETE

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN Nº 622803

Proj. ECN ____

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	3a. USQ Required?	4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	JF Berger ,WTSE ,R1-43 ,3-4563	[] Yes [X] No	05/19/95
	5. Project Title/No./Work Order No.	6. Bldg./Sys./Fac. No.	7. Approval Designator
	242-A MCS Device Logic Revision	242-A	N/A
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.)	9. Related ECN No(s).	10. Related PO No.
	WHC-SD-534-CSWD-005 Rev. 1	N/A	N/A

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

Revise the MCS Device Logic to revision 2. This change rebaselines this document for the MCS system upgrade.

Incorporated the following ECNs into this document (610003, 612394, 620366, 620390, 622501).

13a. Justification (mark one)

Criteria Change	[]	Design Improvement	[X]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

13b. Justification Details

The MCS system at 242-A has been upgraded. It is therefore necessary to revise this SD document to reflect these changes.

14. Distribution (include name, MSIN, and no. of copies)

JF Berger	R1-43
JE Geary	S5-14
DS Haring	R1-43
RJ Nicklas	R1-43
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O.S.T.I. (2)	L8-07

RELEASE STAMP

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DATE MAY 19 1995

STA 4

A-7900-013-2 (11/94) GEF095

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) 622803

15. Design Verification Required	16. Cost Impact						17. Schedule Impact (days)		
	ENGINEERING			CONSTRUCTION					
[X] Yes	Additional	[]	$ N/A	Additional	[]	$ N/A	Improvement	[]	N/A
[] No	Savings	[]	$ N/A	Savings	[]	$ N/A	Delay	[]	N/A

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	Tickler File	[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]	None	[X]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog. Eng. JF Berger JF Berger	5-19-95	PE	
Cog. Mgr. RJ Nicklas David Harding	5/19/95	QA	
QA		Safety	
Safety		Design	
Environ.		Environ.	
Other Informal Reviewer OM Duncan	5-19-95	Other	
		DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature	
		ADDITIONAL	

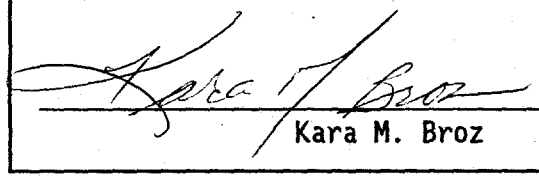
RELEASE AUTHORIZATION

Document Number:	WHC-SD-534-CSWD-005, REV 2
Document Title:	242-A CONTROL SYSTEM DEVICE LOGIC SOFTWARE DOCUMENTATION
Release Date:	5/19/95

This document was reviewed following the procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:



Kara M. Broz

May 19, 1995

JKE 5/19/95

SUPPORTING DOCUMENT

1. Total Pages 83 85

2. Title	3. Number	4. Rev No.
242-A CONTROL SYSTEM DEVICE LOGIC SOFTWARE DOCUMENTATION	WHC-SD-534-CSWD-005	2

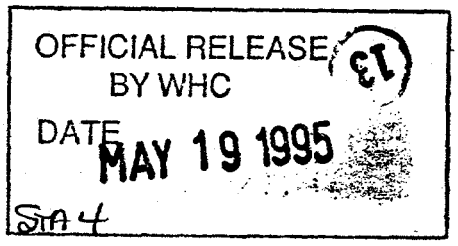
5. Key Words	6. Author
Distributive Control System Monitoring and Control System 242-A Evaporator	Name: J.F. Berger JF Berger 5-19-95 Signature Organization/Charge Code 77310/N1179

7. Abstract

A Distributive Process Control system was purchased by Project B-534. This computer-based control system, called the Monitor and Control System (MCS), was installed in the 242-A Evaporator located in the 200 East Area. The purpose of the MCS is to monitor and control the Evaporator and Monitor a number of alarms and other signals from various Tank Farm facilities. Applications software for the MCS was developed by the Waste Treatment System Engineering Group of Westinghouse. This document describes the Device Logic for this system.

DISCLAIMER

8. RELEASE STAMP



RECORD OF REVISION	(1) Document Number WHC-SD-534-CSWD-005	Page 1

(2) Title
242-A CONTROL SYSTEM DEVICE LOGIC SOFTWARE DOCUMENTATION

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr. Date
REV. 0	(7) Initial release EDT 127136, 12-10-91	C.C SCAIEF	C.P. SCHRODER
REV. 1	Replace Revision 0 with Revision 1 in entirety per ECN 161514.	M.C. TEATS	R.J. NICKLAS
REV. 2 RS	Replace Revision 1 with Revision 2 in entirety per ECN 622803. Incorporate ECNs 610003, 612394, 620366, 620390, 622501)	J.F. BERGER 5/19/95	R.J. NICKLAS 5/19/95

WHC-SD-534-CSWD-005 REV 2

242-A CONTROL SYSTEM DEVICE LOGIC

SOFTWARE DOCUMENTATION

TABLE OF CONTENTS

1.0 INTRODUCTION

This document and Drawing H-2-99949 (multiple sheets) provide the documentation for a portion of the software on the 242-A Monitor and Control System (MCS). Specifically, any discrete interlock and control logic which is implemented using the Texas Instruments' Master Device (MDEV) and Device (DEV) blocks is described here. In addition, any links to the analog blocks in the analog data base are also described.

This document and the drawings contain sufficient information to modify the existing devices or add new devices to the software. It also is intended as an operating guide to the devices. Section 2.0 presents a brief discussion of devices and their general characteristics. Section 3.0 describes the non-operational or "Dummy" devices which are used for simulation and testing. Sections 4.0 and 5.0 contain operating descriptions for the devices which monitor and control the process. Section 6.0 references other documents pertinent to the MCS software. Section 7.0 has appendicies which contain pertinent device information. Section 8.0 is a device index which contains an alphabetized list of all monitor and control devices with an associated page reference to the operating description.

2.0 DEVICE CHARACTERISTICS AND PARAMETERS

This section describes how logic is implemented in the GSE Process Solutions Inc. D3 Control System using Master Device and Device logic. The general features of MDEV logic such as the coding structure, operator interface, inter-device linkages, and the analog data base linkages are described. In addition, specific application information is provided such as the device naming conventions, global bit assignments, and analog parameters used in the devices.

2.1 GENERAL CHARACTERISTICS

For a detailed description of device logic the reader may consult the GSE Process Solutions Inc. D/3 Continuous Control Package Reference Manual (Ref 7). Device Logic is implemented by defining a set of logic which is termed a Master Device (MDEV). All references to the external hardware within a MDEV are given variable names called prompts. In this way a MDEV can be used as many times as required by substituting different hardware references for the prompts. For example, a MDEV which is the logic for a motor starter need be coded only once. It could then be used many times for different motors provided they are controlled in the same manner. Each application of a MDEV is referred to as a Device. Associated with each DEV is a display faceplate which can provide status information. The DEV can be controlled so long as the designer provides the proper logic and linkages to the operator keyboard. Each MDEV can have up to eight defined keyboard commands and up to eight defined statuses. The designer of the MDEV decides which commands and statuses to use and their eight character (maximum) name.

Drawing H-2-99949, Sheet 3 provides an illustration of a typical faceplate for a device. Table 2-1 summarizes the various logic bits used in defining Master Devices as well as the adopted conventions for use of commands and statuses in

TABLE 2-1 MASTER DEVICE PARAMETERS

Command Bits	$C0 to $C7 can be set (logic 1) from the keyboard command keys, from the analog data base using limiter blocks, from other devices using Global Bits, or by a SABL program. Whenever a Command Bit is set, all other Command Bits are reset (logic 0). This ensures that only one command is active at a time.		
Status Bits	$S0 to $S7 are set by the internal device logic.		
Mode Bits			
AUTO/MANUAL	$M0 = 1 $M0 = 0	AUTO Mode MANUAL Mode	
MAINTENANCE	$M1 = 1 $M1 = 0	MAINTENANCE Mode On MAINTENANCE Mode Off	Maintenace Mode is not presently used
OVERRIDE	$M2 = 1 $M2 = 0	OVERRIDE Mode On OVERRIDE Mode Off	
Flag Bits			
FAULT	$F0 = 1 $F0 = 0	FAULT Condition On FAULT Condition Off	
LOCAL	$F1 = 1 $F1 = 0	LOCAL On LOCAL Off	Control at equip. Control from MCS
Temporary Bits	$T0 to $T31 used within a Master Device for linking the output of one logic operation to the input of another. Can also be set directly by Limiter Blocks from the analog data base.		
Global Bits	$G0 to $G71 are used to pass logic information from one device to other devices.		

Device Command and Status Converntions

	Motor		Valve	
C/S Bit	Command	Status	Command	Status
0	STOP	CF-OFF	CLOSE	CF-CLOSD
1	START	CF-ON	OPEN	CF-OPEN
2	SD-RESET	SD-RESET	CS-RESET	CS-RESET
3	JOG	CF-JOGNG	CS-RESET	CS-RESET
4	NA	SHUTDOWN	NA	CHGSTATE
5	NA	INTERLOK	NA	INTERLOK
6	NA	STOPPING	NA	CLOSING
7	NA	STARTING	NA	OPENING

the 242-A control logic. The conventions are adhered to, when possible. This is generally true for equipment such as motors and valves and for interlock bypass devices, however, many of the devices control special equipment and the commands have different meanings.

Command bits ($C0-$C7) are mutually exclusive and therefore only one command can be active at any one time. Command bits can be set from the keyboard or by the device itself (or other devices). For example, on interlock occurrence, a device may command itself to STOP. In addition, so long as the interlock persists, it will not allow the START command to be set. The particular characteristics of a device are determined by the designer. All commands are defined on the drawings as well as in the operational description for each DEV. In addition, the Single Loop Display for a DEV will list all defined commands by their eight character (or less) name. Most commands such as START, STOP, OPEN, CLOSE, etc. have their function described by the name.

Unlike commands, multiple equipment statuses are common (i. e. a motor could be both interlocked and off). On the faceplate display, all statuses which are active are back-lighted. The designer can cause any or all statuses to generate an alarm. The statuses are determined by status bits $S0-$S7.

In addition, each device may be affected by the AUTO/MAN ($M0) and OVERRIDE ($M2) keys on the keyboard. When in AUTO, all keyboard commands are locked out except the AUTO/MAN key. The OVERRIDE is used to override a hardware confirm such as a limit switch on a valve or contactor on a motor. The OVERRIDE is also used to clear a FAULT (see below).

A critical alarm called a FAULT is available for setting at the designer's discretion. When the FAULT bit is set, scanning of the device stops until it is placed into OVERRIDE. In general, OVERRIDE is used to clear the fault bit and scanning is resumed. In the 242-A MCS the FAULT is used to indicate when the feedback confirm does not agree with the expected value. For example, when a motor is started the logic looks for a contact confirm within a fixed

time interval after the start command is issued. If no confirm is forthcoming, the logic sets the FAULT bit. Placing the device in OVERRIDE will clear the fault, however, this is done by ignoring the contact confirm status. The device will indicate that the motor is running even though it may be stopped. The purpose of the OVERRIDE is to allow the motor to be operated even though there may have been a failure of the contact sensing circuit. For example, the wiring from the contactor may be bad or the discrete input card may have failed. It is not recommended that a device be placed into OVERRIDE unless the status of the controlled equipment can be independently confirmed. The need to use the OVERRIDE is an indication of an equipment malfunction which requires maintenance.

The LOCAL bit ($F1) is used to indicate when a device is in a "local" (at the equipment) control mode. The reference manual does not give a clear description of this bit and its effect on the logic. When in LOCAL a device will not respond to the keyboard command bits. It will, however, read inputs and alter the logic accordingly. It will not write to the outputs until it is taken out of the LOCAL mode. When the LOCAL bit is set, the word LOCAL replaces the MANUAL/AUTO descriptor on the display faceplate.

Devices are coded using simple lines of code which are executed in order of occurrence without conditional branching. The number inside the logic gate indicates the order of execution (see drawing). Each program statement describes a logic element such as an "AND", "OR", "EXOR", or "NOT" gate. In addition, flip-flops, timers, and pulsers (one-shots) can be defined. Logic elements are linked to each other via temporary ($T) bits which are numbered from 0 to 31 within a MDEV. Devices can be linked to each other via global bits ($G) which are numbered from 0 to 71. Devices are linked to the analog data base via command ($C), status ($S), or temporary ($T) bits. This is accomplished by "fetching" or "setting" the value of the bit in the Input/Output Switch (IOS) block and the Limiter (LIM) block in the analog data base.

2.2 LOGIC CONVENTIONS

In the majority of cases, a logic value of 0 is used to indicate the interlock condition and a logic of 1 is used to indicate the normal condition. There are two reasons for this. First, when discrete switches are used for monitoring interlock parameters, a loss of voltage is usually indicative of the interlock or alarm condition. This is standard fail-safe design. This loss of voltage translates to a logic 0 within the computer. Secondly, within the computer, the logic 0 condition is also considered to be more fail-safe than a logic 1. For example, logic values are normally initialized to 0 and must be set by something to 1.

There are a few exceptions to the convention of using logic 0 for the alarm or interlock condition. The most common is when valve position is used as an interlock or alarm. Valve position is indicated by a closed limit switch (presence of voltage) which translates to a logic 1 within the computer. When this is the case, the interlock condition of the limit switch is a logic 1.

Within a device, $T31 has been used as the combined interlock condition. When $T31 is logic 0, an interlock condition is present. When more than one condition can create an interlock, a logic gate must be used to combine them. Interlock are generally combined with a logic "or". For example, if either low pressure, high radiation, or high temperature exists, then stop the pump. If a logic 1 was used to indicate these conditions, the logic gate used to combine them would be an "or" gate. However, since a logic 0 is used for these interlock conditions, an "and" gate must be used to acheive the desired condition. If any input to the "and" gate is 0, the output is 0 and therefore the interlock is imposed. If an "or" gate were used, all interlock conditions would have to be present to invoke the pump shutdown. For this reason, an "and" gate is used in the devices to combine interlocks.

2.3 NAMING CONVENTIONS

DEV names are chosen to reflect the specific piece of equipment being monitored and/or controlled. Device names are an External Point Name (EPN) within the D3 system. Like all EPNs the faceplate can be called up on a faceplate display with a spare position simply by typing in the EPN. A naming convention has been chosen for MDEVs to help understand their function. Master device names are of interest only to the device designer or programmer and are not available to the operator other than by reference to the drawing.

All MDEV names begin with a numerical digit which indicates which Process Control Module (PCM) data base contains it. For example 0 represents PCM0, 1 represents PCM1, etc. The second character is a letter which indicates the type of MDEV. Master Devices have been categorized for naming purposes into several different types as shown in Table 2-2. Table 2-2 shows the naming convention for standard MDEVs. If the second character is D or X the MDEV does not follow the standard convention. The character D indicates a "dummy" MDEV used for simulation and testing. The character X indicates that the MDEV is of a special type. Most X or special MDEVs are single purpose master devices. Usually there is something unique about its operation which limits its universal application.

2.4 GLOBAL BIT ASSIGNMENT

As mentioned in Section 2.2, global bits are numbered from 0 to 71 and are used to logically link devices together. In general, a global bit should be set by only one device but can be monitored by any number of devices. Appendix A provides a list of all current global bit assignments, a brief description of their use, and the MDEV and DEV which sets the bit. Reference is also made to the sheet number of Drawing H-2-99949 which documents the device.

