

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 631.97

Proj.
ECN

2. ECN Category (mark one) Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> Change ECN <input type="checkbox"/> Temporary Standby <input type="checkbox"/> Supersedeure <input type="checkbox"/> Cancel/Void <input type="checkbox"/>	3. Originator's Name, Organization, MSIN, and Telephone No. John Huber, 77860, T4-07, 373-5549	4. USQ Required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	5. Date 8/23/96
	6. Project Title/No./Work Order No. Enraf Acceptance Test/N1713	7. Bldg./Sys./Fac. No. N/A	8. Approval Designator Q
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-ATP-077 Rev 4	10. Related ECN No(s). None	11. Related PO No. N/A

12a. Modification Work <input type="checkbox"/> Yes (fill out Blk. 12b) <input checked="" type="checkbox"/> No (NA Blks. 12b, 12c, 12d)	12b. Work Package No. N/A	12c. Modification Work Complete N/A Design Authority/Cog. Engineer Signature & Date	12d. Restored to Original Condition (Temp. or Standby ECN only) N/A Design Authority/Cog. Engineer Signature & Date
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13a. Description of Change
ETN-94-0036 - Replace Rev 4 of WHC-SD-WM-ATP-077 with Rev 5 (attached).

13b. Design Baseline Document? ☐ Yes ☒ No

14a. Justification (mark one)
Criteria Change ☐ Design Improvement ☒ Environmental ☐ Facility Deactivation ☐
As-Found ☐ Facilitate Const ☐ Const. Error/Omission ☐ Design Error/Omission ☐

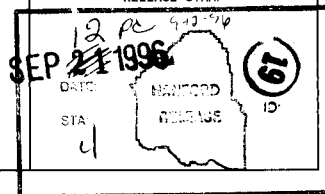
14b. Justification Details
This ATP is being revised to include steps for acceptance testing of Enraf densitometers.

USQ TF-96-678, USQ TF-96-535, USQE TF-94-0195 Rev.2

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

JG Chandler S5-08
JH Huber T4-07 (1 Adv)
FM Jones H6-11
JD Thorne S0-09
RE Hensley S5-06
JM Hay T4-01

RELEASE STAMP



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A-7900-013-3 (05/96) GEF096

Enraf Series 854 Advanced Technology Gauge (ATG) Acceptance Test Procedure

John Huber

Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: ECN 631297 UC:
Org Code: 77B60 Charge Code: N1638
B&R Code: Total Pages: 28

Key Words: Enraf, ATG Series 854, Level Gauge, LIT, Level Indicating Transmitter

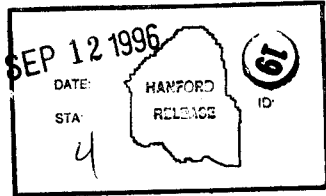
Abstract: This Acceptance Test Procedure was written to test the Enraf Series 854 ATG prior to installation in the Tank Farms. The procedure sets various parameters and verifies that the gauge is functional.

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Release Approval

Date



Approved for Public Release

WHC-SD-WM-ATP-077
REV 5

ENRAF SERIES 854 ADVANCED TECHNOLOGY GAUGE (ATG)
ACCEPTANCE TEST PROCEDURE

J. H. Huber
Tank Farm Transition Projects Engineering

August 22, 1996

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ENRAF SERIES 854 ADVANCED TECHNOLOGY GAUGE (ATG)
ACCEPTANCE TEST PROCEDURE

1.0 INSTRUCTIONS

1.1 PURPOSE

This procedure checks that the shipment of the gauge received at Hanford is completely functional and has received no shipping damage. This procedure does not certify the gauge operation; that is done by the manufacturer.

1.2 SCOPE

This procedure provides acceptance testing for Enraf Series 854 level gauges used to monitor levels and/or waste densities in Hanford Waste Storage Tanks. The test will verify that the gauge functions according to the manufacturer's instructions and specifications and is properly setup prior to being delivered to the tank farm area. This ATP does not set up the gauge for any specific tank, but is generalized to permit testing the gauge in prior to installation package preparation.

1.3 REFERENCES

- Instruction Manual Series 854 ATG Level Gauge, Enraf Inc., Part No. 4416.220, Version 2.2 (See CV-31560, vendor information file).

