

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN **655926**

Proj. ECN

2. ECN Category (mark one) Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> [X] Change ECN <input type="checkbox"/> Temporary <input type="checkbox"/> Standby <input type="checkbox"/> Supersedure <input type="checkbox"/> Cancel/Void <input type="checkbox"/>	3. Originator's Name, Organization, MSIN, and Telephone No. SG SMITH / S1700 / L6-37 / 373-4310	4. USQ Required? [X] Yes <input type="checkbox"/> No	5. Date 10/19/99
	6. Project Title/No./Work Order No. ^{Sub} SY Farm Annulus LDT / HNF920201 / HMLMD131 AJ60 / 106773 102613 ^{Sub}	7. Bldg./Sys./Fac. No. 241-SY	8. Approval Designator Q
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-4546, Rev. 0	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 13b. Design Baseline Document? Yes No

USQ #: TF-96-0690, Rev. 2. Changes apply only to equipment design details prior to the release of field installation design media. James A. Truck 21 Oct. 99

Replace HNF-4546 Revision 0 with HNF-4546 Revision 1, attached.

14a. Justification (mark one)

Criteria Change <input type="checkbox"/>	Design Improvement <input checked="" type="checkbox"/> [X]	Environmental <input type="checkbox"/>	Facility Deactivation <input type="checkbox"/>
As-Found <input type="checkbox"/>	Facilitate Const <input type="checkbox"/>	Const. Error/Omission <input type="checkbox"/>	Design Error/Omission <input type="checkbox"/>

14b. Justification Details

Force transducer calibration adjusted to the manufacturer's recommendations. Rev. 1 also incorporates changes made after running the Rev. 0 ATP in the shop.

THIS MODIFICATION WILL NOT CHANGE COLLECTIVE DOSE SINCE IT HAS NO IMPACT ON RADIOLOGICAL SOURCES, CONTAMINATION CONTROL, OR SHIELDING. DESIGN VERIFICATION PERFORMED BY INFORMAL DESIGN REVIEW PER HNF-IP-0842, VOL. IV, SEC. 4.24.

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

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16. Design Verification Required <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	17. Cost Impact <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; text-align: center;">ENGINEERING</th> <th style="width: 50%; text-align: center;">CONSTRUCTION</th> </tr> <tr> <td style="text-align: center;">Additional [N/A] \$</td> <td style="text-align: center;">Additional [N/A] \$</td> </tr> <tr> <td style="text-align: center;">Savings [N/A] \$</td> <td style="text-align: center;">Savings [N/A] \$</td> </tr> </table>	ENGINEERING	CONSTRUCTION	Additional [N/A] \$	Additional [N/A] \$	Savings [N/A] \$	Savings [N/A] \$	18. Schedule Impact (days) Improvement [N/A] Delay [N/A]
ENGINEERING	CONSTRUCTION							
Additional [N/A] \$	Additional [N/A] \$							
Savings [N/A] \$	Savings [N/A] \$							

19. 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 13. Enter the affected document number in Block 20.

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

20. 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	N/A	N/A

21. Approvals

	Signature	Date		Signature	Date
Design Authority	<i>[Signature]</i>	_____	Design Agent		_____
Cog. Eng. JH HUBER	<i>[Signature]</i>	10-19-99	PE		_____
Cog. Mgr. RE LARSON	<i>[Signature]</i>	10/21/99	QA		_____
QA RR TRUE	<i>[Signature]</i>	10-28-99	Safety		_____
Safety		_____	Design		_____
Environ.		_____	Environ.		_____
Other		_____	Other		_____
Informal Rev. WE WILLINGHAM JR.	<i>[Signature]</i>	10/19/99			_____
Originator SG SMITH	<i>[Signature]</i>	10/19/99			_____
		_____			_____
		_____			_____
		_____			_____
		_____			_____

DEPARTMENT OF ENERGY
Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

ENRAF SERIES 854 ADVANCED TECHNOLOGY GAUGE (ATG) WITH SPU_II CARD FOR LEAK DETECTOR USE ACCEPTANCE TEST PROCEDURE

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U.S. Department of Energy Contract DE-AC06-96RL13200