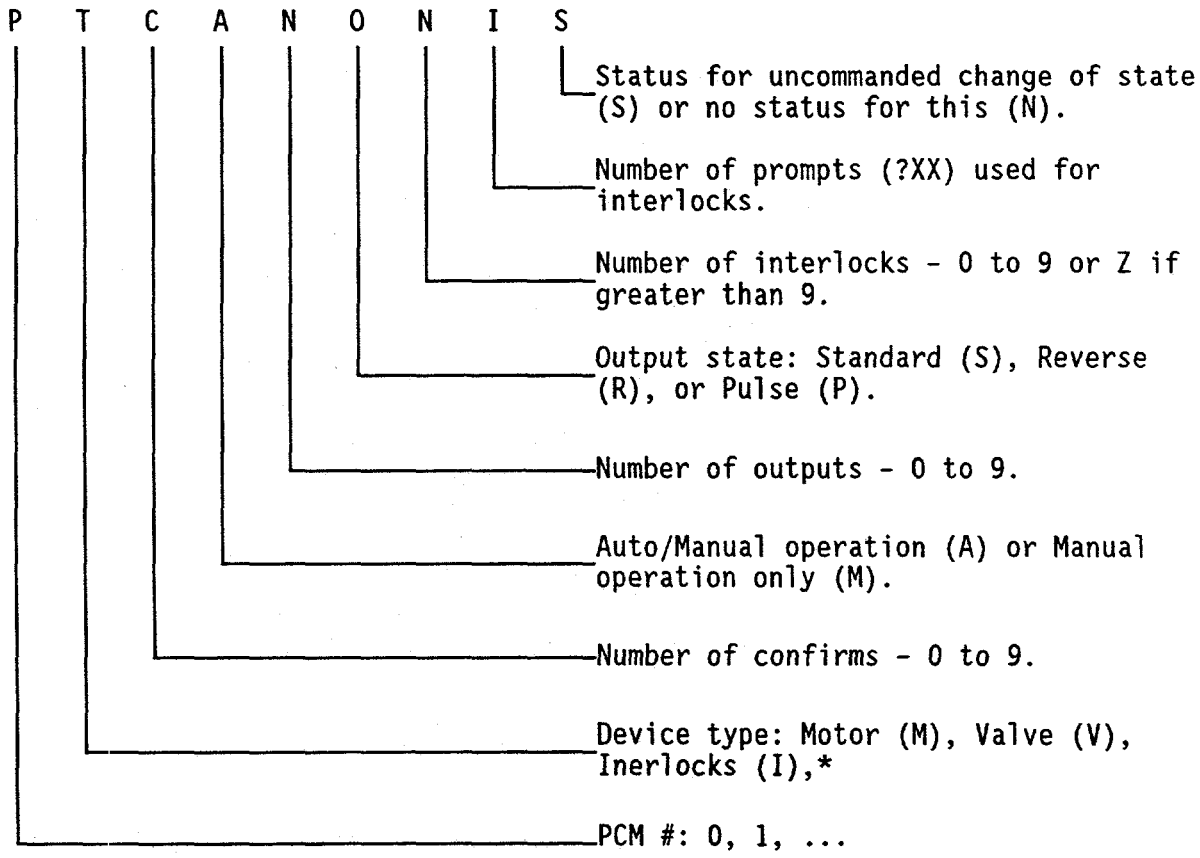
2.5 ANALOG DATA BASE LINKAGES

The devices receive discrete status information from the analog data base via the $T, or $C bits in the device. Any limiter (LIM) block within the analog data base can be used to set a device $T or $C bit by responding to the HISET

and/or LOSET prompts with the device name and bit to be set. Likewise the Input/Output Switch (IOS) block can be made to switch by responding to the toggle prompt with the device name and the desired $T, $C, or $S bit.

The devices typically require interlocks from the analog data base. The interlocks in most cases use a logic zero to indicate the alarm (interlocked) condition. This is done because in a computer logic zero is considered the fail mode for data bits. When using this convention, the HISET parameter in the LIM block must be used for the low alarm and the LOSET parameter must be used for the high alarm. For example, suppose that on a scale of 0 to 100 a low level interlock is required at 20. By setting HI=20 (LIM block prompt) we get a HISET value of logic 0 (interlock state) whenever the value is below 20 and a logic 1 otherwise. Conversely, a high level interlock required at 80 would be achieved by setting LO=80.

TABLE 2-2 STANDARD MASTER DEVICE NAMING CONVENTION



* MDEVs with an X or D in this position do not follow this convention.

OUTPUT STATES

Standard - OUTPUT1 = 1 for open or start (i. e. fail closed/stop), $G bit = 1 for start or normal.

Reverse - OUTPUT0 = 1 for close or stop (i. e. fail open/start), $G bit = 0 for start or normal.

The HI and LO limit trip points are affected by the dead band specified in the AI scan block. Because the HISET and LOSET are being used with logic "0" as the active (interlock) state, the dead band must be taken into account when specifying the HI and LO limits. The following equations govern how to set the HI and LO limits when using logic "0" as the active state:

HI = desired limit + deadband
HISET = 1 @ desired limit + deadband
HISET = 0 @ desired limit

LO = desired limit - deadband
LOSET = 1 @ desired limit - deadband
LOSET = 0 @ desired limit

Because of the way the LIM block algorithm works, the HI limit must always be greater than the LO limit. This means that the same limiter block cannot be used for both a high and a low interlock. In addition, if the LO limit is used, the HI limit cannot be defaulted to NOTSPEC. In this case the HI limit should be set to a value higher than the EPN range. Since the HISET and LOSET can be directed to only one device bit, a LIM block will be required for each time the interlock is used.

When a device is in FAULT it will not accept limiter block HISET and LOSET values until the FAULT condition is cleared. This can result in the appearance of an incorrectly functioning analog limiter block. This occurs when the limiter block HISET or LOSET value is different from the $T bit value in the device and the device is in the FAULT condition.

Appendix B contains a list of analog EPNs which must provide HISET and/or LOSET bits to the devices. Each occurrence of the same EPN in the list requires the inclusion of a limiter block in the analog chain. The list indicates the HI and LO limits required and provides the device EPN and $T or $C bit to set.

Appendix B also contains a list of LIM block settings used for control of devices. These are shown separate from the interlock settings since they use the conventional logic for HISET and LOSET. In addition, a list is provided for IOS blocks which are controlled by devices. The logic for control is provided in the description column.

3.0 DUMMY TEST DEVICES

Drawing H-2-99949, Sheet 4 documents some devices used for simulation and testing. With regard to Sheet 4, only devices GBIT0-0/1 and GBIT1-0/1 always exist in the PCM databases, because they provide constant logic values for other devices. All other devices on Sheet 4 generally do not exist in the PCM databases to reduce the overhead loaded to PCM memory. None of the devices on Sheet 4 have any effect on the operating process. They can be linked to devices under test by use of the global bits. The letter P has been used in the MDEV and DEV names to represent the PCM (0 or 1).

Devices PILK0 through PILK3 are used to simulate interlocks and the global bit used for the interlock can be controlled using the device keyboard commands. In this way an interlock can be set or reset. Devices POUT0 through POUT3 are typically controlled by a device output. They provide the status of the output and should be placed in AUTO when linked to a device under test. They can be controlled manually, but conflicts may exist between the device and the manual setting when linked to a device. POUT0 and POUT1 are also linked to Devices PMOT-PULS, PMOTMNTD1 & 2, PMOVS, and PMOVR. These devices simulate motors and valves and provide confirms in the form of global bits to be used by the devices under test. When it is desired to control these devices via global bits from POUT0 or 1, they must be placed in AUTO.

Devices PTIMER-1 and 2 provide control of analog timers when linked to the analog data base via LIM and IOS blocks. The analog timers can be started and stopped manually or automatically from a device under test. The device under test can be linked to PTIMER-1 or 2 using global bits.

4.0 PCM0 DEVICE OPERATING DESCRIPTIONS

This section provides descriptions of all PCM0 devices used for monitoring and/or controlling the process. The descriptions are in alphabetical order by master device name. Table 4-1 is a list of all PCM0 master devices and the associated page reference. Section 8.0 is an index which contains an alphabetical list of all device names and the associated page reference. Each description also contains a reference to the drawing which formally documents the device.

Standard headings have been used in the descriptions to allow quick reference to the parameter of interest. Sheet 3 of H-2-99949 provides a key to the symbology used on the device drawings.

TABLE 4-1 PCMO MASTER DEVICES

MASTER DEVICE OIOM1S20N

DEV(S): EA1-INLK1

DRAWING: H-2-99949 SHT 12

DESCRIPTION: This device is used to bypass the recirculation line high and low flow interlocks to the Reboiler steam/air valve (FV-EA1-1).

COMMANDS:

C0 NOBYPASS: Turns off the bypass condition.

C1 BYPASS: Turns on the bypass condition.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This device has two interlocks.

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 NOBYPASS: Not in bypass.

S1 BYPASS: Bypass condition is on.

S5 INTERLOK: High or Low flow condition (interlocks steam in Device FV-EA1-1 unless in BYPASS).

FAULT: Not used on this device.

MASTER DEVICE OIOM1S44N

DEV(S): PC-INLK1

DRAWING: H-2-99949 SHT 22

DESCRIPTION: This device is used to bypass up to four interlocks which are passed to another device. It also monitors a hardware bypass switch and goes to the BYPASS state whenever the switch is in bypass. When the hardware switch is moved from bypass to normal, the device is placed in NOBYPASS status, however, it can be returned to BYPASS using the C1 command.

COMMANDS:

C0 NOBYPASS: Puts the device into NOBYPASS status unless the hardware bypass switch is in the bypass position.

C1 BYPASS: Puts the device into BYPASS status.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This device has four interlocks.

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 NOBYPASS: Not in bypass.

S1 BYPASS: Bypass condition is on.

S5 INTERLOK: An interlock condition exists and is being passed to another device unless in BYPASS.

FAULT: Not used on this device.

MASTER DEVICE OM1M2P11S

DEV(S): A-E-101 P-E-101 A-E-102 P-E-102 A-E-104 P-E-104

DRAWING: H-2-99949 SHTS 31, 32, 33, 34, 35, and 36

DESCRIPTION: Controls the operation of a motor with contact confirm. Two pulsed outputs are used - one for START and one for STOP. This master device is used for motors which have a remote manual start/stop station.

COMMANDS:

C0 STOP: Stops the motor.

C1 START: Starts the motor provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This master device has one interlock. When active, the interlock will cause the stop output to remain open continuously thereby preventing manual starting of the motor.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or current.

S1 CF-ON: Running as confirmed by the motor contactor and current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device (remote stop). If no interlock is present after SHUTDOWN, attempting to restart the motor may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact is still present.

S7 STARTING: The motor has been commanded to start but the contact confirm has not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OM2M1S11S

DEV(S): A-C100 P-244-A3 A-244-A

DRAWING: H-2-99949 SHTS 23 and 42

DESCRIPTION: Controls the operation of a motor with both current and contact confirm. This master device has one interlock.

COMMANDS:

C0 STOP: Stops the motor.

C1 START: Starts the motor provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This master device has one interlock.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or the motor current.

S1 CF-ON: Running as confirmed by the motor contactor and the motor current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor or motor current without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device. If no interlock is present after SHUTDOWN, attempting to restart the motor may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact and motor current confirm are still present.

S7 STARTING: The motor has been commanded to start but the contact and current confirms have not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OM2M1S77S

DEV(S): P-AW-102

DRAWING: H-2-99949 SHT 37

DESCRIPTION: Controls the operation of a motor with both current and contact confirm. This master device has up to seven interlocks.

COMMANDS:

C0 STOP: Stops the motor.

C1 START: Starts the motor provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This master device can have up to seven interlocks. These devices all have hardwired interlocks also.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or the motor current.

S1 CF-ON: Running as confirmed by the motor contactor and the motor current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor or motor current without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device. If no interlock is present after SHUTDOWN, attempting to restart the motor may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact and motor current confirm are still present.

S7 STARTING: The motor has been commanded to start but the contact and current confirms have not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OVOM1S11N

DEV(S): TV-DSH1/2

DRAWING: H-2-99949 SHT 13

DESCRIPTION: This device controls a two position valve with no limit switch confirmation for either position.

COMMANDS:

C0 CLOSE: Closes the valve.

C1 OPEN: Opens the valve.

AUTO/MAN: Auto locks out all commands. Device should always be in MANUAL.

INTERLOCKS: This device has one interlock. When steam valve FV-EA1-1 is closed, it forces TV-DSH-1/2 to close also. This interlock is also hardwired.

OVERRIDE: Not used in this device.

STATUSES:

S0 CLOSED: Valve has been commanded to close (no confirmation).

S1 OPEN: Valve has been commanded to open (no confirmation).

S5 INTERLOK: An interlock is present.

FAULT: Not used on this device.

MASTER DEVICE OV1MOS22

DEV(S): HV-CA1-10

DRAWING: H-2-99949 SHT 55

DESCRIPTION: This device controls a two position valve with limit switch confirmation for both positions. The device has two interlocks. If P-C106 discharge pressure is LO or P-C106 is shutdown the vavle will travel to the Filtered Raw Water position.

COMMANDS:

C0 SPLY FRW: Moves the valve to the Filtered Raw Water position.

C1 SPLY PC: Moves the valve to the Process Condensate Position.

C2 CS-RESET: Resets the change-of-state status (CHGSTATE) and causes the SPLY FRW command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This device has two interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-FRW: Valve is in the Filtered Raw Water position as confirmed by the limit switch.

S1 CF-PC: Valve is in the Process Condensate position as confirmed by the limit switch.

S2 CS-RESET: Valve to change to Filtered Raw Water position and reset logic.

S4 CHGSTATE Reconfiguring valve position will give a CHGSTATE. This could be due to an interlock or some undetected abnormality. If no interlock is pressent, attempting to change the valve posistion may result in a FAULT condition.

S5 INTERLOK An interlock is present which forces the valve to Filtered Raw Water.

S6 TRVLTOFRW Valve is traveling to Filtered Raw Water.

S7 TRVLTOPC: Valve is traveling to Process Condensate.

FAULT: The device will FAULT when the travel to either position confirm is not received within a specified time after the command is issued. The FAULT can be cleared by going to OVERRIDE. When in OVERRIDE the confirms are ignored.

MASTER DEVICE OV1M1SOON

DEV(s): HV-SC-1A HV-SC-2A HV-SC-3A HV-SC-1B HV-SC-2B HV-SC-3B

DRAWING: H-2-99949 SHTS 28 and 29.

DESCRIPTION: Valve controller with confirm on close, manual operation only, no local control, one output, standard state, no interlocks.

COMMANDS:

C0 CLOSE: Closes valve.

C1 OPEN: Opens valve.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This master device has no interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirm to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-CLOSD: Closed as confirmed by limit switch.

S1 OPEN: Valve is open or partially open. Only the closed position can be confirmed by the limit switch since the switch opens when the valve begins to open.

S6 CLOSING: Valve has been commanded to close but the confirm has not been received yet.

FAULT: The device will fault when the open/closed status does not agree with the command (after appropriate delay). The fault alarm can be cleared by going to OVERRIDE. The FAULT condition has a 30 second timer instead of the usual five seconds since this is a MOV and has travel time.

MASTER DEVICE OV2M1R55S

DEV(S): HV-EC1-1

DRAWING: H-2-99949 SHT 5

DESCRIPTION: This master device controls a valve with both full-open and full-closed limit switch confirmation. On interlock occurrence, this valve will open (fail-open).

COMMANDS:

C0 CLOSE: Closes the valve provided no interlock is present.

C1 OPEN: Opens the valve.

C2 CS-RESET: Resets the CHGSTATE status and causes the OPEN command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This master device has five interlocks. Activation of any one or more of the interlocks will cause the valve to open. One of the five

interlocks is passed from EX-C-1 via Global Bit G14. This device also has hardwired interlocks.