1.4 RESPONSIBILITIES

- 1.4.1 The Person In Charge (PIC) is responsible for coordinating the level gauge testing.
- 1.4.2 Maintenance (Instrument Craft) is responsible for performing the testing and recording the test results.
- 1.4.3 Quality Control is responsible for witnessing the tests, signing the data sheets when testing is completed and placing a "green tag" on the gauge after successful completion of the test.

1.5 DESCRIPTION OF THE SYSTEM

Enraf-Nonius Series 854 level gauges are certified by Factory Mutual (FM) for National Fire Protectional Association (NFPA 70) hazardous Class I, Division 1, Groups B, C, and D Locations. Its level measuring principle is based on the detection of variations in the weight of a displacer suspended in the process fluid. The displacer is connected to a wire wound on a precision measuring drum. A level change causes a change in the weight of the displacer which will be detected by the force transducer. Electronics within the gauge cause a servo motor to adjust the position of the displacer and compute the tank level based on the new position of the displacer drum. The gauge displays the level in decimal inches. An analog output signal transmits the level data for remote data processing. In densitometer mode, the principle of operation is similar. The gauge measures the weight of the displacer at various levels within the product and compares the measured weight with the known clean weight. The electronics then use this weight difference along with the known displacer volume and area to calculate product density. It should be noted that the only difference between the level measurement gauge and density measurement gauge is the installation of an EPROM (Eraseable, Programable, Read Only Memory) chip installed in the latter.

1.6 TEST CONDITIONS AND EQUIPMENT REQUIRED

The equipment listed below is required to perform this procedure.

- Portable Enraf Terminal (PET) Model No. 847
- Enraf Test Weights (Enraf PN 1854-061)
- Reamer (Enraf PN 4563.030) or #31 drill
- Enraf Extraction Tool (optional)

2.0 TEST EXECUTION SECTION

NOTE:

The commands typed on the PET or computer are shown in square brackets "[]" (The square brackets are NOT to be typed as part of the command). Included is any additional information the command requires. After typing the text within the square brackets, press the ENTER key. If an error is made during the typing of the command, use the backspace (BS) key to delete the error.

After entering a command, the PET or computer will give one of two responses: The first response will show the entered command with an "&" character at the end (i.e. "TG&"). This response tells the user that the gauge accepted the command. The second response will show the two digit command (i.e. TG) followed by a "!" and a three digit error code (i.e. "TG!053"). This command tells the user that the gauge did not accept the command. For a list of error codes, see the Enraf 854 ATG Level Gauge Instruction Manual, section 12.4.

PROCEDURE NOTE

In the following steps, if values are requested, the values shall be recorded in the Test Execution Data Sheet (located at the end of this procedure) for the appropriate step number in the Value column. If verification is requested, write accept in the accept/reject column in the Test Execution Data Sheet for the appropriate step number.

If an error occurs in any step, an exception will be entered in the Exceptions Data Sheet listing the step where the error occurred, and a general description of the error. Corrective actions shall be in accordance with section 3.0. A force transducer calibration may be performed at any time at the Test Conductor's discretion.

2.1 INITIALIZING THE GAUGE

INFORMATION

This section prepares the gauge for testing. It connects power and unlocks the servo motor.

- 2.1.1 Mount the gauge per the 854 ATG Level gauge Instruction Manual. Provide electrical connections to the gauge per the 854 ATG Level Gauge Instruction Manual, the National Fire Protection Association (NFPA 70) National Electrical Code.
- 2.1.2 Install the drum and displacer per the Enraf Series 854 ATG Level Gauge Instruction Manual, Section 8.4.
- 2.1.3 Unlock the servo motor prior to connecting power per the 854 ATG Level Gauge Instruction Manual, Section 8.5.
- 2.1.4 Connect the PET to the optical port located on the side of the gauge housing ~~or connect a computer to the gauge using the RS-232C pigtail, PET and bi-phase mark connector (see appendix A for guidance).~~
- 2.1.5 Connect the gauge to a 120 Vac (+/- 5 Vac) power source, per the 854 ATG Level Gauge Instruction Manual, Section 4.3.1. The display screen on the gauge will show one dark line. After approximately 20 seconds, the display will show the gauge initializing.
- 2.1.6 Configure the gauge per Appendix A. ~~If the gauge is not setup to measure level in inches, reconfigure the gauge per appendix A (changing level dimensions).~~
- 2.1.7 Ensure F5 equals 1B/2B; IF NOT, THEN <F5>, <ENTER>, <ENTER>.