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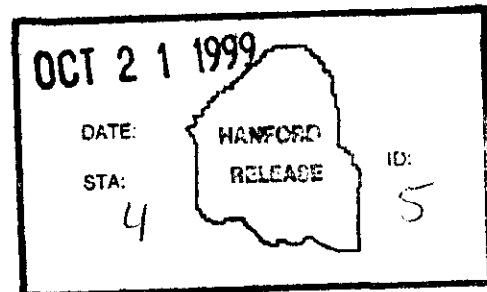
Key Words: ENRAF, ATG Series 854, SPU II Card, Level Gauge, LIT, Indicating Transmitter, Leak Detector

Abstract: The following Acceptance Test Procedure was written to test the ENRAF series 854 ATG with SPU II card prior to installation in the Tank Farms. The procedure sets various parameters and verifies the gauge and alarms functionality.

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Release Approval
Date 10/22/99



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ENRAF SERIES 854 ADVANCED TECHNOLOGY GAUGE (ATG) WITH SPU_II CARD FOR LEAK DETECTOR USE ACCEPTANCE TEST PROCEDURE

1.0 INSTRUCTIONS

1.1 PURPOSE

This procedure checks the ENRAF gauge received at Hanford is completely functional and has received no shipping damage. This procedure does not certify the gauge operation. The manufacturer certifies gauge operation.

1.2 SCOPE

This procedure provides acceptance testing for ENRAF Series 854 level gauges used to detect leaks in Hanford Waste Storage Tank annuli. 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 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).
- Instruction Manual SPU II Hard alarm output contacts, ENRAF B.V., Part No. 4416.223, Version 1.1, May 1993
- Enraf Series 854 Advanced Technology Gauge (ATG) Acceptance Test Procedure, Lockheed Martin Hanford Company, HNF-SD-WM-ATP-077, Rev. 7
- Test Report for ENRAF Annulus Leak Detector Development, Lockheed Martin Hanford Company, HNF-4328, Rev. 0.

1.4 RESPONSIBILITIES

- 1.4.1 The Supervisor/Lead is responsible for coordinating the level gauge testing.
- 1.4.2 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 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 that will be detected by the force transducer. Electronics within the gauge cause a servomotor 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.

The type of displacer to be used is the ALD Displacer Assembly. The ALD Displacer Assembly is found on drawing H-2-817634, Part #89 (added by ECN-649073).

The following ATP is valid for only those 854 ATG that have the SPU_II card (hard alarm output option) installed.

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)
- Ohmmeter with two pair of test leads (calibration not required)
- Calculator

1.7 CRITERIA

- 1.7.1 The gauge must accept all commands. If a command is not accepted as described by vendor documentation, the condition must be resolved adequately on the Exceptions Data Sheet.
- 1.7.2 The force transducer must accept calibration. The force transducer within the gauge is the primary component important to gauge operability. Should the force transducer be out of calibration, the gauge will not weigh the displacer properly, causing the gauge to report erroneous levels if at all. In the case of a Level Gauge ATP, the force transducer must report a known test weight within 3 grams of the actual weight inscribed or marked on the test weight.
- 1.7.3 All error codes must be clearable. All operations or activities performed by the gauge must be carried out as expected or described in the test or vendor documentation. If any operation returns an error code, recovery must be possible within a reasonable amount of time and effort. If an error code does not clear within a reasonable amount of time, document as an exception on the Exceptions Data Sheet.

1.8 DATA SHEET INSTRUCTIONS

- 1.8.1 The Test Execution Data sheet contains five columns.
- 1.8.1.1 Column 1 contains the step number relating to the data.
- 1.8.1.2 Column 2 contains the attribute or feature of the gauge being tested.
- 1.8.1.3 Column 3 contains the expected value as a result of performing the referenced step.

- 1.8.1.4 Column 4 contains space for recording the actual value or data resulting from step performance.
- 1.8.1.5 Column 5 is to be marked "A" for Accept if the expected value was recorded or "R" for Reject if a value different from the expected value was recorded. If "R" is entered, a corresponding entry must be made in the Expects Data Sheet. The cognizant engineer shall disposition the exception as described in Section 3.0.

1.9 TEST CONDUCT

- 1.9.1 If at anytime during performance of this procedure assistance is needed or required conditions cannot be met, contact the cognizant engineer.
- 1.9.2 If the measuring drum is dropped onto a hard surface, it must be replaced with a new one. The dropped drum may be discarded.
- 1.9.3 The drum compartment cover and electronics cover may be removed and/or installed at any time during the test as needed.