An interlock that causes the valve to open will not close the valve upon clearing. Once the interlock clears, the valve must be commanded to open manually from the keyboard. Thus valve cycling is prevented.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-CLOSD: Closed as confirmed by the full-closed limit switch.

S1 CF-OPEN: Open as confirmed by the full-open limit switch.

S2 CS-RESET: Temporary status during resetting of the CHGSTATE status.

S4 CHGSTATE: A loss of CF-CLOSD occurred without an OPEN command. This could be due to an interlock or some undetected abnormality. If no interlock is present, attempting to CLOSE the valve may result in a FAULT condition.

S5 INTERLOK: An interlock is present which prevents closing the valve.

S6 CLOSING: Status when the device has been commanded to CLOSE but the full-closed confirmation has not been received yet.

S7 OPENING: Status when the device has been commanded to OPEN but the full-open confirmation has not been received yet.

FAULT: The device will FAULT when the CF-OPEN or CF-CLOSD confirm is not received within a specified time after the command is issued. The FAULT can be cleared by going to OVERRIDE (Override Key) which causes the confirms to be ignored.

MASTER DEVICE OV2M1SOON

DEV(S): HV-SUMP-1

DRAWING: H-2-99949 SHT 16
DESCRIPTION: This master device controls a valve with both full-open and full-closed limit switch confirmation.

COMMANDS:

C0 CLOSE: Closes the valve.

C1 OPEN: Opens the valve.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This master device has no interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-CLOSD: Closed as confirmed by the full-closed limit switch.

S1 CF-OPEN: Open as confirmed by the full-open limit switch.

S6 CLOSING: Status when the device has been commanded to CLOSE but the full-closed confirmation has not been received yet.

S7 OPENING: Status when the device has been commanded to OPEN but the full-open confirmation has not been received yet.

FAULT: The device will FAULT when the CF-OPEN or CF-CLOSD confirm is not received within a specified time after the command is issued. The FAULT can be cleared by going to OVERRIDE. When in OVERRIDE the confirms are ignored.

MASTER DEVICE OV2M1S44S

DEV(S): HV-EA1-2 HV-RC1-3 HV-RC3-3

DRAWING: H-2-99949 SHTS 17, 18

DESCRIPTION: This master device controls a two position valve with limit switch confirmation for both positions (DIVERT and NORMAL). On interlock occurrence, this valve will go to the Divert position (fail-divert).

COMMANDS:

C0 DIVERT: Commands the valve to go to the DIVERT position.

C1 NORMAL: Commands the valve to go to the NORMAL position provided there is no interlock.

C2 CS-RESET: Resets the change-of-state status (CHGSTATE) and causes the DIVERT command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This master device has up to four interlocks any one of which will cause the valve to go to DIVERT when activated. Interlocks are also hardwired.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-DVRT: In DIVERT position as confirmed by the limit switch.

S1 CF-NORM: In NORMAL position as confirmed by the limit switch.

S2 CS-RESET: Temporary status during resetting of the CHGSTATE status.

S4 CHGSTATE: A loss of CF-NORM occurred without a DIVERT command. This could be due to an interlock or some undetected abnormality. If no interlock is present, attempting to change the valve to NORMAL may result in a FAULT condition.

S5 INTERLOK: An interlock is present which forces the valve to DIVERT.

S6 TRVLNGTD: Status when the device has been commanded to DIVERT but the limit switch confirmation has not been received yet.

S7 TRVLNGTN: Status when the device has been commanded to NORMAL but the limit switch confirmation has not been received yet.

FAULT: The device will FAULT when the NORMAL or DIVERT confirm is not received within a specified time after the command is issued. The FAULT can be cleared by going to OVERRIDE (Override Key). When in OVERRIDE confirms are ignored.

MASTER DEVICE OXALMSUMP

DEV(S): P-207A-S

DRAWING: H-2-99949 SHT 23

DESCRIPTION: This device is used to provide an alarm if the 207-A Building sump level is high and the sump pump does not turn on.

COMMANDS:

C0 RES OFF: Command issued by the device after SA-RESET. Not used by the operator.

C1 This is a legal command, but does not affect the device.

C2 SA-RESET: Resets the sump alarm and is followed by the RES OFF command.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used and has no effect on the device.

STATUSES:

S0 NORMAL: Indicates that there is no alarm condition associated with the sump pump.

S2 SA-RESET: Temporary status during resetting of the SUMP ALM.

S5 HI&P OFF: Status indicating that the sump level is high and the sump pump is not operating. The high sump level signal is delayed for 10 seconds before the alarm is generated to allow the pump to come on.

S6 SUMP ALM: Indicates the alarm status for the above condition.

FAULT: Not used on this device.

MASTER DEVICE OXBASPUMP

DEV(S): 207-A-P3

DRAWING: H-2-99949 SHTS 27 and 30

DESCRIPTION: Controls the operation of a motor with both current and contact confirm.

COMMANDS:

C0 STOP: Stops the motor.

C1 START: Starts the motor provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This master device has interlocks which are hardwired and are monitored by YS-SCP3-IL. In addition, an interlock occurs when any one of the basin levels is low and the associated drain valve is open. This condition is delayed by one minute to allow time for the valves to close.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or current.

S1 CF-ON: Running as confirmed by the motor contactor and current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor or motor current without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device. If no interlock is present after SHUTDOWN, attempting to restart the motor may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact and motor current confirm are still present.

S7 STARTING: The motor has been commanded to start but the contact and current confirms have not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OXBOTDUMP

DEV(S): BOT-DUMP

DRAWING: H-2-99949 SHT 15

DESCRIPTION: This device is used to control the dumping of the pot as well as flushing the pot and dump lines. When bypass goes to active ($G2 from PB1-BYPAS equals one), the valves will be placed in the BLOCK position. On loss of bypass, a 60 second POT FLUSH will occur and then the valves will be placed in the DUMP position, provided the 102-AW tank pressure is NORMAL (as indicated by PSH-102-3), or provided the pressure interlock is bypassed using device DUMP-INLK. This begins a controlled dump. The dump will proceed to completion as long as the tank 102-AW pressure remains NORMAL or as long as DUMP-INLK is set to the BYPASS mode. If the tank pressure becomes HIGH, then the valves will automatically be placed in the BLOCK position. When the pressure returns to NORMAL, the analog timer (in DUMP-INLK) KY-102-3 starts. When timer KY-102-3 times-out, then the dumping operation automatically resumes unless the PB-1 bypass is active ($G2 equals one).

The operator may select the BLOCK, DUMP, or LINEFLSH positions whenever the bypass is active. On selection of POT FLUSH, the pot is flushed for 30 seconds and the valves revert to the DUMP position. If DUMP or POT FLUSH is selected, the controlled dump described above will be performed. If LINEFLSH

is selected, a high pressure in Tank 102-AW will not stop the flushing of the line.

COMMANDS:

C0 BLOCK: Valves HV-CA1-7, 8, and 9 are placed in the BLOCK position (7 and 9 closed, 8 open).

C1 DUMP: Valves HV-CA1-7, 8 and 9 are placed in the DUMP position (7 and 9 open, 8 closed), as long as the 102-AW tank pressure is NORMAL.

C2 POT FLSH: Valves HV-CA1-7, 8, and 9 are placed in the POT FLUSH position (7 and 8 open, 9 closed) for 30 seconds, then a DUMP is automatically initiated.

C3 LINEFLSH: Valves HV-CA1-7, 8, and 9 are placed in the LINEFLSH position (8 and 9 open, 7 closed).

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This device has one interlock to stop the CA1 vessel from dumping when the 102-AW tank pressure (PSH-102-3) is high. The initiation of POT FLSH and DUMP are additional interlocks.

OVERRIDE: Not used on this device.

STATUSES:

S0 BLOCK: Valves HV-CA1-7, 8, and 9 are in the BLOCK position (7 and 9 closed, 8 open).

S1 DUMP: Valves HV-CA1-7, 8 and 9 are in the DUMP position (7 and 9 open, 8 closed).

S2 POT FLSH: Valves HV-CA1-7, 8, and 9 are in the POT FLUSH position (7 and 8 open, 9 closed).

S3 LINEFLSH: Valves HV-CA1-7, 8, and 9 are in the DUMP FLUSH position (8 and 9 open, 7 closed).

S5 INTERLOK: Indicates tank 102-AW high pressure exists.

FAULT: Not used by this device.

MASTER DEVICE OXCASSAL1

DEV(S): CASSOAL1A

DRAWING: H-2-99949 SHT 50

DESCRIPTION: This device logically "ORs" alarms together and provides outputs to the Computer Automated Surveillance System (CASS) to indicate alarm conditions.

COMMANDS: None.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used on this device.

STATUSES: None

FAULT: Not used on this master device.

MASTER DEVICE OXCASSAL2

DEV(S): CASSOAL2A CASSOAL2B

DRAWING: H-2-99949 SHT 51

DESCRIPTION: This device logically "ORs" alarms together and provides outputs to the Computer Automated Surveillance System (CASS) to indicate alarm conditions.

COMMANDS: None.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used on this device.

STATUSES: None

FAULT: Not used on this master device.

MASTER DEVICE OXCONTROL

DEV(S): CONTROL

DRAWING: H-2-99949 SHT 39

DESCRIPTION: This device is used to select either Specific Gravity (SPG) or Waste Volume Reduction (WVR) control. See the analog chain FIC-CA1-4 for details of the effect on control.

COMMANDS:

C0 WVR CTRL: Selects WVR control.

C1 SPG CTRL: Selects SPG Control.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: No interlocks.

OVERRIDE: Not used.

STATUSES:

S0 WVR CTRL: Status indicating WVR control is in effect.

S1 SPG CTRL: Status indicating SPG control is in effect.

FAULT: Not used.

MASTER DEVICE OXDUMPILK

DEV(S): DUMP-INLK

DRAWING: H-2-99949 SHT 15

DESCRIPTION: This device is used to bypass the feed tank 102-AW high pressure interlock to the CA1 vessel dump valves. The function of timer KY-102-3 is to allow some time for the 102-AW tank pressure to recover before the DUMP can resume. The duration of the time-out of timer KY-102-3 is adjustable by entering a setpoint value.

COMMANDS:

C0 NOBYPASS: Puts the device into NOBYPASS status.

C1 BYPASS: Puts the device into BYPASS status.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This device has one interlock, which can be bypassed to allow dumping of the vessel in the event the pressure switch fails low.

OVERRIDE: Not used on this device.

STATUSES:

S0 NOBYPASS: Not in BYPASS.

S1 BYPASS: BYPASS condition is on.

S5 INTERLOK: Indicates tank 102-AW high pressure exists.

FAULT: Not used by this device.

MASTER DEVICE OXEA1ILK2

DEV(S): EA1-INLK2

DRAWING: H-2-99949 SHT 12

DESCRIPTION: This device is used to bypass the Reboiler low pressure and low steam flow interlocks to the Reboiler steam valve (FV-EA1-1).

COMMANDS:

C0 NOBYPASS: Turns off the bypass condition.

C1 BYPASS: Turns on the bypass condition.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This device has two interlocks.

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 NOBYPASS: Not in bypass.

S1 BYPASS: Bypass condition is on.

S5 INTERLOK: Interlocks are present.

FAULT: Not used on this device.

MASTER DEVICE OXEC2S3D1

DEV(S): HVEC2/3-1

DRAWING: H-2-99949 SHT 5

DESCRIPTION: This master device controls a valve with both full-open and full-closed limit switch confirmation. On interlock occurrence, this valve will close (fail-close).

COMMANDS:

C0 CLOSE: Closes the valve.

C1 OPEN: Opens the valve provided no interlock is present.

C2 CS-RESET: Resets the change-of-state status (CHGSTATE) and causes the CLOSE command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This device has two interlocks, one of which is delayed by 255 seconds. This delayed interlock will close HVEC2/3-1 if valve HV-EC1-1 is in the "not closed" state for 255 seconds. The other interlock is passed from EX-C-1 via Global Bit G14. In addition there are hardwired interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-CLOSD: Closed as confirmed by the full-closed limit switch.

S1 CF-OPEN: Open as confirmed by the full-open limit switch.

S2 CS-RESET: Temporary status during resetting of the CHGSTATE status.

S4 CHGSTATE: A loss of CF-OPEN occurred without an CLOSE command. This could be due to an interlock or some undetected abnormality. If no interlock is present, attempting to OPEN the valve may result in a FAULT condition.

S5 INTERLOK: An interlock is present which prevents opening the valve.

S6 CLOSING: Status when the device has been commanded to CLOSE but the full-closed confirmation has not been received yet.

S7 OPENING: Status when the device has been commanded to OPEN but the full-open confirmation has not been received yet.

FAULT: The device will FAULT when the CF-OPEN or CF-CLOSD confirm is not received within a specified time after the command is issued. The FAULT can be cleared by going to OVERRIDE. When in OVERRIDE the confirms are ignored.

MASTER DEVICE OXETFILD

DEV(S): ETFILK

DRAWING: H-2-99949 SHT 18

DESCRIPTION: This device has all ETF interlocks as inputs. These interlocks are sent to device LERFILK via global bit $G22. Device also passes status of HV-RC3-3 and P-C100 to ETF.

COMMNADS: No commnads. Status only.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: This device has four interlocks.

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 INTERLOCK: Interlock condition from ETF.

S1 TANK HI: ETF surge tank high.

S2 TANKHIHI: ETF surge tank HIHI.

S3 COMMFAIL: ETF modem communications failure.

S4 AOV CLS: EGF AOV-60A56 closed.

S6 P-C100: Pump P-C100 is off.

S7 HV-RC3-3: Valve HV-RC3-3 is diverted.

FAULT: Not used on this device.

MASTER DEVICE OXEXHDCD1

DEV(S): EX-C-1

DRAWING: H-2-99949 SHT 24

DESCRIPTION: Controls the operation of a motor with contact confirm. Two pulsed outputs are used - one for START and one for STOP. This master device is used for motors which have a remote manual start/stop station and a Remote/Local switch. The confirm-on status ($S1) is used to turn on and shut down the vessel vent heater via TDIC-HC11.

COMMANDS:

C0 STOP: Stops the motor.

C1 START: Starts the motor provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN/LOCAL: Auto locks out all commands. Device should always be in Manual. When the Remote/Local switch is in the Local position, the motor can only be started from the local start/stop station.

INTERLOCKS: This master device has one interlock (Global bit 19 from EXC1-INLK). When in REMOTE an active interlock will stop the motor. When in LOCAL hardwired interlocks will stop the motor.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or current.

S1 CF-ON: Running as confirmed by the motor contactor and current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device (remote stop). If no interlock is present after SHUTDOWN, attempting to restart the motor may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact and current are still present.

S7 STARTING: The motor has been commanded to start but the contact and current confirm have not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OXEXC1ILK

DEV(S): EXC1-INLK

DRAWING: H-2-99949 SHT 24

DESCRIPTION: This device is used to pass the Vessel Vent interlocks to the exhauster control device EX-C-1.

COMMANDS: None

AUTO/MAN: No effect.

INTERLOCKS: This device has five interlocks.

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 NORMAL: No interlok is activated.

S5 INTERLOK: One or more of the six interlocks is activated.

FAULT: Not used on this device.

MASTER DEVICE OXFVEA1D1

DEV(S): FV-EA1-1

DRAWING: H-2-99949 SHT 12

DESCRIPTION: This device controls the operation of the air/steam to the Reboiler. A steam permissive signal is sent to the steam controller FIC-EA1-1 whenever the AIR OFF command is active and reboiler pressure drops below the lower limit as determined by PI-EA1-1. The permissive is removed whenever the steam valve closes or when the AIR OFF is activated and the reboiler pressure is high. When the permissive is "zero", the output to valve FV-EA1-1 is set to zero by FIC-EA1-1. When the permissive is "one", the output to valve FV-EA1-1 is set according to the PID algorithm in FIC-EA1-1.