2.2 CHECKING FOR ERROR CODES

INFORMATION

Record any errors on the data sheet. Correct the errors, or enter it as an exception. For a list of error codes, see the Enraf 854 ATG Level Gauge Instruction Manual.

2.2.1 Enter Command [EP] = "XPU error code". Verify that EP000 is displayed. Record verification in the data sheet.

2.2.2 Enter Command [ES] = "SPU error code". Verify that ES0000 is displayed. Record verification in the data sheet.

2.3 TESTING THE LEVEL GAUGE OPERABILITY

INFORMATION

This section enters data into the memory of the level gauge.
These values tailor the gauge for the specific tank.

2.3.1 Enter Command [UN]. This command unlocks the gauge and allows the displacer to move downward to the floor or other hard surface.

NOTE:

If the displacer does not move downward, check to make sure that the drum moves freely on the bearings. If the drum does not move freely, perform the drum bearing removal/reconditioning procedure in Appendix B. If the drum does move freely, re-calibrate the force transducer using the procedure in Appendix C. After drum bearing reconditioning or force transducer re-calibration, perform step 2.3.1 again. Document the drum bearing reconditioning or force transducer re-calibration as an exception.

2.3.2 Enter Command [W2=ENRAF2]. This command enters protection level 2.

2.3.3 Enter the following parameters into the gauge (Verify proper parameter entry and record the verification in the Data Sheet):

- [TT=+00900.00] ("TANK TOP" parameter)
- [UR=+00900.00] ("UPPER REFERENCE" parameter)
- [MH=+00890.00] ("MOTOR HIGH" parameter)
- [MZ=+00880.00] ("LOCK TEST LIMIT" parameter)
- [HH=+00870.00] ("HIGH HIGH ALARM" parameter)

- [HA=+00860.00] ("HIGH ALARM" parameter)
- [LA=+00006.00] ("LOW ALARM" parameter)
- [LL=+00003.00] ("LOW LOW ALARM" parameter)
- [ML=+00001.00] ("MOTOR LIMIT SWITCH LOW" parameter)
- [RL=+00850.00] ("REFERENCE LEVEL" parameter)

2.3.4 Enter command [AR]. This command directs the gauge to accept the current value for "RL".

2.3.5 Enter command [EX].

NOTE:

Prior to executing step 2.3.6, verify that the opening to the gauge flange is blocked so that the displacer cannot be raised up into the drum housing.

2.3.6 Enter Command [CA]. This command raises the displacer. Verify that the displacer raises up to the gauge flange and stops. Record the verification in the data sheet.

2.3.7 Enter Command [UN].

2.3.8 After the gauge stabilizes, verify that the level reading in the gauge LCD display is reading within 0.10 inches of the RL value programmed in step 2.3.3. Record the verification in the data sheet.

2.3.9 Enter command [TG]. This commands tests the gauge.

2.3.10 Verify that the displacer rises a couple of inches and then goes back down to the RL. Record the verification in the data sheet.

2.4 DRUM CIRCUMFERENCE VERIFICATION

2.4.1 Enter Command [DC]. This command displays the preprogrammed drum circumference.

2.4.2 Verify that the drum circumference value displayed (DC) is the same as the value for the Drum circumference found engraved on the wire drum. Record the value in the data sheet. If the Drum Circumference value engraved on the wire drum does not exactly match the preprogrammed Drum Circumference (DC) value,

perform steps 2.4.3 through 2.4.5, otherwise go to step 2.5.
Note that display on computer is in meters, and engraved value is in millimeters.

NOTE:

This value is displayed in scientific notation.

The value will look like "DC=+.33000000E+00".

2.4.3 Enter Command [W2=ENRAF2].

2.4.4 Enter Command [DC=+.XXXXXXXXXE+00]. The value for XXXXXXXX is the Drum Circumference value engraved on the wire drum. Record the value in the data sheet.

2.4.5 Enter command [EX].

2.5 DISPLACER WEIGHT VERIFICATION

2.5.1 Enter command [CA].

2.5.2 After the displacer rises a few inches, enter command [FR]. This command stops the displacer.

2.5.3 Enter command [MF]. This command measures the motor frequency.

2.5.4 After "FR" appears in the gauge's LCD display, PET display or computer display, enter command [WQ]. This command measures the weight of the displacer. Record the WQ value in the data sheet.

NOTE:

This value is displayed in scientific notation.

The value will look like "WQ=+.22300000E+03".