2.0 TEST EXECUTION

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 "Accepts" 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 Supervisor / Lead's discretion.

2.1 INITIALIZING THE GAUGE

INFORMATION

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

- 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.
- 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 Section COMPUTER SETUP GUIDANCE and Figure 1.
- 2.1.7 In the Logger program, select SEND ITEMS and Ensure F5 equals 1B/2B; IF NOT, THEN <F5>, 1B<ENTER>, 2B <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 place the gauge into generic configuration for use in any 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 steps found in Section 2.5. 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 VERIFICATION** that all parameters were entered correctly:

- [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 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 VERIFICATION** in the data sheet.
- 2.3.9 Enter command [TG]. This command tests the gauge.
- 2.3.10 Verify that the displacer rises a couple of inches and then goes back down to the RL. **RECORD VERIFICATION** in the data sheet.

2.4 DRUM CIRCUMFERENCE VERIFICATION

- 2.4.1 Enter Command [DC]. This command displays the preprogrammed drum circumference. **RECORD** this value on the data sheet.
- 2.4.2 **RECORD** the drum circumference value engraved on the wire drum.
- 2.4.3 Verify that the drum circumference value displayed (DC) is the same as the value for the Drum circumference found engraved on the wire drum. **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 2.4.6, **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".

2.4.4 Enter Command [W2=ENRAF2].

2.4.5 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.

2.4.6 Enter command [EX].

2.5 DISPLACER WEIGHT VERIFICATION AND FORCE TRANSDUCER CALIBRATION

CAUTION

When removing and replacing weights, displacers and snaps, be sure to disconnect power and lock the motor lock, maintain a small amount of tension on the wire, then unlock the motor lock and connect power to continue. This protects the force transducer from damage.

NOTE:

The [UN] command may need to be used instead of [CA] in order to raise the lighter test weights.

2.5.1 Raise the displacer to approximately 6" below the gauge flange by entering the command [CA]. To stop the displacer, enter command [FR].

- 2.5.2 Enter command [W2=ENRAF2].
- 2.5.3 Enter command [WT=DDD]. This command disables the "wire-rupture" protection.
- 2.5.4 Enter command [EX] and wait for gauge to reinitialize.
- 2.5.5 Remove the displacer and snap from the measuring wire.
- 2.5.6 Attach 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.
- 2.5.7 Enter command [BT]. This command activates a BALANCE TEST. The BALANCE TEST will take approximately five minutes to complete.
- 2.5.8 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) on the data sheet.
- 2.5.9 Attach the 75 gram weight to the 25 gram weight. The 75 gram weight is the second smallest in the set. **NOTE:** If there is insufficient room for the test weights to move downward (approximately 12"), perform step 2.5.1 to raise the test weights.
- 2.5.10 Repeat steps 2.5.7 and 2.5.8. **RECORD** the frequency (F1) on the data sheet.
- 2.5.11 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 2.5.1 to raise the test weights.
- 2.5.12 Repeat steps 2.5.7 and 2.5.8. **RECORD** the frequency (F2) on the data sheet.
- 2.5.13 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 insufficient room for the test weights to move downward (approximately 12"), perform step 2.5.1 to raise the test weights.

- 2.5.14 Repeat steps 2.5.7 and 2.5.8. **RECORD** the frequency (F3) on the data sheet.
- 2.5.15 Enter command [W2=ENRAF2].
- 2.5.16 Enter command [F0=+.XXXXXXXXXE+XX]. This command re-programs frequency 0. The value of F0 is the value obtained in step 2.5.8.
- 2.5.17 Repeat step 2.5.16 for frequencies F1, F2, and F3. The values for F1, F2, and F3 are the values obtained in steps 2.5.10, 2.5.12, and 2.5.14 respectively.
- 2.5.18 Enter command [WT=EDE]. This command enables the "wire-rupture" protection.
- 2.5.19 Enter command [EX].
- 2.5.20 Enter command [CA].
- 2.5.21 After the test weights rise a few inches, enter command [FR]. This command stops the test weights.
- 2.5.22 Remove the 25 gram test weight, leaving the 225 gram test weight installed (the snap is not installed at this point).
- 2.5.23 Enter command [MF]. This command measures the motor frequency.
- 2.5.24 After "FR" appears in the gauge's LCD display, PET display or computer display, enter command [WQ]. This command measures the weight of the test weight. **RECORD** the WQ value in the data sheet.
- 2.5.25 Verify the difference between the WQ value and 225 is within +/- 3 grams. **RECORD** the value on the data sheet.
- 2.5.26 If the value recorded in 2.5.25 is greater than 3 grams or less than - 3 grams, contact cognizant engineer for assistance and proceed as directed.
- 2.5.27 **RECORD** the weight engraved on the displacer.