COMMANDS:

C0 AIR OFF: Causes the air valve to turn off and permits the steam valve to be turned on (opens solenoid valve between controller FIC-EA1-1 and steam valve FV-EA1-1) provided there are no interlocks.

C1 AIR ON: Opens air valve HV-EA1-3 and closes steam valve FV-EA1-1.

AUTO: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This device has numerous software and hardwired interlocks. On occurrence of an interlock, the air is turned on and the steam is turned off.

Some of the interlocks can be bypassed using Devices EA1-INLK1 and EA1-INLK2. See descriptions of these devices for details of their operation.

OVERRIDE: Not used on this device.

STATUSES:

S0 AIR OFF: Air off. Steam can be turned on with a software permissive to the steam controller FIC-EA1-1.

S1 AIR ON: Air on and steam off.

S2 STM PRMI: Air off and software permissive to steam controller (Reboiler pressure no longer high).

S5 INTERLOK: An interlock is present.

FAULT: Not used on this device.

MASTER DEVICE OXGBITOS1

DEV(S): GBIT0-0/1

DRAWING: H-2-99949 SHT 4

DESCRIPTION: This device provides a constant logic 0 ($G0) and a constant logic 1 ($G1) for use in PCM0 devices (1XGBITOS1 does the same for PCM1). They are typically used to provide a fixed input to an unused logic gate. In some cases this allows the use of the same master device for more than one device.

COMMANDS:

C0 NORMAL: The device is always forced to this command.

AUTO/MAN: Has no affect on the operation of this device.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used on this device.

STATUSES: None

FAULT: Not used on this master device.

MASTER DEVICE OXHC1INLK

DEV(S): HC1-INLK1

DRAWING: H-2-99949 SHT 23

DESCRIPTION: This device allows the low flow interlock for TDIC-HC11 to be bypassed. The BYPASS command permits the heater controller output to function regardless of the status of the flow signal FI-AS-5. The BYPASS command is used during the startup of the vacuum steam jets when the flow signal is erratic due to moisture in the system. After proper flow indication is established, the NOBYPASS command must be manually entered because the device does not have a limit for the maximum time that the device can be in the BYPASS state.

COMMANDS:

C0 NOBYPASS: Places the device in NOBYPASS mode (interlock not bypassed).

C1 BYPASS: Places the device in BYPASS mode (bypasses interlock).

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This device has one interlock which activates upon low flow (via FI-AS-5) in the Vessel Vent system. Two other interlocks that affect the heater operation are Vessel Vent Fan not running and high heater outlet temperature. The fan and temperature interlocks are implemented in the temperature control loop, TDIC-HC11.

OVERRIDE: OVERRIDE (Override Key) has no effect on this device.

STATUSES:

S0 NOBYPASS: Interlock is not bypassed.

S1 BYPASS: Interlock is bypassed.

S3 HTR-PRMI: The heater permissive is active, which allows the temperature controller TDIC-HC11 output to function, provided no other interlocks are present.

S5 INTERLOK: The low flow interlock is present.

FAULT: Not used on this device.

MASTER DEVICE OXHVCA1D1

DEV(S): HV-CA1-1

DRAWING: H-2-99949 SHT 6

DESCRIPTION: This master device controls a valve with both full-open and full-closed limit switch confirmation. On interlock occurrence, this valve will close (fail-close).

COMMANDS:

C0 CLOSE: Closes the valve.

C1 OPEN: Opens the valve provided no interlock is present.

C2 CS-RESET: Resets the change-of-state status (CHGSTATE) and causes the CLOSE command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This master device has three interlocks which will cause the valve to close when activated. One of the interlocks (P-AW-102 shutdown) causes HV-CA1-1 to close on shutdown of P-AW-102, however, HV-CA1-1 can be opened again. Device HV-CA1-1 is linked to Device VCA1-INLK via a global bit (G10). Device VCA1-INLK has multiple interlock inputs which are passed to HV-CA1-1 through this global bit. See the description for VCA1-INLK.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-CLOSD: Closed as confirmed by the full-closed limit switch.

S1 CF-OPEN: Open as confirmed by the full-open limit switch.

S6 CLOSING: Status when the device has been commanded to CLOSE but the full-closed confirmation has not been received yet.

S7 OPENING: Status when the device has been commanded to OPEN but the full-open confirmation has not been received yet.

S5 INTERLOK: An interlock is present which prevents opening the valve.

S4 CHGSTATE: A loss of CF-OPEN occurred without an CLOSE command. This could be due to an interlock or some undetected abnormality. If no interlock is present, attempting to OPEN the valve may result in a FAULT condition.

S2 CS-RESET: Temporary status during resetting of the CHGSTATE status.

FAULT: The device will FAULT when the CF-OPEN or CF-CLOSD confirm is not received within a specified time after the command is issued. The FAULT can be cleared by going to OVERRIDE. When in OVERRIDE the confirms are ignored.

MASTER DEVICE OXHVCA1D5

DEV(S): HV-CA1-5

DRAWING: H-2-99949 SHT 7

DESCRIPTION: This device controls a two position valve with limit switch confirmation for both positions.

COMMANDS:

C0 NOZZLE 5: Moves the valve to the Nozzle 5 position.

C1 NOZZLE 4: Moves the valve to the Nozzle 4 Position.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This device has no interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-NOZ 5: Valve is in the Nozzle 5 position as confirmed by the limit switch.

S1 CF-NOZ 4: Valve is in the Nozzle 4 position as confirmed by the limit switch.

S6 TRVLNGT5: Valve is traveling to Position 5.

S7 TRVLNGT4: Valve is traveling to Position 4.

FAULT: The device will FAULT when the CF-NOZ 4 or CF-NOZ 5 confirm is not received within a specified time after the command is issued. The FAULT can be cleared by going to OVERRIDE. When in OVERRIDE the confirms are ignored.

MASTER DEVICE OXHVCA1D6

DEV(S): HV-CA1-6

DRAWING: H-2-99949 SHT 14

DESCRIPTION: This master device controls a valve with both full-open and full-closed limit switch confirmation. In addition, the valve is opened automatically whenever the slurry flush is active (Global bit 3).

COMMANDS:

C0 CLOSE: Closes the valve provided the slurry flush is not active.

C1 OPEN: Opens the valve.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This master device has no interlock status, however, initiation of the flush sequence (DEV HV-CA1-1) will cause the valve to open.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-CLOSD: Closed as confirmed by the full-closed limit switch.

S1 CF-OPEN: Open as confirmed by the full-open limit switch.

S6 CLOSING: Status when the device has been commanded to CLOSE but the full-closed confirmation has not been received yet.

S7 OPENING: Status when the device has been commanded to OPEN but the full-open confirmation has not been received yet.

FAULT: The device will FAULT when the CF-OPEN or CF-CLOSD confirm is not received within a specified time after the command is issued. The FAULT can be cleared by going to OVERRIDE. When in OVERRIDE the confirms are ignored.

MASTER DEVICE OXHVMOVD2

DEV(S): HV-MOV-2

DRAWING: H-2-99949 SHT 43

DESCRIPTION: This master device controls a two-position valve with limit switch confirmation on both positions.

COMMANDS:

C0 DRAIN: Moves the valve to the drain position.

C1 FLOW: Moves the valve to the flow position.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This master device has no interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-DRAIN: Valve is in the drain position as confirmed by the limit switch.

S1 CF-FLOW: Valve is in the flow position as confirmed by the limit switch.

S6 TRVLNGTD: Status when the device has been commanded to the drain position but the confirmation has not been received yet.

S7 TRVLNGTF: Status when the device has been commanded to the flow position but the confirmation has not been received yet.

FAULT: The device will FAULT when the CF-DRAIN or CF-FLOW confirm is not received within a specified time after the command is issued. The FAULT can be cleared by going to OVERRIDE. When in OVERRIDE the confirms are ignored.

MASTER DEVICE OXJGVALVE

DEV(S): JGV-STMFL JGV-SUMP

DRAWING: H-2-99949 SHT 16

DESCRIPTION: This device is used to control a steam jet or jet gang valve. For the following operating description see H-2-99002 Zones E-D, 7-6. When the start command is issued an output energizes HY-BLK-1. This causes instrument air to be sent to HV-BLK-1 and it closes. A second output is sent to energize HY-STM-1 and HY-AIR-1. When HY-AIR-1 is energized, it vents the air to HV-AIR-1 causing it to close. When HY-STM-1 is energized, it causes instrument air to be sent to HV-STM-1 and it opens providing steam to the jet.

When the off command is invoked, HY-AIR-1 and HY-STM-1 are de-energized but HY-VENT-1 remains energized for another 60 seconds. Thus the valve HV-BLK-1 remains closed, the valve HV-STM-1 is closed, and the valve HV-AIR-1 is turned on via air from HY-AIR-1. At the end of 60 seconds HY-BLK-1 is de-energized which closes the HV-BLK-1 and vents HV-AIR-1 causing it to close also.

COMMANDS:

C0 STOP: Stops the jet. Always followed by 60 seconds of air blow.

C1 START: Starts the jet. Will continue until stopped.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used in this device.

STATUSES:

S0 OFF: No steam or air.

S1 ON: Jet is on (steam).

S2 AIR BLOW: Air purge for 60 seconds after turning off.

S3 ON 8MIN+: This will be the status if the jet is left ON for 8.5 minutes. The jet will remain ON but will indicate this status.

FAULT: Not used on this device.

MASTER DEVICE OXLERFILK

DEV(S): LERFILK

DRAWING: H-2-99949 SHT 18

DESCRIPTION: This master device transmits an interlock, via a global bit, to the P-C100 process condensate pump and HV-RC3-3 divert valve. When the interlock activates, the HV-RC3-3 valve will divert and the P-C100 pump will shut down. The signals that can cause the interlock to activate appear as statuses in the device.

COMMANDS: There are no commands on this master device.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: The interlocks are the Liquid Effluent Retention Facility (LERF) catch basin leak detectors and the LERF transfer line annulus leak detectors.

OVERRIDE: Not used.

STATUSES:

S0 LINE LDI: Tag LDI-A1 has tripped the interlock.

S1 LINE LDS: Tag LDS-A1 has tripped the interlock.

S2 BASIN 42: Tag LDS-BSN42 has tripped the interlock.

S3 BASIN 43: Tag LDS-BSN43 has tripped the interlock.

S4 BASIN 44: Tag LDS-BSN44 has tripped the interlock.

S5 INTERLOK: One of the above tags has tripped the interlock, causing HV-RC3-3 to divert and P-C100 to shut down.

S6 ETFILK: From DEV ETFILK global bet $G22.

FAULT: Not used.

MASTER DEVICE OXLFSPUMP

DEV(S): P-350-1

DRAWING: H-2-99949 SHT 38

DESCRIPTION: Controls the operation of a motor with current confirm.

COMMANDS:

C0 STOP: Stops the motor and resets the AUTOSTRT status.

C1 START: Starts the motor.

C2 AS-RESET: Resets the AUTOSTRT status. If this status is alarmed, it will clear the alarm.

AUTO/MAN: When in AUTO a permissive is sent to the pump to allow starting and stopping based on the status of the hardwired level low signal (LK-350-1). When in MANUAL the operator can control the starting and stopping of the motor regardless of the interlock status.

INTERLOCKS: Interlocks are hardwired and are not monitored by the software device. The interlocks will prevent the pump from starting when in AUTO.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor current.

S1 CF-ON: Running as confirmed by the motor current.

S2 AS-RESET: Temporary status during resetting of the AUTOSTRT status.

S3 ON 4MIN+: Status when pump has been on for more than 4 minutes.

S4 AUTOSTRT: The motor has started while in AUTO status due to LK-350-1.

S6 STOPPING: The motor has been commanded to stop but the motor current confirm is still present.

S7 STARTING: The motor has been commanded to start but the current confirm has not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OXMDPC100

DEV(S): P-C100

DRAWING: H-2-99949 SHT 22

DESCRIPTION: Controls the operation of a motor with both current and contact confirm. This master device has eight interlocks, six of which that are not bypassed. A seventh interlock from PC-INLK1 can be bypassed in device PC-INLK1. The eighth interlock (from LERFILK) is active unless valve HV-RC3-3 is in the DIVERT position. Upon activation of the LERF interlock, the P-C100 pump will shut down. When valve HV-RC3-3 is in the divert position (as indicated by the valve's divert limit switch input ZS-RC3-3D), then the P-C100 pump may be manually restarted.

COMMANDS:

C0 STOP: Stops the motor.

C1 START: Starts the motor provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This master device has eight software interlocks, two of which can be bypassed (see above). This device also has hardwired interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or current.

S1 CF-ON: Running as confirmed by the motor contactor and current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor or motor current without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device. If no interlock is present after SHUTDOWN, attempting to restart the motor may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact and motor current confirm are still present.

S7 STARTING: The motor has been commanded to start but the contact and current confirms have not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OXMDPC106

DEV(S): P-C106

DRAWING: H-2-99949 SHT 55

DESCRIPTION: Controls the operation of a motor with both current and contact confirm. This master device has four interlocks. Any one of these interlocks will cause the pump to shut down and cause valve HV-CA1-10 to travel to the Filtered Raw Water position.

COMMANDS:

C0 STOP: Stops the motor.

C1 START: Starts the motor provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This master device has four software interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or current.

S1 CF-ON: Running as confirmed by the motor contactor and current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor or motor current without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device. If no interlock is present after SHUTDOWN, attempting to restart the motor may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact and motor current confirm are still present.

S7 STARTING: The motor has been commanded to start but the contact and current confirms have not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OXMDVP244

DEV(S): P-244-A1

DRAWING: H-2-99949 SHTS 40

DESCRIPTION: Controls the operation of a motor with both current and contact confirm. This master device has up to seven interlocks.

COMMANDS:

C0 STOP: Stops the motor.

C1 START: Starts the motor provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This master device can have up to seven interlocks. These devices all have hardwired interlocks also. One of the interlocks (?ILK5) uses inverted logic as seen on the drawing.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or the motor current.

S1 CF-ON: Running as confirmed by the motor contactor and the motor current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor or motor current without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device. If no interlock is present after SHUTDOWN, attempting to restart the motor may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact and motor current confirm are still present.

S7 STARTING: The motor has been commanded to start but the contact and current confirms have not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OXPADSPRY

DEV(S): HV-PDSPRY

DRAWING: H-2-99949 SHT 15

DESCRIPTION: This device is used to control the sequencing of the pad spray valves. When the device is started the valves will sequence, opening for 15 seconds each. The sequence order is 10, 11, 12, 13, and back to 10.

COMMANDS:

C0 STOP: Closes all pad spray valves.

C1 START10: Initiates pad spray sequence with valve CA1-10.

C2 START11: Initiates pad spray sequence with valve CA1-11.

C3 START12: Initiates pad spray sequence with valve CA1-12.

C4 START13: Initiates pad spray sequence with valve CA1-13.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: No interlocks on this device.

OVERRIDE: Not used. Has no effect on the device.

STATUSES:

S0 STOPPED: No pad spray valves open.

S1 CA1-10: Valve CA1-10 open.

S2 CA1-11: Valve CA1-11 open.

S3 CA1-12: Valve CA1-12 open.

S4 CA1-13: Valve CA1-13 open.

FAULT: Not used on this device.