2.5.5 Verify that the WQ value is within 3 grams of the weight engraved on the displacer. Record the verification in the data sheet.

- 2.5.6 If the value for WQ is not within 3 grams (.00300000E+03) of the weight engraved on the displacer, calibrate the force transducer per the force transducer calibration procedure found in Appendix C. Document this calibration as an exception. After force transducer calibration, perform steps 2.5.3-2.5.5 again.

NOTE:

The previous step is not required for densitometer testing. A force transducer calibration is routinely performed for densitometers in the following sections.

2.6 TESTING THE DISPLAY (Densitometers Only)

INFORMATION

This section tests for proper communications and the ability of the gauge to change from the Level Display to the Analog Display. The Analog Display will only be used for diagnostics during gauge operation. The Level Display will be used during normal operation.

Enter these commands from the computer terminal.

- 2.6.1 Select item 2) SEND ITEMS from the LOGv18 menu.
- 2.6.2 Press F2, enter 00, and press ENTER to address the gauge (TA=00). The transmission address of the gauge is displayed in the second column at the bottom of the screen.
- 2.6.3 Enter command [W1=ENRAF1] to enter protection level 1.
- 2.6.4 Enter command [DF=J] to enter the analog display format J.
- 2.6.5 Enter command [EX] to exit protection level 1, store the changed data and initialize the 854 ATG.
- 2.6.6 **RECORD VERIFICATION** that the analog display (format J) screen is displayed on the gauge after initialization. See Figure 7.9 (page 29) in the 854 ATG Instruction Manual.
 - NOTE:** The terminal display will not show the format change until the F2 key is pressed and then the ENTER key.
- 2.6.7 Enter command [W1=ENRAF1] to enter protection level 1.
- 2.6.8 Enter command [DF=B] to enter the display format B.
- 2.6.9 Enter command [EX] to exit protection level 1, store the changed data and initialize the 854 ATG.

- 2.6.10 **RECORD VERIFICATION** that the level display (format B) screen is displayed on the gauge after initialization (See Figure 7.3, page 26, in the 854 ATG instruction manual).

2.7 DENSITY CALIBRATION SETUP (Densitometers Only)

INFORMATION

The drum circumference value, provided by the manufacturer, is used in calibrating the gauge for changes in level. The value insures the gauge reports level changes accurately.

- 2.7.1 Enter command [W2=ENRAF2] to enter protection level 2.
- 2.7.2 Enter command [SM] to enter the maintenance mode.
- 2.7.3 Enter command [GU] to raise the displacer and enter command [FR] to stop the displacer. Raise the displacer until it is in full view, and can be easily accessed. **RECORD** the level value.
- CAUTION:** When entering the [FR] command, be aware of the time delay between entering the command and the displacer stopping.
- 2.7.4 Enter command [S0] to exit the maintenance mode.
- 2.7.5 Enter command [MZ=+xxxxx.xx] to enter the level value recorded in 2.7.3 as the Lock Test motor limit setting. **RECORD VERIFICATION** of proper value entry. The gauge will automatically return to this level during a LT (lock test) command.
- 2.7.6 Enter command [WT=EDD] to disable the wire-rupture detection. **RECORD VERIFICATION** of proper value entry. The disabling allows for calibration.
- 2.7.7 Enter command [EX] to exit protection level 2, store all entered data and initialize the 854 ATG.

2.8 DENSITY CALIBRATION (Densitometers Only)

INFORMATION

Density calibration requires the gauge to be fully operational. When exchanging items hanging on the wire, make sure the gauge is de-energized to avoid damage to the force transducer. Be sure to maintain some tension on the wire while changing weights to prevent the wire from uncoiling from the drum.

No liquid is required for this calibration.

2.8.1 Replace the displacer with the 25g test weight on the measuring wire.

CAUTION: When exchanging items hanging on the wire, make sure the gauge is de-energized to avoid damage to the force transducer. Also be sure to maintain tension on the wire to avoid unraveling the wire from the drum.

2.8.2 Enter command [UN] to release the test weight.

2.8.3 Enter command [BT] to begin a balance test. The ATG will now find the average frequency corresponding to the 25g weight. Wait until the test has been completed.

2.8.4 Enter command [BF] to request the measured average frequency after completion of the balance test. RECORD the frequency. Do not yet reprogram this value in the gauge. Reprogramming must be done after completion of all four calibration measurements.