- 2.5.28 Remove the test weight and install the displacer and snap.
- 2.5.29 Enter command [MF] and wait for "FR" to appear in the display.
- 2.5.30 Enter command [WQ] and **RECORD** on the data sheet.
- 2.5.31 **VERIFY** that the WQ value for the displacer and its engraved weight match to within +/- 6 grams by subtracting the WQ value from the engraved value and **RECORD** the value on the data sheet.
- 2.5.32 If the value recorded in 2.5.31 is greater than 6 grams or less than - 6 grams, contact the cognizant engineer and proceed as directed (the engrave displacer weight may be incorrect, the force transducer may be damaged or may need to be recalibrated).

2.6 SETTING PARAMETERS FOR THE SPU_II CARD

- 2.6.1 Enter Command [W2=ENRAF2]. Accesses Protection Level 2.
- 2.6.2 Enter Command [RY=HATLAT]. This will set relay 1 to be used for a HIGH ALARM and relay 2 to be used for a LOW ALARM. **RECORD** the verification on the data sheet.
- 2.6.3 Enter Command [W1=ENRAF1]. Accesses Protection level 1
- 2.6.4 Enter Command [RZ=EEEE]. This will set both relay 1 and relay 2 to be energized in case of alarm situation and energized in case of 854 ATG failure. **RECORD** the verification on the data sheet.
- 2.6.5 Enter Command [EX]. Command returns unit to operation mode.

2.7 WIRING THE SPU II CARD

The following process will examine the connection of the SPU II card and re-wire the relays contacts if necessary.

- 2.7.1 Disconnect the power supply.
- 2.7.2 Remove the electronic compartment cover.

- 2.7.3 Locate the SPU II card inside the electronic compartment.
- 2.7.4 At the terminal strip "CN1", find the black wire marked "6". If the black wire "6" is terminated to terminal "NO" then skip to step 2.7.6.
- 2.7.5 Remove the black wire marked "6" from terminal "NC" and terminate to "NO" on the "CN1" terminal strip.
- 2.7.6 At the terminal strip "CN2", find the black wire marked "8". If the black wire "8" is terminated to terminal "NO" then skip to step 2.7.8.
- 2.7.7 Remove the black wire marked "8" from terminal "NC" and terminate to "NO" on the "CN2" terminal strip.
- 2.7.8 Make sure that the black wire "8" and "6" are both connected to terminal "NO" on their respective terminal strips. **RECORD** verification on the data sheet.
- 2.7.9 Replace the electronic compartment cover.

2.8 CONNECTING INSTRUMENTATION TO ALARM OUTPUTS

The following process will connect the two alarm relays provided by the SPU_II card to an ohmmeter for testing of alarm activation.

The default configuration sets the first relay to indicate a High Alarm (HA). The second relay indicates a Low Alarm (LA).

- 2.8.1 Remove the terminal compartment cover.
- 2.8.2 Connect gray terminals 5 and 6 to a set of leads for the ohmmeter. Mark leads as RELAY 1.
- 2.8.3 Connect gray terminals 7 and 8 to a set of leads for the ohmmeter. Mark leads as RELAY 2.
- 2.8.4 Reconnect the power supply

2.9 ENTERING PARAMETERS FOR ALARM TESTING

2.9.1 Adjust displacer position such that there is a minimum of 6-inches free-play above and below using the [CA], [UN] and [FR] commands.

2.9.2 Enter Command [W2=ENRAF2]. Command enters protection level 2.

2.9.3 Enter the following parameters into the gauge. Verify proper entry and **RECORD VERIFICATION** that all parameters were entered correctly.