MASTER DEVICE OXPB1BYPA

DEV(S): PB1-BYPAS

DRAWING: H-2-99949 SHT 8

DESCRIPTION: This device is used to bypass the PB-1 shutdown status. Whenever PB-1 is on (as determined by the contactor YS-PB-1), this device will inhibit the interlock to other devices. Whenever PB-1 shuts off, this device will go to TIME BYP status and will continue to inhibit the interlock until Timer KY-PB1-1 times out. After KY-PB1-1 times out, this device will go to BYP OFF and the interlock will be activated. The interlocks can be inhibited by going to BYP ON (Command #1). The device will remain in BYP ON until turned off (Command #0) or until PB-1 starts. When in BYP OFF the device activates interlocks to:

1. Open the vacuum breaker valve HV-EC1-1,
2. Close feed valve HV-CA1-1.
3. Causes a 60 second POT FLSH by Device BOT-DUMP.

COMMANDS:

C0 BYP OFF: Activates the interlock condition. Cannot be placed in this status unless PB-1 is not running.

C1 BYP ON: Inhibits the interlock condition. Cannot be placed in this status unless PB-1 is not running.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This device does not have an interlock status but uses YS-PB1-1 to control the BYPASS conditions.

OVERRIDE: Not used and has no effect on the device.

STATUSES:

S0 BYP OFF: PB-1 is off and interlocks to other devices are active.

S1 BYP ON: PB-1 is off and interlocks to other devices are inhibited.

S2 TIME BYP: PB-1 is off and timer KY-PB1-1 has not timed out. Interlocks to other devices are inhibited.

FAULT: Not used on this device.

MASTER DEVICE 0XPB1PUMP

DEV(S): PB-1

DRAWING: H-2-99949 SHT 9

DESCRIPTION: Controls the operation of PB-1 and associated interlocks. This device has both current and contact confirm.

COMMANDS:

C0 STOP: Stops PB-1.

C1 START: Starts PB-1 provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

C3 JOG: Jogs PB-1 for 5 seconds provided no interlock is present. All interlocks except seal water pressure and flow can be bypassed in order to jog the pump.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: Seal water pressure and flow (PI-CA1-9 and (FI-CA1-1) and high-high motor current (II-PB1-1) have no bypass and will shut PB-1 down. The weight factor interlocks from Device PB1WFINLK can be bypassed (see description of PB1WFINLK).

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or the motor current.

S1 CF-ON: Running as confirmed by the motor contactor and the motor current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S3 CF-JOGNG: Jogging as confirmed by the motor contactor.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor or motor current without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device. If no interlock is present after SHUTDOWN, attempting to restart the pump may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact and motor current confirm are still present.

S7 STARTING: The motor has been commanded to start but the contact and current confirms have not been received yet.

FAULT: The device will fault when it does not start, jog, or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OXPB1WFIL

DEV(S): PB1WFINLK

DRAWING: H-2-99949 SHT 9

DESCRIPTION: This device allows the weight factor interlocks for PB-1 to be bypassed provided LI-CA1-3 is not low.

COMMANDS:

C0 NOBYPASS: Places the device in NOBYPASS mode (interlocks not bypassed).

C1 BYPASS: Places the device in BYPASS mode (bypasses interlocks).

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This device has two interlocks (LI-CA1-1 and 2). Both interlocks must be present to shutdown PB-1. The interlocks can be bypassed provided LI-CA1-3 is not low. When LI-CA1-3 is low, the device is commanded to the NOBYPASS status.

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 NOBYPASS: Interlocks are not bypassed.

S1 BYPASS: Interlocks are bypassed.

S2 LI-CA1-3: LI-CA1-3 is low and interlocks are not bypassed.

S5 INTERLOK: An interlock is present.

FAULT: Not used on this device.

MASTER DEVICE OXPB2PUMP

DEV(S): PB-2

DRAWING: H-2-99949 SHT 10

DESCRIPTION: Controls the operation of PB-2 and associated interlocks. This device has both current and contact confirm.

COMMANDS:

C0 STOP: Stops PB-2.

C1 START: Starts PB-2 provided there is no interlock.

C2 SD-RESET: Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

C3 JOG: Jogs PB-2 for 5 seconds provided no interlock is present.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: PB-2 has seven interlocks connected directly to Device PB-2 with additional interlocks passed from Devices PB2SLFILK and PB2WFINLK. These interlocks can be bypassed (see descriptions for PB2WFINLK and PB2SLFILK). PB-2 also has hardwired interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor or the motor current.

S1 CF-ON: Running as confirmed by the motor contactor and the motor current.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S3 CF-JOGNG: Jogging as confirmed by the motor contactor.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor or motor current without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device. If no interlock is present after SHUTDOWN, attempting to restart the pump may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact and motor current confirm are still present.

S7 STARTING: The motor has been commanded to start but the contact and current confirms have not been received yet.

FAULT: The device will fault when it does not start, jog, or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OXPB2SFIL

DEV(S): PB2SLFILK

DRAWING: H-2-99949 SHT 10

DESCRIPTION: This device allows the slurry flushing interlock for PB-2 to be bypassed.

COMMANDS:

C0 NOBYPASS: Places the device in NOBYPASS mode (interlocks not bypassed).

C1 BYPASS: Places the device in BYPASS mode (bypasses interlocks).

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This device has one interlock which is activated whenever the flush valves are in the evaporator flush, farm flush, or block position (see Device HV-CA1-2).

OVERRIDE: OVERRIDE (Override Key) has no effect on this device.

STATUSES:

S0 NOBYPASS: Interlocks are not bypassed.

S1 BYPASS: Interlocks are bypassed.

S5 INTERLOK: An interlock is present.

FAULT: Not used on this device.

MASTER DEVICE OXPB2WFIL

DEV(S): PB2WFINLK

DRAWING: H-2-99949 SHT 10

DESCRIPTION: This device allows the weight factor interlocks for PB-2 to be bypassed.

COMMANDS:

C0 NOBYPASS: Places the device in NOBYPASS mode (interlocks not bypassed).

C1 BYPASS: Places the device in BYPASS mode (bypasses interlocks).

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: This device has two interlocks (LI-CA1-1 and 2). Both interlocks must be present to shutdown PB-2.

OVERRIDE: OVERRIDE (Override Key) has no effect on this device.

STATUSES:

S0 NOBYPASS: Interlocks are not bypassed.

S1 BYPASS: Interlocks are bypassed.

S5 INTERLOK: An interlock is present.

FAULT: Not used on this device.

MASTER DEVICE OXRC1DPIG

DEV(S): RC1-PIG

DRAWING: H-2-99949 SHT 19

DESCRIPTION: This master device controls the sample flow through the radiation monitoring pig for the RC1 sampling system. Timer KY-RC1-1 causes the pig sample stream to be periodically diverted and drained. If NO VENT is selected, the funnel valve is not opened during the divert/drain period (4 min 15 sec). If AUTOVENT is selected, the funnel valve will be opened during this time. Whenever PIG FLSH is selected, the device immediately goes to the Divert, Vent, and Drain valve positions and remains there until NO VENT or AUTOVENT is again selected. On occurrence of a radiation interlock, the valves revert to their normal position regardless of which command is selected. The radiation interlock can be bypassed using HS-RC1-6.

COMMANDS:

C0 NO VENT: Causes the funnel valve to remain closed during diversion.

C1 AUTOVENT: Causes the funnel valve to open during diversion.

C2 PIG FLSH: Causes the valves to Divert, Vent, and Drain (no interlock).

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: Two radiation interlocks prohibit sample diversion. These interlocks are also hardwired.

OVERRIDE: Not used.

STATUSES:

S0 NO VENT: Indicates the NO VENT command is selected.

S1 AUTOVENT: Indicates the AUTOVENT command is selected.

S2 PIG FLSH: Indicates that the PIG FLSH command is selected and the valves are in the Divert, Vent, and Drain position (unless interlocked).

S3 DI/DRAIN: The valves are placed in the Divert and Drain position, but the funnel valve remains closed (no confirms).

S4 DI/VN/DR: The valves are placed in the Divert, Vent, and Drain position.

S5 INTERLOK: Indicates the presence of an interlock.

S6 LOW FLOW: Indicates the existence of low flow to the sample pig. The low flow is inhibited during the timed diversion and for 75 sec after return to normal and for 5.5 min during pig flush. The low flow alarm is sent to Device CASSOAL2B for output to CASS.

S7 BYPASS Interlocks are bypassed.

FAULT: Not used.

MASTER DEVICE OXRC1SAMP

DEV(S): RC1-SAMP

DRAWING: H-2-99949 SHT 19

DESCRIPTION: Controls the operation of Pump P-RC1-1 and Sampler RC1. When the sample pump is on, a signal is sent to the analog data base to meter flow for proportional sampling. A signal is returned from the analog data base each time a set number of gallons has been metered. This causes RC1-SAMP to pulse the sampler.

COMMANDS:

C0 STOP: Stops the pump and sends a signal to the analog data base to stop metering flow for proportional sampling. Also stops Timer KY-RC1-1.

C1 START: Starts the pump provided there is no interlock. Starts Timer KY-RC1-1. Also sends a signal to the analog data base to begin metering flow for proportional sampling.

C2 SD-RESET Resets the SHUTDOWN status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: One interlock (TK-C-103 level low) will turn off the pump and the RC1 sampling system.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor.

S1 CF-ON: Running as confirmed by the motor contactor.

S2 SD-RESET: Temporary status during resetting of the SHUTDOWN status.

S3 SAMPLE: Sampler is being pulsed.

S4 SHUTDOWN: The motor has stopped as confirmed by the contactor without being commanded to stop. This could be due to an interlock (as indicated by the INTERLOK status) or due to some abnormal condition not monitored by the device. If no interlock is present after SHUTDOWN, attempting to restart the pump may result in a FAULT condition.

S5 INTERLOK: Indicates an interlock condition is present.

S6 STOPPING: The motor has been commanded to stop but the contact confirm is still present.

S7 STARTING: The motor has been commanded to start but the contact confirm has not been received yet.

FAULT: The device will fault when it does not start or stop within the allowable time period after the associated command is issued. The FAULT condition can be cleared by going to OVERRIDE (Override Key).

MASTER DEVICE OXRC2DPIG

DEV(S): RC2-PIG

DRAWING: H-2-99949 SHT 20

DESCRIPTION: This master device controls the sample flow through the radiation monitoring pig for the RC2 sampling system. Timer KY-RC2-1 causes the pig sample stream to be diverted and drained on a periodic basis. If NO VENT is selected, the funnel valve is not opened during the divert/drain period (4 min 15 sec). If AUTOVENT is selected, the funnel valve will be opened during this time. Whenever PIG FLSH is selected, the device immediately goes to the Divert, Vent, and Drain valve positions and remains there until NO VENT or AUTOVENT is again selected. On occurrence of a radiation interlock, the valves revert to their normal position regardless of which command is selected. The radiation interlock can be bypassed using HS-RC2-6.

COMMANDS:

C0 NO VENT: Causes the funnel valve to remain closed during diversion.

C1 AUTOVENT: Causes the funnel valve to open during diversion.

C2 PIG FLSH: Causes the valves to Divert, Vent, and Drain (no interlock).

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: Two radiation interlocks prohibit sample diversion. These interlocks are also hardwired.

OVERRIDE: Not used.

STATUSES:

S0 NO VENT: Indicates the NO VENT command is selected.

S1 AUTOVENT: Indicates the AUTOVENT command is selected.

S2 PIG FLSH: Indicates that the PIG FLSH command is selected and the valves are in the Divert, Vent, and Drain position (unless interlocked).

S3 DI/DRAIN: The valves are placed in the Divert and Drain position, but the funnel valve remains closed (no confirms).

S4 DI/VN/DR: The valves are placed in the Divert, Vent, and Drain position (no confirms).

S5 INTERLOK: Indicates the presence of an interlock.

S6 LOW FLOW: Indicates the existence of low flow to the sample pig. The low flow is inhibited during the timed diversion and for 75 sec after return to normal and for 5.5 min during pig flush.

S7 BYPASS Interlocks are bypassed.

FAULT: Not used.

MASTER DEVICE OXRC2SAMP

DEV(S): RC2-SAMP

DRAWING: H-2-99949 SHT 20

DESCRIPTION: Controls the operation of Valve HV-RC2-5 and Sampler RC2. When the valve is opened, a signal is sent to the analog data base to meter flow for proportional sampling. A signal is returned from the analog data base each time a set number of gallons has been metered. This causes RC2-SAMP to pulse the sampler.

COMMANDS:

C0 STOP: Closes (no confirm) valve HV-RC2-5 and sends a signal to the analog data base to stop metering flow for proportional sampling. Also stops Timer KY-RC2-1.

C1 START: Opens (no confirm) valve HV-RC2-5 provided there is no interlock. Starts Timer KY-RC2-1. Also sends a signal to the analog data base to begin metering flow for proportional sampling.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: Interlocks for this device are not presently used although it has the capability for three.

OVERRIDE: Not used.

STATUSES:

S0 OFF: Sampler not running and valve HV-RC2-5 closed.

S1 ON: Running and valve HV-RC2-5 open.

S3 SAMPLE: Sampler is being pulsed.

S5 INTERLOK: Although this status is available, it is not presently used.

FAULT: Not used.

MASTER DEVICE OXRC3DPIG

DEV(S): RC3-PIG

DRAWING: H-2-99949 SHT 21

DESCRIPTION: This device controls the sample flow through the radiation monitoring pigs for the RC3 sampling system. Timer KY-RC3-1 causes the pig sample stream to be diverted and drained on a periodic basis when the NO VENT command is selected. Whenever PIG FLSH is selected, the device immediately goes to the Divert and Drain valve positions and remains there until NO VENT is again selected. The funnel (vent) valve on this sample pig is not automatically controlled because a control valve does not exist as it does for RC1 and RC2.

On occurrence of a radiation interlock, the valves revert to their normal position regardless of which status (NO VENT or PIG FLSH) is selected. The radiation interlock can be bypassed using HS-RC3-6.

COMMANDS:

C0 NO VENT: Causes the valves to Divert and Drain whenever the timer KY-RC3-1 activates.

C1 NO VENT: Same as C0.

C2 PIG FLSH: Causes the valves to Divert and Drain provided no interlock is present.

AUTO/MAN: AUTO locks out all commands. The device should always be in MANUAL.

INTERLOCKS: Two radiation interlocks prohibit sample diversion when the radiation is high. These interlocks are also hardwired.

OVERRIDE: Not used.

STATUSES:

S0 NO VENT: Indicates the NO VENT command is selected.

S2 PIG FLSH: Indicates that the PIG FLSH command is selected and the valves are in the Divert and Drain position (unless interlocked).

S3 DI/DRAIN: The valves are placed in the Divert and Drain position.

S5 INTERLOK: Indicates the presence of an interlock.

S6 LOW FLOW: Indicates the existence of low flow to the sample pig. The low flow is inhibited during the timed diversion and for 75 sec after return to normal and for 5.5 min during pig flush.

S7 BYPASS Interlocks are bypassed.

FAULT: Not used.

MASTER DEVICE OXRC3SAMP

DEV(S): RC3-SAMP

DRAWING: H-2-99949 SHT 21

DESCRIPTION: Controls the operation of Sampler RC3. When the sampler is running, a signal is sent to the analog data base to meter flow for proportional sampling. A signal is returned from the analog data base each time a set number of gallons has been metered. This causes RC3-SAMP to pulse the sampler.

COMMANDS:

C0 STOP: Stops the sampler and sends a signal to the analog data base to stop metering flow for proportional sampling. Also stops Timer KY-RC3-1.

C1 START: Starts the sampler and sends a signal to the analog data base to begin metering flow for proportional sampling. Also starts Timer KY-RC3-1.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: No interlocks.

OVERRIDE: Not used.

STATUSES:

S0 OFF: Sampler not running.

S1 ON: Sampler running.

S3 SAMPLE: Sampler is being pulsed.

FAULT: Not used.