2.8.5 Enter command [UN] to release the test weight.

2.8.6 Enter command [LT] to raise the test weight to the MZ level.

2.8.7 Add the 75g weight to the 25g weight.

2.8.8 Enter command [UN] to release the test weight.

2.8.9 Enter command [BT] to begin a balance test. The ATG will now find the average frequency corresponding to the 25g+75g weight combination. Wait until the test has been completed.

2.8.10 Enter command [BF] to request the measured average frequency after completion of the balance test. RECORD the frequency.

- 2.8.11 Enter command [UN] to release the test weight.
- 2.8.12 Enter command [LT] to raise the test weight again.
- 2.8.13 Replace the 75g weight with the 150g.
- 2.8.14 Enter command [UN] to release the test weight.
- 2.8.15 Enter command [BT] to begin a balance test. The ATG will now find the average frequency corresponding to the 25g+150g test-weight combination. Wait until the test has been completed
- 2.8.16 Enter command [BF] to request the measured average frequency after completion of the balance test. **RECORD** the frequency.
- 2.8.17 Enter command [UN] to release the test weight.
- 2.8.18 Enter command [LT] to raise the test weight again.
- 2.8.19 Replace the 150g weight with the 225g weight.
- 2.8.20 Enter command [UN] to release the test weight.
- 2.8.21 Enter command [BT] to begin a balance test. The ATG will now find the average frequency corresponding to the 25g+225g test-weight combination. Wait until the test has been completed.
- 2.8.22 Enter command [BF] to request the measured average frequency after completion of the balance test. **RECORD** the frequency.
- 2.8.23 Enter command [UN] to release the test weight.
- 2.8.24 Enter command [LT] to raise the test weight again.
- 2.8.25 Enter command [W2=ENRAF2] to enter protection level 2.
- 2.8.26 Enter command [F0=+.xxxxxxxExx] to input the frequency value recorded in Step 2.8.4. **RECORD VERIFICATION** of proper value entry.
- 2.8.27 Enter command [F1=+.xxxxxxxExx] to input the frequency value recorded in Step 2.8.10. **RECORD VERIFICATION** of proper value entry.
- 2.8.28 Enter command [F2=+.xxxxxxxExx] to input the frequency value recorded in Step 2.8.16. **RECORD VERIFICATION** of proper value entry.
- 2.8.29 Enter command [F3=+.xxxxxxxExx] to input the frequency value recorded in Step 2.8.22. **RECORD VERIFICATION** of proper value entry.

- 2.8.30 Enter command [DW=+.xxxxxxxExx] to assign the value for DW, which is engraved on the density displacer. **RECORD VERIFICATION** of proper value entry.
- 2.8.31 Enter command [DV=+.xxxxxxxExx] to assign the value for DV, which is engraved on the density displacer and recorded in Step MMM?. **RECORD VERIFICATION** of proper value entry.
- 2.8.32 Enter command [DA=+.16000000E+02] to assign the value for the displacer area. **RECORD VERIFICATION** of proper value entry.
- 2.8.33 Enter command [S1=+.24500000E+03] to assign the value for the weight of the displacer with one-third submerged. This value is used to determine when I1 has been reached. **RECORD VERIFICATION** of proper value entry.
- 2.8.34 Enter command [WT=EDE] to enable the wire rupture detection. **RECORD VERIFICATION** of proper value entry.
- 2.8.35 Enter command [RM=+.24500000E+03] to assign the value for wire tension during execution of the AR command. **RECORD VERIFICATION** of proper value entry.
- 2.8.36 Enter command [EX] to exit protection level 2.
- 2.8.37 Replace the test weights with the displacer on the measuring wire.

CAUTION: When exchanging items hanging on the wire, make sure the gauge is de-energized to avoid damage to the force transducer. Also be sure to maintain tension on the wire to avoid unraveling the wire from the drum.

2.9 TRANSPORTING THE LEVEL GAUGE

CAUTION

This section prepares the gauge for transport. The motor must be locked to prevent possible damage to the force transducer.

- 2.9.1 If the level gauge display is not in FORMAT B (see the 854 ATG Level Gauge Instruction Manual, Figure 7.3), enter command [W1=ENRAF1]. Once in Protection Level 1, enter command [DF=B] (this command switches the gauge to display format B). Enter command [EX].
- 2.9.2 If using a computer for the testing, log the gauge data onto the computer (see Appendix A).
- 2.9.3 Disconnect the gauge from the power source.
- 2.9.4 "Lock" the servo motor, per the 854 ATG Level Gauge Instruction Manual, Section 8.5, prior to transporting the gauge.
- 2.9.5 Remove the drum and displacer, per the 854 ATG Level Gauge Instruction Manual, Section 8.4, prior to transporting the gauge.