- [HA=+XXXXX.XX] ("HIGH ALARM" parameter) where XXXXX.XX is the current displacer level plus 4.00 inches.
- [LA=+XXXXX.XX] ("LOW ALARM" parameter) where XXXXX.XX is the current displacer level minus 4.00 inches.
- [AH=+00000.02] ("ALARM HYSTERESIS" parameter)

2.9.4 Enter command [EX]. Returns gauge to operational mode.

2.10 CERTIFYING ALARM ACTIVATION FOR ALARMS

2.10.1 LOW ALARM ACTIVATION

NOTE:
AT ANY TIME DURING STEP IT APPEARS THE DISPLACER WILL STRIKE THE GROUND, ENTER COMMAND [FR] IMMEDIATELY TO AVOID DAMAGE TO UNIT.

2.10.1.1 Connect the leads marked RELAY 2 to the ohmmeter

2.10.1.2 Enter command [UN]. Allows displacer to move downward.

2.10.1.3 Once the ohmmeter reads an open circuit (infinite resistance), Enter Command [FR] to stop displacer. **RECORD** the verification on the data sheet.

- 2.10.1.4 Verify an "L" appears in line 2 of the gauge / PET display when the level reads LA value entered above to within +/- 0.10 inch. Commands [CA], [UN], and [FR] may be used to move the displacer repeatedly across the alarm level to determine an accurate correlation between the alarm and the level reading. **RECORD** the verification on the data sheet.
- 2.10.1.5 Enter the command [RX]. Command will give the relay status. Once the command is entered a two digit letter combination (B0,B1) will appear. B0 gives status of relay 1 and B1 gives status of relay 2. Below are the possible results:

B0 or B1	Status of relay
K	Acknowledged alarm
D	De-activated relay
A	Activated relay
T	Relay is active with time setting
F	Fail (Default)
N	Relay is not mounted (and not checked)

Verify the status of relay 2 (B1) to be A, the relay was activated. **RECORD** the verification on the data sheet.

- 2.10.1.6 Disconnect the leads marked RELAY 2 from the ohmmeter.

2.10.2 HIGH ALARM ACTIVATION

NOTE:
IF AT ANY TIME THE DISPLACER APPEARS TO REACH THE DRUM HOUSING IMMEDIATELY ENTER COMMAND [FR] TO PREVENT DAMAGE TO UNIT. IT IS VERY IMPORTANT THAT THE DISPLACER DOES NOT BECOME JAMMED INSIDE THE DRUM HOUSING.

- 2.10.2.1 Connect the leads marked RELAY 1 to the ohmmeter.
- 2.10.2.2 Enter command [CA] to raise the displacer.

- 2.10.2.3 Once the ohmmeter reads an open circuit (infinite resistance), Enter Command [FR] to stop displacer. **RECORD** the verification on the data sheet.
- 2.10.2.4 Verify an "H" appears in line 2 of the gauge / PET display when the level reads the HA value entered above to within +/- 0.10 inch. Commands [CA], [UN], and [FR] may be used to move the displacer repeatedly across the alarm level to determine an accurate correlation between the alarm and the level reading. **RECORD** the verification on the data sheet.
- 2.10.2.5 Enter the command [RX]. This command will give the relay status. Once the command is entered a two digit letter combination (B0,B1) should appear. B0 gives status of relay 1 and B1 gives status of relay 2.

Verify the status of relay 1 (B0) is A, **RECORD** the verification on the data sheet.
- 2.10.2.6 Disconnect the leads marked RELAY1 from the ohmmeter.
- 2.10.2.7 Repeat steps 2.3.2 – 2.3.5 to reset the default values. **VERIFY** proper parameter entry and **RECORD VERIFICATION** that all parameters were entered correctly:
- 2.10.2.8 Disconnect the power supply.
- 2.10.2.9 Disconnect leads from gray terminals 5 and 6.
- 2.10.2.10 Disconnect leads from gray terminals 7 and 8.
- 2.10.2.11 Replace the terminal compartment cover.

2.11 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.

- 2.11.1 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].
- 2.11.2 If using a computer for the testing, log the gauge data onto the computer (see Appendix A, Section LOGGING GAUGE DATA ONTO COMPUTER).
- 2.11.3 Disconnect the gauge from the power source.
- 2.11.4 "Lock" the servomotor, per the 854 ATG Level Gauge Instruction Manual, Section 8.5, prior to transporting the gauge. **RECORD VERIFICATION** motor is locked.
- 2.11.5 Remove the drum and displacer, per the 854 ATG Level Gauge Instruction Manual, Section 8.4, prior to transporting the gauge.
- 2.11.6 Reinstall all covers as removed during this procedure.