MASTER DEVICE OXSELECDI

DEV(S): SELECT-DI

DRAWING: H-2-99949 SHT 39

DESCRIPTION: This device is used to select either the #1 or #2 Tubes for use in the evaporator C-A-1 level calculation.

COMMANDS:

C0 NO CMD: Has no effect on the device.

C1 #1 TUBES: Selects the #1 Tubes.

C2 #2 TUBES: Selects the #2 Tubes.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: No interlocks.

OVERRIDE: Not used.

STATUSES:

S0 NO CMD: Temporary status if NO CMD (C0) is selected.

S1 DI-CA1-1: #1 Tubes are being used for the density calculation.

S2 DI-CA1-2: #2 Tubes are being used for the density calculation.

FAULT: Not used.

MASTER DEVICE OXSELECTI

DEV(S): SELECT-TI

DRAWING: H-2-99949 SHT 39

DESCRIPTION: This device is used to select one of two temperature elements (TI-EA1-7 or TI-CA1-7). These are used for reboiler temperature differential. TI-CA1-7 can be used if TI-EA1-7 fails.

COMMANDS:

C0 TI-EA1-7: Selects TI-EA1-7.

C1 TI-CA1-7: Selects TI-CA1-7.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: No interlocks.

OVERRIDE: Not used.

STATUSES:

S0 TI-EA1-7: TI-EA1-7 is selected.

S1 TI-CA1-7: TI-CA1-7 is selected.

FAULT: Not used.

MASTER DEVICE OXSELECWF

DEV(S): SELECT-WF

DRAWING: H-2-99949 SHT 39

DESCRIPTION: This device is used to select either the #1 or #2 WF for use in the level calculation.

COMMANDS:

C0 NO CMD: Has no effect on the device.

C1 LI-CA1-1: Selects WFI-CA1-1.

C2 LI-CA1-2: Selects WFI-CA1-2.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: No interlocks.

OVERRIDE: Not used.

STATUSES:

S0 NO CMD: Temporary status if NO CMD (C0) is selected.

S1 LI-CA1-1: WFI-CA1-1 is being used in the level calculation.

S2 LI-CA1-2: WFI-CA1-2 is being used in the level calculation.

FAULT: Not used.

MASTER DEVICE OXSLFLUSH

DEV(S): HV-CA1-2

DRAWING: H-2-99949 SHT 14

DESCRIPTION: Controls the slurry flush system. Can be operated either manually or in automatic mode. Whenever flushing is active a signal is sent to Device HV-CA1-6 causing it to open. During flushing a signal is also sent to PB2-INLK2 which causes PB-2 to shutdown (except when PB2-INLK2 is in BYPASS).

COMMANDS:

C0 BLOCK: Place valve HV-CA1-2 in Position 2 (air off) and valve HV-CA1-2A in Position 2 (air on).2

C1 SL OUT: Place valve HV-CA1-2 in Position 1 (air on) and valve HV-CA1-2A in Position 1 (air off).

C2 EVAP FL: Place valve HV-CA1-2 in Position 1 (air on) and valve HV-CA1-2A in Position 2 (air on).

C3 FARM FL: Place valve HV-CA1-2 in Position 2 (air off) and valve HV-CA1-2A in Position 1 (air off). Send signal to Device HV-CA1-6 to open valve HV-CA1-6.

C4 LO-RESET: Resets the LOCKOUT condition and then goes to BLOCK. See LOCKOUT status below.

AUTO: If the device is not in LOCKOUT status, the occurrence of low slurry flow (as determined by FSL-CA1-4) will start Timer KY-CA1-2. If the slurry flow is restored it stops and resets the timer.

If Timer KY-CA1-2 times out it will initiate the automatic flush sequence. The automatic sequence consists of a 30 second EVAPORATOR FLUSH followed by a FARM FLUSH (Timer KY-CA1-2F). Upon completion of the FARM FLUSH, the valves are placed in the BLOCK position and the LOCKOUT status is set. In LOCKOUT the automatic flush is locked out until manually reset (LO-RESET).

MANUAL: The operator may select the BLOCK, SL OUT, EVAP FL, FARM FL, or LO-RESET commands. When in MANUAL, the automatic flush sequence will not be initiated.

INTERLOCKS: This device has no interlock status, however, the low slurry flow will initiate the flushing.

OVERRIDE: Not used and has no effect on the device.

STATUSES:

S0 BLOCK: Valve HV-CA1-2 in Position 2 (air off) and valve HV-CA1-2A in Position 2 (air on).

S1 SL OUT: Valve HV-CA1-2 in Position 1 (air on) and valve HV-CA1-2A in Position 1 (air off).

S2 EVAP FL: Valve HV-CA1-2 in Position 1 (air on) and valve HV-CA1-2A in Position 2 (air on).

S3 FARM FL: Valve HV-CA1-2 in Position 2 (air off) and valve HV-CA1-2A in Position 1 (air off).

S4 LO-RESET: Temporary status when reset is commanded. Always followed by BLOCK status.

S5 LOCKOUT: Valves are in the BLOCK position and the auto flush sequence is inhibited.

FAULT: Not used on this device.

SPECIAL DESCRIPTION: If the auto flush sequence has been initiated, switching from AUTO to MANUAL will not stop the sequence unless the LO-RESET command is invoked. Upon completion of the auto sequence, the status will be LOCKOUT which can be reset with the LO-RESET command.

MASTER DEVICE OXSWAPUMP

DEV(S): P-C-105 P-C-105A

DRAWING: H-2-99949 SHTS 7 and 8

DESCRIPTION: Controls the operation of the two seal water pumps. Allows the designation of a Primary and Secondary pump. Only one pump need be operated if it can maintain pressure and flow.

COMMANDS:

C0 STOP: Stops the pump when in manual.

C1 START: Starts the pump when in manual.

C2 SF-RESET: Resets the start-fail status and causes the STOP command to follow. If this status is alarmed, it will clear the alarm.

AUTO/MAN: When in AUTO a pump is designated as the Secondary (standby) pump to be started automatically in the event seal water flow and pressure can not be maintained with the other pump. When in MANUAL a pump is designated as the Primary pump and must be started manually. The Primary pump will provide a start signal to the Secondary pump (after two minutes) in the event seal water pressures and flows cannot be maintained. When in MANUAL, a pump will ignore any auto start signal from the other pump. Failure to establish the required minimum pressures and flows for a period of four minutes while a pump is running will also stop the pump regardless of the AUTO/MAN status.

INTERLOCKS: No interlocks.

OVERRIDE: OVERRIDE (Override Key) causes the confirms to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-OFF: Not running as confirmed by the motor contactor.

S1 CF-ON: Running as confirmed by the motor contactor.

S2 SF-RESET: Temporary status during resetting of the STRTFAIL status.

S4 STRTFAIL: The motor failed to auto-start (commanded by the other pump device) because it was in MANUAL.

S6 STOPPING: The motor has been commanded to stop but the contactor off confirm has not been received yet.

S7 STARTING: The motor has been commanded to start but the contactor on confirm has not been received yet.

FAULT: The device will fault when it does not start or stop within five seconds after the command is issued. It will also fault if the contactor opens due to some external condition. The fault can be cleared by going to OVERRIDE.

MASTER DEVICE OXVCA1ILK

DEV(S): VCA1-INLK

DRAWING: H-2-99949 SHT 6

DESCRIPTION: This device is used to bypass interlocks which are passed to device HV-CA1-1. It also monitors a hardware bypass switch and goes to the BYPASS state whenever the switch is in bypass. A timer (KY-CA1-1) limits the amount of time the interlocks can be bypassed. When the hardware switch is moved from bypass to normal, the device is placed in NOBYPASS status, however, it can be returned to BYPASS using the C1 command.

COMMANDS:

C0 NOBYPASS: Puts the device into NOBYPASS status unless the hardware bypass switch is in the bypass position.

C1 BYPASS: Puts the device into BYPASS status.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: This device has ten interlocks.

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 NOBYPASS: Not in bypass.

S1 BYPASS: Bypass condition is on.

S5 INTERLOK: An interlock condition exists and is being passed to device HV-CA1-1 unless in BYPASS.

FAULT: Not used on this device.

MASTER DEVICE OXVSTATC0

DEV(S): HV-CA1-7 HV-CA1-9

DRAWING: H-2-99949 SHT 13

DESCRIPTION: This master device provides status information for a valve with two position limit switch confirmation. No valve control is available from this device.

COMMANDS: None

AUTO/MAN: Will work in either AUTO or MANUAL.

INTERLOCKS: None

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 CF-CLOSD: Valve is closed as confirmed by limit switch.

S1 CF-OPEN: Valve is open as confirmed by limit switch.

S2 TRAVEL: Valve is between close and open positions.

FAULT: Not used on this device.

MASTER DEVICE OXVSTATNB

DEV(S): HV-2-37 HV-2-34

DRAWING: H-2-99949 SHT 13

DESCRIPTION: This master device provides status information for a valve with two position limit switch confirmation. No valve control is available from this device.

COMMANDS: None

AUTO/MAN: Will work in either AUTO or MANUAL.

INTERLOCKS: None

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 CF-NORM: Valve is in the normal position as confirmed by limit switch.

S1 CF-BKFL: Valve is in the backflush position as confirmed by limit switch.

S2 TRAVEL: Valve is between close and open positions.

FAULT: Not used on this device.

MASTER DEVICE OXVSTATRW

DEV(S): HV-RW-1 HV-RW-2

DRAWING: H-2-99949 SHT 13

DESCRIPTION: This master device provides status information for a valve with two position limit switch confirmation. No valve control is available from this device. This device differs in that the limit switch always indicates either closed or open. Therefore there is no travel status.

COMMANDS: None

AUTO/MAN: Will work in either AUTO or MANUAL.

INTERLOCKS: None

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 CF-CLOSD: Valve is closed as confirmed by limit switch.

S1 CF-OPEN: Valve is open as confirmed by limit switch.

S2 OPEN30+S: Valve has been open for more than 30 seconds.

FAULT: Not used on this device.

MASTER DEVICE OXVSTATSL

DEV(S): HV-CA1-2S

DRAWING: H-2-99949 SHT 13

DESCRIPTION: This master device provides status information for the slurry valves using the limit switches. No valve control is available from this device.

COMMANDS: None

AUTO/MAN: Will work in either AUTO or MANUAL.

INTERLOCKS: None

OVERRIDE: OVERRIDE (Override Key) has no effect on this master device.

STATUSES:

S0 BLOCK: HV-CA1-2 in Position 2 and HV-CA1-2A in Position 2.

S1 SL OUT: HV-CA1-2 in Position 1 and HV-CA1-2A in Position 1.

S2 FARM FL: HV-CA1-2 in Position 2 and HV-CA1-2A in Position 1.

S3 EVAP FL: HV-CA1-2 in Position 1 and HV-CA1-2A in Position 2.

FAULT: Not used on this device.

MASTER DEVICE ANNACKMDO

DEV(S): HS-AB1ACK

DRAWING: H-2-99949 SHT 54

DESCRIPTION: This master device provides a digital output signal to silence the audible horn on the hardwired Process Annunciator Panel ANN-242-AB1. The device is set to the ACKNWLG command for a one second duration ($C1) by the Silence Key Task (by pressing the operator workstation SILENCE key) running on the Display Control Module computer. After one second, the device is forced to the NORMAL ($C0) command. The Silence Key Task calls the device via the device's network number, unit number, and Internal Point Number (IPN). Therefore, any software changes to the system network number, sequence database unit number, or continuous database IPN's may require modification of the code for the Key Task.

COMMANDS:

C0 NORMAL: The device is always forced to this command.

C1 ACKNWLG: Set for one second by pressing any operator workstation SILENCE key.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used on this device.

STATUSES:

S0 NORMAL: No silencing of audible horn.

S1 ACKNWLG: Silences the audible horn.

FAULT: Not used on this master device.

MASTER DEVICE MDVALMO

DEV(S): AUDALARMO

DRAWING: H-2-99949 SHT 54

DESCRIPTION: Any yellow or white alarm causes the ALM-ON command ($C1) to be set, which causes the audible horn to be turned on. When any operator workstation SILENCE key is pressed, the ALM-OFF command ($C0) is set, which causes the audible horn to be turned off. The Silence Key Task, which is spawned by pressing a workstation SILENCE key, calls the device via the device's network number, unit number, and Internal Point Number (IPN). Therefore, any software changes to the system network number, sequence database unit number, or continuous database IPN's may require modification of the code for the Key Task.

COMMANDS:

C0 NORMAL: The device is always forced to this command.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used on this device.

STATUSES: None

FAULT: Not used on this master device.

5.0 PCM1 DEVICE OPERATING DESCRIPTIONS

This section provides descriptions of all PCM1 devices used for monitoring and/or controlling the process. The descriptions are in alphabetical order by master device name. Table 5-1 is a list of all PCM1 master devices and the associated page reference. Section 8.0, the index, contains an alphabetical list of all device names and the associated page reference. Each description also contains a reference to the drawing which formally documents the device.

Standard headings have been used in the descriptions to allow quick reference to the parameter of interest. Sheet 2 of H-2-99949 provides a key to the symbology used on the device drawings.

TABLE 5-1 LIST OF PCM1 MASTER DEVICES

MASTER DEVICE 1XARMBYPA

DEV(S): HS-ARMAAX HS-ARM-AP HS-ARM-AW HS-ARM-AN

DRAWING: H-2-99949 SHTS 52 and 53

DESCRIPTION: This device is used to bypass the Area Radiation Monitor interlocks. The device provides a contact output which bypasses the hardwired interlock relay. It is used during testing of the Area Radiation Monitors to prevent alarms and pump shutdowns. A timer (KY-ARM-**) limits the amount of time the interlocks can be bypassed. The timer can be reset, however, while maintaining the CF-BYPAS state. The bypassed condition is confirmed by monitoring the status of the bypass relay.

COMMANDS:

C0 NOBYPASS: Puts the device into CF-NOBYP status.

C1 BYPASS: Puts the device into CF-BYPAS status.

C2 TM-RESET: Resets the analog timer back to zero while maintaining the previous status of the bypass output.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: The interlocks being bypassed are all hardwired.

OVERRIDE: OVERRIDE (Override Key) causes the confirm to be ignored and will therefore clear the FAULT condition if it is present.

STATUSES:

S0 CF-NOBYP: Not in bypass as confirmed by the contact input.

S1 CF-BYPAS: Bypass condition is on as confirmed by the contact input.

S2 TM-RESET: Status during resetting of the timer.

FAULT: The device will fault when it does not receive the bypass confirm within three seconds. It will also fault if the bypass relay closes without being commanded to bypass. The FAULT can be cleared by going to OVERRIDE.

MASTER DEVICE 1XANNDSIL

DEV(S): HS-AN-SIL HS-AP-SIL HS-AW-SIL

DRAWING: H-2-99949 SHT 44

DESCRIPTION: This device provides an output (on command) to silence an external hardwired annunciator.

COMMANDS:

C0 NORMAL: The normal command which is set for this device.

C1 SILENCE: Causes the device to output a one second pulse which silences the hardware annunciator alarm.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: None.

OVERRIDE: OVERRIDE (Override Key) has no effect on this device.

STATUSES:

S0 NORMAL: Status when not in SILENCE.

S1 SILENCE: Temporary status during pulse output.

FAULT: Not used on this device.

MASTER DEVICE 1XCASSAL1

DEV(S): CASS1AL1A

DRAWING: H-2-99949 SHT 50

DESCRIPTION: This device logically "ORs" alarms together and provides outputs to the Computer Automated Surveillance System (CASS).

COMMANDS: None.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used on this device.

STATUSES: None

FAULT: Not used on this master device.