2.10 DATA

- 2.10.1 Mail a copy of the completed data sheets, vender information, and hardcopy of the logfile to J. H. Huber at T4-07.

3.0 EXCEPTIONS TO ACCEPTANCE TEST

Exceptions to the test are dispositioned and agreed to by all witnesses. Actions taken regarding disposition are noted on the "Exception to Acceptance Test" sheet. Typical dispositions are:

- Test approved with exception (i.e., rerun of the acceptance test unnecessary).
- Entire acceptance test to be repeated after the discrepancy has been corrected.
- ATP step(s) affected to be repeated after the discrepancy has been corrected.

4.0 TEST DATA MANAGEMENT

The test data shall be entered on the attached data sheets. Witness signatures at the bottom of the data sheet indicates that the witness agrees to the accuracy of the data recorded and comparisons made.

Upon successful completion of testing activities, the master copy of the DATA SHEETS will be signed by the Test Witnesses. An appropriate "Acceptance Test Report" shall be generated to publish the results of testing activities.

4.1 ACCEPTANCE TEST REPORT GUIDANCE

The data sheets which are completed during the testing activities will be included in the Acceptance Test Report. If additional gauges are tested using this procedure, a different data sheet will be used for each gauge and added to the ATR as a revision.

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TEST EXECUTION DATA SHEET				
Date:				Tank Number:
Gauge Serial Number:				Densitometer? Yes No
Test Performed By:				
Reference Sequence	Attribute	Accept/Reject	Value	Comment
2.2.1	EP			
2.2.2	ES			
2.3.3	PARAMETERS			
2.3.6	CA			
2.3.8	RL			
2.3.10	RL			
2.4.2	DC			
2.4.4	DC			
2.5.4	WQ			
2.5.5	WQ			
2.6.6	J			
2.6.10	B			
2.7.3	MZ			
2.7.5	MZ			
2.7.6	EDD			

TEST EXECUTION DATA SHEET CONTINUED

TEST EXECUTION DATA SHEET				
5.2.8.4	F0			
2.8.10	F1			
2.8.16	F2			
2.8.22	F3			
2.8.26	F0			
2.8.27	F1			
2.8.28	F2			
2.8.29	F3			
2.8.30	DW			
2.8.31	DV			
2.8.32	DA			
2.8.34	EDE			
2.8.35	RM			
2.9.4	MOTOR LOCK			

Test Witnesses:

PIC _____ Date _____

Quality Control _____ Date _____

Maintenance _____ Date _____

EXCEPTIONS DATA SHEET

Gauge Serial Number: _____

Paragraph No.	Description/Disposition

<u>TEST APPROVED - NO EXCEPTIONS:</u>		<u>TEST APPROVED - WITH EXCEPTIONS:</u>	
PIC _____	Date _____	PIC _____	Date _____
Quality Assurance _____	Date _____	Quality Assurance _____	Date _____
Maintenance _____	Date _____	Maintenance _____	Date _____
Cog Engineer (Densitometers Only) _____	Date _____	Cog Engineer (Densitometers Only) _____	Date _____

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APPENDIX A

COMPUTER SETUP GUIDANCE:

- | 1. Turn PET ON. ~~Connect the infrared connector from the PET to the ENRAF gauge.~~
- | 2. Enter the TA command, note the gauge address displayed in the PET display, (i.e. TA05).
| TURN PET OFF.
- | 3. Disconnect the infrared connector, and connect the computer and PET to the gauge per
| Figure A-1. Power up PET/gauge as required.
4. Place the PET in SETUP MODE by pressing keys control-esc at the same time.
5. Press the down arrow (↓) on the PET keyboard until MODE is displayed at the top of the
PET display.
6. Press the right arrow (→) until the cursor is underneath RS232.
7. Press the down arrow (↓) until the display on the PET reads "RS-232 Baudrate".
8. Verify (and if necessary correct) the cursor is underneath 1200.
9. Press the down arrow until the PET display reads SETUP MODE, and then press, control-
esc at the same time.
10. Turn on the computer, respond no to accessing network resources, push any key to
continue.
11. At the c:\> prompt on the computer display, access the logger directory by typing,
cd\logger
- | 12. Start the logger program by typing, LOGV18
13. Use the computer arrow keys and highlight item #1, "Setup system", then press the
enter key.