2.12 DATA

- 2.12.1 Mail a copy of the completed data sheets, vendor information, and electronic copy of the log file 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 "Exceptions Data 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 Test Witnesses will sign the master copy of the DATA SHEETS. 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.

TEST EXECUTION DATA SHEET			Page 1 of 2		
Date:		Tank Number:			
Gauge Serial Number:		Test Performed by:			
Reference Sequence	Attribute	Expected Value	Actual Value	A/R	Comment
2.2.1	EP	EP000			
2.2.2	ES	ES0000			
2.3.3	PARAMETERS	Entered Correctly			
2.3.6	CA	Displacer raises			
2.3.8	RL	850 +/- 0.10			
2.3.10	RL	850 +/- 0.10			
2.4.1	DC programmed	As read			
2.4.2	DC engraved	As read			
2.4.5	New DC	DC engraved			
2.5.8	F0	As read			
2.5.10	F1	As read			
2.5.12	F2	As read			
2.5.14	F3	As read			
2.5.24	WQ Test Weight	225 +/- 3 grams			
2.5.25	WQ - 225	+/- 3 grams			
2.5.27	Displacer Weight Engraved/Marked	As read			
2.5.30	WQ Displacer	As read			
2.5.31	(2.5.30)-(2.5.27)	+/- 6 grams			
2.6.2	RY=HATLAT	Entered Correctly			
2.6.4	RZ= EEEE	Entered Correctly			
2.7.8	SPU II BLK Wires "6" and "8"	Connected to "NO" terminals			
2.9.3	PARAMETERS	Entered Correctly			
2.10.1.3	[LA] Activation	Alarm Activated			
2.10.1.4	Low Alarm Level	LA +/- 0.10			
2.10.1.5	RX	(?,A)			

CONTINUED ON NEXT PAGE

TEST EXECUTION DATA SHEET			Page 2 of 2		
Date:		Tank Number:			
Gauge Serial Number:		Test Performed by:			
Reference Sequence	Attribute	Expected Value	Actual Value	A/R	Comment
2.10.2.3	[HA] Activation	Alarm Activated			
2.10.2.4	High Alarm Level	HA +/- 0.10			
2.10.2.5	RX	(A,?)			
2.10.2.7	PARAMETERS	Entered Correctly			
2.11.4	MOTOR LOCK	Locked			

Test Witnesses:

Supervisor/Lead

Date

Quality Control

Date

Instrument Tech.

Date

EXCEPTIONS DATA SHEET

Gauge Serial Number: _____

Page ___ of ___

Paragraph No.	Description/Disposition										
<table border="1"><thead><tr><th data-bbox="215 1213 873 1711">TEST APPROVED - NO EXCEPTIONS:</th><th data-bbox="873 1213 1448 1711">TEST APPROVED - WITH EXCEPTIONS:</th></tr></thead><tbody><tr><td data-bbox="215 1381 873 1444">_____ PIC</td><td data-bbox="873 1381 1448 1444">_____ PIC</td></tr><tr><td data-bbox="215 1444 873 1507">_____ Quality Assurance</td><td data-bbox="873 1444 1448 1507">_____ Quality Assurance</td></tr><tr><td data-bbox="215 1507 873 1570">_____ Maintenance</td><td data-bbox="873 1507 1448 1570">_____ Maintenance</td></tr><tr><td data-bbox="215 1570 873 1711">_____ Cog Engineer</td><td data-bbox="873 1570 1448 1711">_____ Cog Engineer</td></tr></tbody></table>		TEST APPROVED - NO EXCEPTIONS:	TEST APPROVED - WITH EXCEPTIONS:	_____ PIC	_____ PIC	_____ Quality Assurance	_____ Quality Assurance	_____ Maintenance	_____ Maintenance	_____ Cog Engineer	_____ Cog Engineer
TEST APPROVED - NO EXCEPTIONS:	TEST APPROVED - WITH EXCEPTIONS:										
_____ PIC	_____ PIC										
_____ Quality Assurance	_____ Quality Assurance										
_____ Maintenance	_____ Maintenance										
_____ Cog Engineer	_____ Cog Engineer										