MASTER DEVICE 1XCASSAL2

DEV(S): CASS1AL2A

DRAWING: H-2-99949 SHT 51

DESCRIPTION: This device logically "ORs" alarms together and provides outputs to the Computer Automated Surveillance System (CASS).

COMMANDS: None.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used on this device.

STATUSES: None

FAULT: Not used on this master device.

MASTER DEVICE 1XGBITOS1

DEV(S): GBIT1-0/1

DRAWING: H-2-99949 SHT 4

DESCRIPTION: This device provides a constant logic 0 ($G0) and a constant logic 1 ($G1) for use in PCM1 devices (0XGBITOS1 does the same for PCM0). They are typically used to provide a fixed input to an unused logic gate. In some cases this allows the use of the same master device for more than one device.

COMMANDS:

CO NORMAL: The device is always forced to this command.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used on this device.

STATUSES: None

FAULT: Not used on this master device.

MASTER DEVICE 1XSHDNALM

DEV(S):	P-AN-101	P-AN-102	P-AN-103	P-AN-104	P-AN-105
	P-AN-106	P-AN-107	P-AP-101	P-AP-102	P-AP-103
	P-AP-104	P-AP-105	P-AP-106	P-AP-107	P-AP-108
	EXH-AP-K1	EXH-AP-K2	P-AW-101	P-AW-103	P-AW-104
	P-AW-105	P-AW-106	P-AY-101	P-AY-102	P-AZ-101
	P-AZ-102				

DRAWING: H-2-99949 SHTS 45, 46, 47, 48, and 49

DESCRIPTION: This device provides a SHUTDOWN status whenever the associated motor being monitored shuts down. No control of the motor is provided.

COMMANDS:

C0 NORMAL: The normal command which is set for this device. There is no specific status associated with this command. It is simply the command in effect whenever the device is not being reset.

C1 NORMAL: Same as C0.

C2 SD-RESET: Resets the SHUTDOWN status and returns to the NORMAL command.

AUTO/MAN: Auto locks out all commands. Device should always be in Manual.

INTERLOCKS: None.

OVERRIDE: OVERRIDE (Override Key) has no effect on this device.

STATUSES:

S0 CF-OFF: Motor is off as confirmed by the motor current or contactor.

S1 CF-ON: Motor is on as confirmed by the motor current or contactor.

S2 SD-RESET: Temporary status during reset of the SHUTDOWN status.

S4 SHUTDOWN: Motor was running and stopped. Also the change in operating status has not been acknowledged by the SD-RESET command.

FAULT: Not used on this device.

MASTER DEVICE ANNACKMD1

DEV(S): HS-AB2ACK

DRAWING: H-2-99949 SHT 54

DESCRIPTION: This master device provides a digital output signal to silence the audible horn on the hardwired Auxiliary Annunciator Panel ANN-242-AB2. The device is set to the ACKNWLG command for a one second duration ($C1) by the Silence Key Task (by pressing the operator workstation SILENCE key) running on the Display Control Module computer. After one second, the device is forced to the NORMAL ($C0) command. The Silence Key Task calls the device via the device's network number, unit number, and Internal Point Number (IPN). Therefore, any software changes to the system network number, sequence database unit number, or continuous database IPN's may require modification of the code for the Key Task.

COMMANDS:

C0 NORMAL: The device is always forced to this command.

C1 ACKNWLG: Set for one second by pressing any operator workstation SILENCE key.

AUTO/MAN: Has no effect on the operation of this device.

INTERLOCKS: This device has no interlocks.

OVERRIDE: Not used on this device.

STATUSES:

S0 NORMAL: No silencing of audible horn.

S1 ACKNWLG: Silences the audible horn.

FAULT: Not used on this master device.

6.0 REFERENCES

1. WHC-SD-534-CSRS-001, 242-A Process Control Computer Software Requirements and Specifications.

2. WHC-SD-534-SDP-001, 242-A Process Control Computer Software Development Plan.

3. WHC-SD-534-CSWD-003, 242-A Process Control Computer Software Test Plan.

4. WHC-SD-534-ATR-001, Project B-534 Software Test Report.

5. WHC-SD-534-CSCM-001, 242-A Process Control Computer Software Configuration Management Plan.

6. WHC-SD-534-CSWD-006, 242-A Monitor and Control System Digital Input and Analog Loop Software Description.

7. TI, 1988a, Texas Instruments D/3 Continuous Control Package Reference Manual, Texas Instruments, Hunt Valley, Maryland.

7.0 APPENDICIES

APPENDIX A GLOBAL BIT ASSIGNMENT

PCM0 GLOBAL BITS

Bit SHT	Function	MDEV	DEV	
0	Constant Logic 0	0XGBIT0S1	GBIT0-0/1	4
1	Constant Logic 1	0XGBIT0S1	GBIT0-0/1	4
2	Bypass for PB-1 Running	0XPB1BYPA	PB1-BYPAS	8
3	Slurry Flush Active	0XSLFLUSH	HV-CA1-2	14
4	Slurry Flush PB-2 Shutdown	0XSLFLUSH	HV-CA1-2	14
5	Start P-C-105A	0XSWAPUMP	P-C-105	7
6	Start P-C-105	0XSWAPUMP	P-C-105A	8
7	Bypass Recirc Line H/L Flow	0I0M1S20N	EA1-INLK1	12
8	Bypass PB1 WT Factor Interlocks	0XPB1WFIL	PB1WFINLK	9
9	Bypass PB2 WT Factor Interlocks	0XPB2WFIL	PB2WFINLK	10
10	Bypass HV-CA1-1 Interlocks	0XVCA1ILK	VCA1-INLK	6
11	Bypass Slurry Flush Shutdown of PB2	0XPB2SFIL	PB2SLFILK	10
12	Bypass Reboiler Interlocks to FV-EA1-1	0XEA1ILK2	EA1-INLK2	12
13	Bypass Rad Interlocks to P-C100	0I0M1S44N	PC-INLK1	22
14	Pass VV Interlocks to Other Devices	0XEXHDCD1	EX-C-1	24
15	RC1 Sampler System Status	0XRC1SAMP	RC1-SAMP	19
16	RC2 Sampler System Status	0XRC2SAMP	RC2-SAMP	20
17	RC3 Sampler System Status	0XRC3SAMP	RC3-SAMP	21
18	Low Flow Alarm from RC1-PIG to CASS	0XRC1DPIG	RC1-PIG	19
19	Interlocks for Vessel Vent	0XEXC1ILK	EXC1-INLK	24
20	Pass LERF Interlock to Other Devices	0XLERFILK	LERFILK	18
21	Bypass Pressure Interlock to BOT-DUMP	0XDUMPILK	DUMP-INLK	15
22	Interlock from ETF	0XETFILD	ETFILK	18
23	P-C106 Shutdown Interlock to HV-CA1-10	0XMDPC106	P-C106	55
50	Simulated Interlock	0DGLOBALB	0ILK0	4
51	Simulated Interlock	0DGLOBALB	0ILK1	4
52	Simulated Interlock	0DGLOBALB	0ILK2	4
53	Simulated Interlock	0DGLOBALB	0ILK3	4
54	Simulated Output	0DGLOBALB	0OUT0	4
55	Simulated Output	0DGLOBALB	0OUT1	4
56	Simulated Output	0DGLOBALB	0OUT2	4
57	Simulated Output	0DGLOBALB	0OUT3	4
61	Simulated Motor Confirm	0DMOTPULS	0MOT-PULS	4
62	Simulated Motor Confirm	0DMOTMNTD	0MOTMNTD1	4
63	Simulated Motor Confirm	0DMOTMNTD	0MOTMNTD2	4
64	Analog Timer Timeout Indication	0DALTIMER	0TIMER-1	4
65	Analog Timer Timeout Indication	0DALTIMER	0TIMER-2	4
66	Analog Timer Start/Reset Control	0DALTIMER	0TIMER-1	4
67	Analog Timer Start/Reset Control	0DALTIMER	0TIMER-2	4
68	Fail-Open Valve CF0 Confirm	0DMOVOUT0	0MOVR	4
69	Fail-Open Valve CF1 Confirm	0DMOVOUT0	0MOVR	4
70	Fail-Closed Valve CF0 Confirm	0DMOVOUT1	0MOVS	4
71	Fail-Closed Valve CF1 Confirm	0DMOVOUT1	0MOVS	884

PCM1 GLOBAL BITS

Bit SHT	Function	MDVE	DEV	
0	Constant Logic 0	1XGLBLBIT	GBIT1-0/1	4
1	Constant Logic 1	1XGLBLBIT	GBIT1-0/1	4
50	Simulated Interlock	1DGLOBALB	1ILK0	4
51	Simulated Interlock	1DGLOBALB	1ILK1	4
52	Simulated Interlock	1DGLOBALB	1ILK2	4
53	Simulated Interlock	1DGLOBALB	1ILK3	4
54	Simulated Output	1DGLOBALB	1OUT0	4
55	Simulated Output	1DGLOBALB	1OUT1	4
56	Simulated Output	1DGLOBALB	1OUT2	4
57	Simulated Output	1DGLOBALB	1OUT3	4
61	Simulated Motor Confirm	1DMOTPULS	1MOT-PULS	4
62	Simulated Motor Confirm	1DMOTMNTD	1MOTMNTD1	4
63	Simulated Motor Confirm	1DMOTMNTD	1MOTMNTD2	4
64	Analog Timer Timeout Indication	1DALTIMER	1TIMER-1	4
65	Analog Timer Timeout Indication	1DALTIMER	1TIMER-2	4
66	Analog Timer Start/Reset Control	1DALTIMER	1TIMER-1	4
67	Analog Timer Start/Reset Control	1DALTIMER	1TIMER-2	4
68	Fail-Open Valve CF0 Confirm	1DMOVOUT0	1MOVR	4
69	Fail-Open Valve CF1 Confirm	1DMOVOUT0	1MOVR	4
70	Fail-Closed Valve CF0 Confirm	1DMOVOUT1	1MOVS	4
71	Fail-Closed Valve CF1 Confirm	1DMOVOUT1	1MOVS	4

APPENDIX B ANALOG DATA BASE LINKS

PCMO LIMITER BLOCKS FOR DEVICE INTERLOCKS, ALARMS, AND MOTOR CURRENT CONFIRM

EPN	M-B-PT	H/L	DEVICE	BIT	DESCRIPTION
II-SC-P3	1-0-09	HI	207-A-P3	$T1	SC Bas Pump P3 Motor Current Confirm
II-A-244A	1-0-05	HI	A-244-A	$T1	TK-244A Agitator Mot Current Confirm
WFI-244TK	1-1-02	HI	A-244-A	$T31	TK-244A Wt Fac Lo
II-A-C100	0-4-12	HI	A-C100	$T1	PC Agitator Motor Current Confirm
WFIC-C100	0-1-00	HI	A-C100	$T31	TK-C-100 Wt Fac Lo
WFI-E101	0-3-02	HI	A-E-101	$T31	Eluant Tank Wt Fac Lo
WFI-E102	0-4-01	HI	A-E-102	$T31	Anti-Foam Tank Wt Fac Lo
WFI-E104	0-3-00	HI	A-E-104	$T31	Decon Tank Wt Fac Lo
RI-VVALP	0-5-06	LO	CASSOAL1A	$T3	Vessel Vent Rad Hi
RI-VVB/G	0-5-07	LO	CASSOAL1A	$T0	VVG Exh Stack B/G Rad Hi
WFI-244SP	1-1-00	LO	CASSOAL1A	$T6	244A Sump Wt Fac Hi
WFI-244TK	1-1-02	LO	CASSOAL1A	$T9	TK-244A Wt Fac Hi
WFI-244TK	1-1-02	HI	CASSOAL1A	$T12	TK-244A Wt Fac Lo
WFI-E101	0-3-02	LO	CASSOAL2A	$T6	Eluant Tank Wt Fac Hi
WFI-E102	0-4-01	LO	CASSOAL2A	$T7	Anti-Foam Tank Wt Fac Hi
WFI-E104	0-3-00	LO	CASSOAL2A	$T8	Decon Tank Wt Fac Hi
WFI-SUMP1	0-4-05	LO	CASSOAL2A	$T4	Pump Room Sump Wt Fac Hi
WFIC-C100	0-1-00	LO	CASSOAL2A	$T5	TK-C-100 Wt Fac Hi
LI-CA1-1	NOT-HW	LO	CASSOAL2A	$T2	Evap CA1-1 Wt Fac Hi
LI-CA1-2	NOT-HW	LO	CASSOAL2A	$T3	Evap CA1-2 Wt Fac Hi
RI-CA1-1	0-5-00	LO	CASSOAL2B	$T7	EC1 Cond PC Line Rad Hi
RI-EA1-1	0-5-01	LO	CASSOAL2B	$T9	Steam Cond Line Rad Hi
RI-RC1-1	0-5-02	LO	CASSOAL2B	$T1	Steam Cond Sampler Rad Hi
RI-RC2-1	0-5-03	LO	CASSOAL2B	$T3	URW Sampler Rad Hi
RI-RC3-1	0-5-04	LO	CASSOAL2B	$T5	Process Cond Sampler Rad Hi
FI-CA1-3	1-5-04	HI	EA1-INLK1	$T1	Recirc Bypass Slurry Flow Lo
FI-CA1-3	1-5-04	LO	EA1-INLK1	$T0	Recirc Bypass Slurry Flow Hi
FIC-EA1-1	0-2-06	HI	EA1-INLK2	$T1	Reboiler Stm Flow Lo
PI-EA1-1	0-2-05	HI	EA1-INLK2	$T0	Reboiler Steam Pressure Low
II-EXC-1	0-4-13	HI	EX-C-1	$T1	Vess Vnt Exh Motor Current Confirm
PDI-FC5-1	0-3-08	LO	EXC1-INLK	$T24	VV First Filter DP Hi
PDI-FC5-2	0-3-09	LO	EXC1-INLK	$T27	VV Second Filter DP Hi
PDI-FC512	NOT-HW	LO	EXC1-INLK	$T28	VV Overall DP Hi
PI-CA1-11	0-0-10	LO	FV-EA1-1	$T5	Evap Vacuum Lo
PI-EA1-1	0-2-05	LO	FV-EA1-1	$T12	Reboiler Stm Inlet Pres Hi
RI-CA1-1	0-5-00	LO	FV-EA1-1	$T4	EC1 Cond PC Line Rad Hi
RI-EA1-1	0-5-01	LO	FV-EA1-1	$T7	Steam Cond Line Rad Hi
RI-RC1-1	0-5-02	LO	FV-EA1-1	$T6	Steam Cond Sampler Rad Hi
TI-DSH-3	1-1-11	LO	FV-EA1-1	$T3	Reboiler Inlet Temp Hi
FI-AS-5	0-3-06	HI	HC1-INLK1	$T0	Vessel Vent Flow Lo
FIC-CA1-4	1-5-05	HI	HV-CA1-2	$T0	Evap Slurry Flow Lo
RI-EA1-1	0-5-01	LO	HV-EA1-2	$T30	Steam Cond Line Rad Hi
RI-RC1-1	0-5-02	LO	HV-EA1-2	$T28	Steam Cond Sampler Rad Hi
PDI-CA1-1	0-0-07	LO	HV-EC1-1	$T26	Evap Lower DeEnt DP Hi