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14. Highlight item #4, "Gauge address" and press enter.
15. Enter the gauge address noted from step #2 (note the flashing cursor), then press enter.
16. Verify that the other parameters shown in the "SETUP MENU" display match the parameters shown below. If the parameters don't match, change them using the procedure in steps 14 and 15.

SETUP MENU

1) RS232C port & Baudrate	(port 1 @ 1200 Baud.)
2) Add header to every file	(N)
3) CIU address	()
*4) Gauge Address	(XX)
5) Max. number of records in file LOGV17.CYC	(100)
6) Name cyclusefile	(LOGV17.CYC)
7) Max. number of retries per CIU request	(3)
8) Timeout CIU	(.9 sec.)
9) Turn around delay	(0 sec.)
A) ITEM directory	(C:\LOGGER\ITEMS\)
B) CYC file directory	(C:\LOGGER\CYC\)
C) LOG file directory	(C:\LOGGER\LOG\)
D) file to Field file directory	(C:\LOGGER\FTF\)
E) Library directory	(C:\LOGGER\LIB\)
F) RAM disk	(\)
G) Return to main menu	

*XX is obtained from gauge parameter [TA]

17. Highlight item #G, "Return to main menu", press enter key.
18. A prompt will ask, "Save new setup on disk (y,n)?, type, y for a yes response.
19. Highlight item #2, "Send items", press enter key.
20. Return to section 2.1.7.

CHANGING LEVEL DIMENSIONS:

1. <ESC> from LOGGER'S "MAIN MENU", enter the "SPECIAL MENU".

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2. Enter the "CHANGE DIMENSIONS" menu.
3. Enter the gauge's "TRANSMISSION ADDRESS" (TA).
4. Enter "1) LEVEL DIMENSION (XXXXXX)"
5. Enter "TO INCHES"
6. Return to the "MAIN MENU"
7. Return to "SEND ITEMS"

LOGGING GAUGE DATA ONTO COMPUTER:

1. From LOGGER'S "MAIN MENU", enter the "SPECIAL MENU".
2. Enter "1) GAUGE LOGGING TO DISK".
3. Enter the gauge's "TRANSMISSION ADDRESS" (TA).

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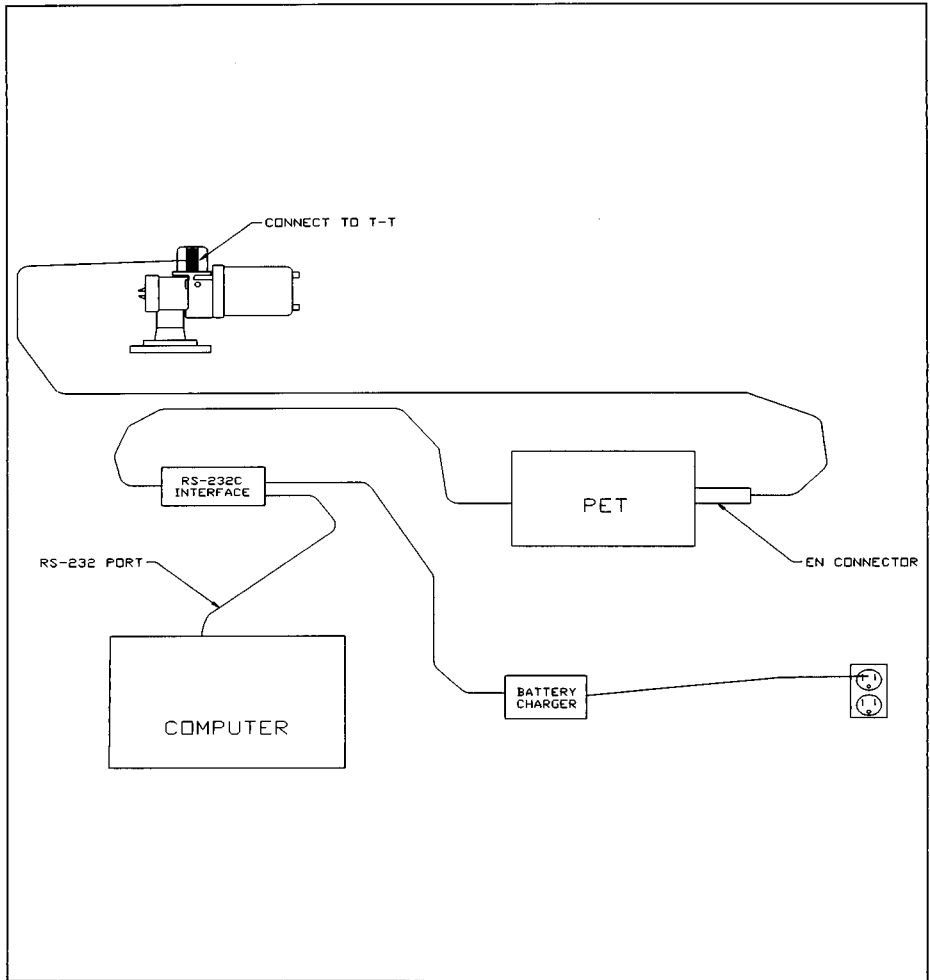