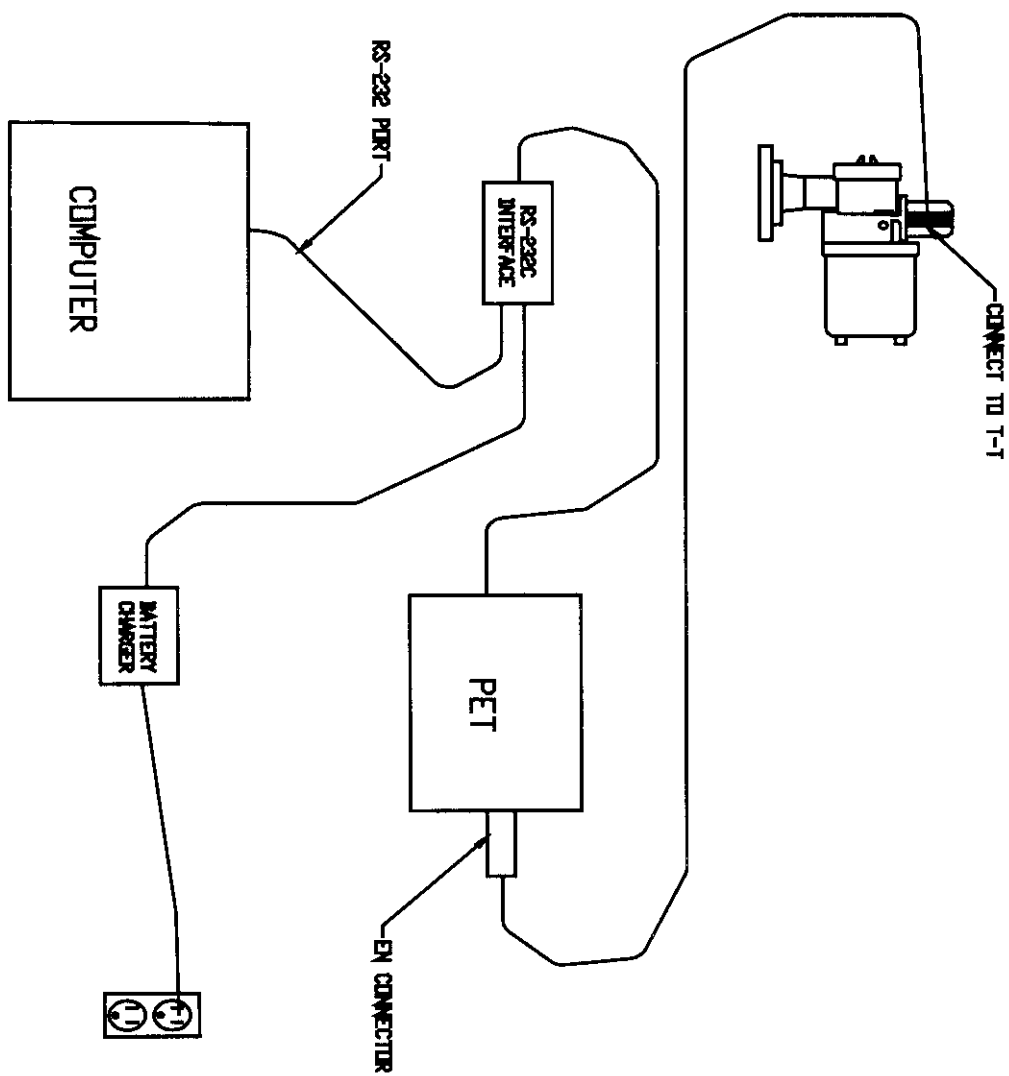


FIGURE 1

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APPENDIX A

**Computer Setup Guidance
Changing Level Dimensions
Logging Gauge Data onto Computer**

COMPUTER SETUP GUIDANCE:

1. Turn PET ON.
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, each time a 1200 baudrate selection appears.
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.
11. If in MS-DOS mode, at the c:\> prompt on the computer display, access the logger directory by typing, cd\logger
12. Start the logger program by typing, LOGV18 or selecting the Logger icon in Windows95.
13. Use the computer arrow keys and highlight item #1, "Setup system", then press the enterkey.
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 cyclusfile                 (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".
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 ON DISK".
3. Enter the gauge's "TRANSMISSION ADDRESS" (TA).

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APPENDIX B

Drum Bearing Removal/Conditioning

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.