EPN	M-B-PT	H/L	DEVICE	BIT	DESCRIPTION
PDI-CA1-2	0-0-08	LO	HV-EC1-1	$T29	Evap Upper DeEnt DP Hi
RI-RC1-1	0-5-02	LO	HV-RC1-3	$T28	Steam Cond Sampler Rad Hi
RI-RC3-1	0-5-04	LO	HV-RC3-3	$T28	Process Cond Sampler Rad Hi
LDI-A1	1-6-00	LO	LERFILK	$T25	242A-LERF Transfer Line Leak
II-P244A1	1-0-06	HI	P-244-A1	$T1	TK-244A Pump 1 Motor Current Confirm
WFI-244TK	1-1-02	HI	P-244-A1	$T23	TK-244A Wt Fac Lo-Lo
II-P244A3	1-0-08	HI	P-244-A3	$T1	TK-244A Smp Pump Mot Current Confirm
WFI-244SP	1-1-00	HI	P-244-A3	$T31	244A Sump Wt Fac Lo
II-350-1	1-0-11	HI	P-350-1	$T1	TK-A-350 Pump Motor Current Confirm
II-AW-102	1-0-03	HI	P-AW-102	$T1	P-AW-102 Pump Motor Current Confirm
LI-CA1-1	NOT-HW	LO	P-AW-102	$T25	Evap WF #1 Hi
LI-CA1-2	NOT-HW	LO	P-AW-102	$T26	Evap WF #2 Hi
RI-CA1-1	0-5-00	LO	P-AW-102	$T27	PC Line Rad Hi
PDI-CA1-1	0-0-07	LO	P-AW-102	$T28	Lower De-Entrainment DP Hi
PDI-CA1-2	0-0-08	LO	P-AW-102	$T29	Upper De-Entrainment DP Hi
FI-CA1-1	1-5-00	HI	P-C-105	$T26	PB1 Seal Water Flow Lo
FI-CA1-2	1-5-01	HI	P-C-105	$T27	PB2 Seal Water Flow Lo
PI-CA1-10	0-0-12	HI	P-C-105	$T29	PB2 Seal Water Pres Lo
PI-CA1-9	0-0-11	HI	P-C-105	$T28	PB1 Seal Water Pres Lo
FI-CA1-1	1-5-00	HI	P-C-105A	$T26	PB1 Seal Water Flow Lo
FI-CA1-2	1-5-01	HI	P-C-105A	$T27	PB2 Seal Water Flow Lo
PI-CA1-10	0-0-12	HI	P-C-105A	$T29	PB2 Seal Water Pres Lo
PI-CA1-9	0-0-11	HI	P-C-105A	$T28	PB1 Seal Water Pres Lo
II-P-C100	0-4-11	HI	P-C100	$T1	PC Pump Motor Current Confirm
PDI-IDX-5	NOT-HW	LO	P-C100	$T25	IDX Col Overall DP Hi
PDI-IDX-2	NOT-HW	LO	P-C100	$T23	IDX Col Upper Screen DP Hi
PDI-IDX-3	NOT-HW	LO	P-C100	$T24	IDX Col Lower Screen DP Hi
PDI-ILS-1	NOT-HW	LO	P-C100	$T27	FC-3 Filter DP Hi
WFIC-C100	0-1-00	HI	P-C100	$T26	TK-C-100 Wt Fac Lo
PDI-FC1-1	NOT-HW	LO	P-C100	$T28	FC-1 Filter DP Hi
WFI-E101	0-3-02	HI	P-E-101	$T31	Eluant Tank Wt Fac Lo-Lo
WFI-E102	0-4-01	HI	P-E-102	$T31	Anti-Foam Tank Wt Fac Lo-Lo
WFI-E104	0-3-00	HI	P-E-104	$T31	Decon Tank Wt Fac Lo-Lo
FI-CA1-1	1-5-00	HI	PB-1	$T24	PB1 Seal Water Flow Lo
II-PB1-1	0-4-14	HI	PB-1	$T1	PB1 Motor Current Confirm
II-PB1-1	0-4-14	LO	PB-1	$T25	PB1 Motor Current Hi-Hi
PI-CA1-9	0-0-11	HI	PB-1	$T23	PB1 Seal Water Pres Lo
FI-CA1-2	1-5-01	HI	PB-2	$T24	PB2 Seal Water Flow Lo
II-PB2-1	1-0-02	HI	PB-2	$T1	PB2 Motor Current Confirm
PI-CA1-10	0-0-12	HI	PB-2	$T23	PB2 Seal Water Pres Lo
PI-CA1-8	1-6-09	LO	PB-2	$T25	PB2 Slurry Outlet Pres Hi
LI-CA1-3	NOT-HW	HI	PB1WFINLK	$T0	Evap Overall Wt Fac Low
LI-CA1-1	NOT-HW	HI	PB1WFINLK	$T1	Evap CA1-1 Wt Fac Lo-Lo
LI-CA1-2	NOT-HW	HI	PB1WFINLK	$T2	Evap CA1-2 Wt Fac Lo-Lo
LI-CA1-1	NOT-HW	HI	PB2WFINLK	$T1	Evap CA1-1 Wt Fac Lo-Lo
LI-CA1-2	NOT-HW	HI	PB2WFINLK	$T2	Evap CA1-2 Wt Fac Lo-Lo
RI-CA1-1	0-5-00	LO	PC-INLK1	$T1	EC1 Cond PC Line Rad Hi
RI-RC3-1	0-5-04	LO	PC-INLK1	$T0	Process Cond Sampler Rad Hi
RI-RC1-1	0-5-02	LO	RC1-PIG	$T2	Steam Cond Sampler Rad Hi

EPN	M-B-PT	H/L	DEVICE	BIT	DESCRIPTION
RI-RC2-1	0-5-03	LO	RC2-PIG	$T2	URW Sampler Rad Hi
RI-RC3-1	0-5-04	LO	RC3-PIG	$T2	Process Cond Sampler Rad Hi
RI-CA1-1	0-5-00	LO	VCA1-INLK	$T6	EC1 Cond PC Line Rad Hi
LI-CA1-1	NOT-HW	LO	VCA1-INLK	$T2	Evap CA1-1 Wt Fac Hi
LI-CA1-2	NOT-HW	LO	VCA1-INLK	$T4	Evap CA1-2 Wt Fac Hi
PDI-CA1-1	0-0-07	LO	VCA1-INLK	$T8	Evap Lower DeEnt DP Hi
PDI-CA1-2	0-0-08	LO	VCA1-INLK	$T9	Evap Upper DeEnt DP Hi

PCMO LIMITER BLOCKS FOR DEVICE CONTROL

EPN	M-B-PT	LIMIT	H/L	DEVICE	BIT	DESCRIPTION
FQIC-RC1	NOT-HW	SETPT	HI	RC1-SAMP	$T21	Pulse RC1 Sampler
FQIC-RC2	NOT-HW	SETPT	HI	RC2-SAMP	$T5	Pulse RC2 Sampler
FQIC-RC3	NOT-HW	SETPT	HI	RC3-SAMP	$T5	Pulse RC3 Sampler
KY-102-3	NOT-HW	SETPT	HI	DUMP-INLK	$T3	KY-102-3 Timeout (1)
KY-CA1-1	NOT-HW	SETPT	HI	VCA1-INLK	$T16	KY-CA1-1 Timeout (1)
KY-CA1-2	NOT-HW	SETPT	HI	HV-CA1-2	$T3	KY-CA1-2 Timeout (1)
KY-CA1-2F	NOT-HW	SETPT	HI	HV-CA1-2	$T12	KY-CA1-2A Timeout (1)
KY-PB1-1	NOT-HW	SETPT	HI	PB1-BYPAS	$T6	KY-PB1-1 Timeout (1)
KY-RC1-1	NOT-HW	SETPT	HI	RC1-PIG	$T1	KY-RC1-1 Timeout (1)
KY-RC2-1	NOT-HW	SETPT	HI	RC2-PIG	$T1	KY-RC2-1 Timeout (1)
KY-RC3-1	NOT-HW	SETPT	HI	RC3-PIG	$T1	KY-RC3-1 Timeout (1)

PCMO DEVICE CONTROL OF I/O SWITCH BLOCKS

EPN	M-B-PT	DEVICE	BIT	DESCRIPTION
DI-CA1-1	NOT-HW	SELECT-DI	$C1	Select (1) DI-CA1-1
FIC-CA1-1	NOT-HW	SELECT-WF	$C1	Select (1) LI-CA1-1
FIC-CA1-4	1-5-05	CONTROL	$C1	Select (1) SPG Control, (0) WVR Control
FIC-E102	1-5-14	P-E-102	$C1	Permissive (1) to Control
FIC-EA1-1	0-2-13	FV-EA1-1	$T18	Steam Flow Permissive (1)
FQI-EA1-D	NOT-HW	HV-EA1-2	$S1	Start (0), Stop (1) Flow totalization
FQI-EA1NM	NOT-HW	HV-EA1-2	$S1	Start (1), Stop (0) Flow totalization
FQI-RC1-D	NOT-HW	HV-RC1-3	$S1	Start (0), Stop (1) Flow totalization
FQI-RC1NM	NOT-HW	HV-RC1-3	$S1	Start (1), Stop (0) Flow totalization
FQI-RC3-D	NOT-HW	HV-RC3-3	$S1	Start (0), Stop (1) Flow totalization
FQI-RC3NM	NOT-HW	HV-RC3-3	$S1	Start (1), Stop (0) Flow totalization
FQIC-RC1	NOT-HW	RC1-SAMP	$C1	Start (1), Stop (0) Proportional Metering
FQIC-RC2	NOT-HW	RC2-SAMP	$C1	Start (1), Stop (0) Proportional Metering
FQIC-RC3	NOT-HW	RC3-SAMP	$C1	Start (1), Stop (0) Proportional Metering
KY-102-3	NOT-HW	DUMP-INLK	$T2	Start (1), Stop/Reset (0) Timer KY-102-3
KY-CA1-1	NOT-HW	VCA1-INLK	$C1	Start (1), Stop/Reset (0) Timer KY-CA1-1
KY-CA1-2	NOT-HW	HV-CA1-2	$T2	Start (1), Stop/Reset (0) Timer KY-CA1-2
KY-CA1-2F	NOT-HW	HV-CA1-2	$T11	Start (1), Stop/Reset (0) Timer KY-CA1-2F
KY-PB1-1	NOT-HW	PB1-BYPAS	$T5	Start (1), Stop/Reset (0) Timer KY-PB1-1
KY-RC1-1	NOT-HW	RC1-PIG	$T0	Start (1), Stop (0) Timer KY-RC1-1
KY-RC2-1	NOT-HW	RC2-PIG	$T0	Start (1), Stop (0) Timer KY-RC2-1

EPN	M-B-PT	DEVICE	BIT	DESCRIPTION
KY-RC3-1	NOT-HW	RC3-PIG	$T0	Start (1), Stop (0) Timer KY-RC2-1
SIC-PB2-1	0-0-14	PB-2	$C1	Start (1) Speed Controller
TDI-EA1-1	NOT-HW	SELECT-TI	$S1	Select (1) TI-CA1-7
TDIC-HC11	NOT-HW	EX-C-1	$S1	Permissive (1) to Control
TDIC-HC11	NOT-HW	HC1-INLK1	$S3	Permissive (1) to Control

PCMO ANALOG CONTROL OF I/O SWITCH BLOCKS

EPN	M-B-PT	EPN	ALARM	DESCRIPTION
TDIC-HC11	NOT-HW	TI-HC1-2	HI	Permissive (0) to Control

PCM1 LIMITER BLOCKS FOR DEVICE INTERLOCKS, ALARMS, AND MOTOR CURRENT CONFIRM

EPN	M-B-PT	H/L	DEVICE	BIT	DESCRIPTION
RI-ASAMU	1-1-00	LO	CASS1AL1A	$T0	AMU Room Rad Hi
RI-ASSUR	1-1-01	LO	CASS1AL1A	$T3	Change Room Rad Hi
RI-ASCON	1-1-03	LO	CASS1AL1A	$T9	Condenser Room Rad Hi
II-AN1011	0-3-0	HI	P-AN-101	$T0	Motor current confirm (1)
II-AN1021	0-3-1	HI	P-AN-102	$T0	Motor current confirm (1)
II-AN1031	0-3-2	HI	P-AN-103	$T0	Motor current confirm (1)
II-AN1041	0-3-3	HI	P-AN-104	$T0	Motor current confirm (1)
II-AN1051	0-3-4	HI	P-AN-105	$T0	Motor current confirm (1)
II-AN1061	0-3-5	HI	P-AN-106	$T0	Motor current confirm (1)
II-AN1071	0-3-6	HI	P-AN-107	$T0	Motor current confirm (1)
II-AP1011	0-3-7	HI	P-AP-101	$T0	Motor current confirm (1)
II-AP1021	0-3-8	HI	P-AP-102	$T0	Motor current confirm (1)
II-AP1031	0-3-11	HI	P-AP-103	$T0	Motor current confirm (1)
II-AP1041	0-3-12	HI	P-AP-104	$T0	Motor current confirm (1)
II-AP1051	0-3-13	HI	P-AP-105	$T0	Motor current confirm (1)
II-AP1061	0-3-14	HI	P-AP-106	$T0	Motor current confirm (1)
II-AP1071	0-4-0	HI	P-AP-107	$T0	Motor current confirm (1)
II-AP1081	0-4-1	HI	P-AP-108	$T0	Motor current confirm (1)
II-AW1011	0-4-2	HI	P-AW-101	$T0	Motor current confirm (1)
II-AW1031	0-4-3	HI	P-AW-103	$T0	Motor current confirm (1)
II-AW1041	0-4-4	HI	P-AW-104	$T0	Motor current confirm (1)
II-AW1051	0-4-5	HI	P-AW-105	$T0	Motor current confirm (1)
II-AW1061	0-4-6	HI	P-AW-106	$T0	Motor current confirm (1)
II-AY-101	0-4-11	HI	P-AY-101	$T0	Motor current confirm (1)
II-AY-102	0-4-12	HI	P-AY-102	$T0	Motor current confirm (1)
II-AZ-101	0-4-13	HI	P-AZ-101	$T0	Motor current confirm (1)
II-AZ-102	0-4-14	HI	P-AZ-102	$T0	Motor current confirm (1)

PCM1 LIMITER BLOCS FOR DEVICE CONTROL

EPN	M-B-PT	LIMIT	H/L	DEVICE	BIT	DESCRIPTION
KY-ARMAAX	NOT-HW	SETPT	HI	HS-ARMAAX	$T2	Timer Reset Acknowledge (1)
KY-ARMAAX	NOT-HW	SETPT	HI	HS-ARMAAX	$T3	Timer Timeout (1)
KY-ARM-AN	NOT-HW	SETPT	HI	HS-ARM-AN	$T2	Timer Reset Acknowledge (1)
KY-ARM-AN	NOT-HW	SETPT	HI	HS-ARM-AN	$T3	Timer Timeout (1)
KY-ARM-AP	NOT-HW	SETPT	HI	HS-ARM-AP	$T2	Timer Reset Acknowledge (1)
KY-ARM-AP	NOT-HW	SETPT	HI	HS-ARM-AP	$T3	Timer Timeout (1)
KY-ARM-AW	NOT-HW	SETPT	HI	HS-ARM-AW	$T2	Timer Reset Acknowledge (1)
KY-ARM-AW	NOT-HW	SETPT	HI	HS-ARM-AW	$T3	Timer Timeout (1)

PCM1 DEVICE CONTROL OF I/O WITCH BLOCKS

EPN	M-B-PT	DEVICE	BIT	DESCRIPTION
KY-ARMAAX	NOT-HW	HS-ARMAAX	$T1	Start (1), Stop/Reset (0) Timer
KY-ARM-AN	NOT-HW	HS-ARM-AN	$T1	Start (1), Stop/Reset (0) Timer
KY-ARM-AP	NOT-HW	HS-ARM-AP	$T1	Start (1), Stop/Reset (0) Timer
KY-ARM-AW	NOT-HW	HS-ARM-AW	$T1	Start (1), Stop/Reset (0) Timer

8.0 INDEX TO DEVICES