Figure A-1

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APPENDIX B

DRUM BEARING REMOVAL/RECONDITIONING

1. Disconnect the gauge from the power source. Use a PLD to lock out power.
2. "Lock" the servo motor, per the 854 ATG Level Gauge Instruction Manual, Section 8.5.
3. Remove the drum and displacer per the 854 ATG Level Gauge Instruction Manual, Section 8.4.
4. Remove the drum shaft bushing from the gauge per the 854 ATG Level Gauge Instruction Manual, Figure 9.3.
5. Remove the bearings (2 black disks on each end of the bushing) from the drum shaft bushing per the 854 ATG Level Gauge Instruction Manual, Figure 9.3.
6. Use the reamer or the #31 drill to ream out both bearings.
7. Reinstall the reconditioned drum bearings into the drum shaft bushing.
8. Reinstall the drum shaft bushing into the gauge.
9. Reinstall the drum and displacer, per the 854 ATG Level Gauge Instruction Manual, Section 8.4.
10. "Unlock" the servo motor, per the 854 ATG Level Gauge Instruction Manual, Section 8.5.
11. Connect the gauge to the power source.

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APPENDIX C

FORCE TRANSDUCER CALIBRATION

1. Raise the displacer to approximately 6" below the gauge flange by entering command [CA]. To stop the displacer, enter command [FR].
2. Enter command [W2=ENRAF2].
3. Enter command [WT=DDD]. This command disables the "wire-rupture" protection.
4. Remove the displacer from the measuring wire.
5. Attached the 25 gram weight to the measuring wire loop. The 25 gram weight is the smallest of weights in the set and has two hooks.
6. Enter command [BT]. This command activates a BALANCE TEST. The BALANCE TEST will take approximately five minutes to complete.
7. After "FR" appears in the gauge's LCD display, PET display or computer display, enter command [BF]. This command will display the frequency measured during the BALANCE TEST. Record this frequency (F0) below:

F0=_____

8. Attach the 75 gram weight to the 25 gram weight. The 75 gram weight is the third smallest in the set. Note: If there is insufficient room for the test weights to move downward (approximately 12"), perform step 1 to raise the test weights.
9. Repeat steps 6 and 7. Record the frequency (F1) below:
F1=_____
10. Remove the 75 gram weight and attach the 150 gram weight to the 25 gram weight. The 150 gram weight is the second largest weight in the set. Note: If there is insufficient room for the test weights to move downward (approximately 12"), perform step 1 to raise the test weights.
11. Repeat steps 6 and 7. Record the frequency (F2) below:
F2=_____
12. Remove the 150 gram weight and attach the 225 gram weight to the 25 gram weight. The 225 gram weight is the largest weight in the set. Note: If there is

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insufficient room for the test weights to move downward (approximately 12"), perform step 1 to raise the test weights.

13. Repeat steps 6 and 7. Record the frequency (F3) below:

F3=_____

14. Enter command [W2=ENRAF2].
15. Enter command [F0=+.XXXXXXXXX+XX]. This command re-programs frequency 0. The value of F0 is the value obtained in step 7.
16. Repeat step 15 for frequencies F1, F2 and F3. The values for F1, F2 and F3 are the values obtained in steps 9, 11 and 13 respectively.
17. Enter command [WT=EDE]. This command enables the "wire-rupture" protection.
18. Enter command [EX].
19. Remove weights and install displacer.
20. Return to section 2.6.