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ACCEPTANCE TEST REPORT FOR THE 241AN107 ENRAF
ADVANCED TECHNOLOGY GUAGES

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1		Cog. Eng. JL Dowell	<i>[Signature]</i>	7/10/95	E6-21	KG Carothers	<i>[Signature]</i>	7/10/95	R1-51	1	1
1		Cog. Mgr. GN Hanson	<i>[Signature]</i>	8/29/95	S5-05	VR Enderlin	<i>[Signature]</i>	4/29/95	H5-70	1	
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RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-ATR-120, Rev. 0

Document Title: Acceptance Test Report for the 241-AN-107 Enraf
Advanced Technology Gauges

Release Date: September 11, 1995

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

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

T.L. Ontiveros

September 11, 1995

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SUPPORTING DOCUMENT

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Advanced Technology Gauges

3. Number

WHC-SD-WM-ATR-120

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6. Author

Name: V. R. Enderlin

Signature

Organization/Charge Code 57E00/N2099

7. Abstract

This Acceptance Test Report covers the results of the execution of the Acceptance Test Procedure for the 241-AN-107 Enraf Advanced Technology Gauges. The test verified the proper operation of the gauges to measure waste density and level in the 241-AN-107 tank.

8.

RELEASE STAMP

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WHC-SD-WM-ATR-120
Rev 0

ACCEPTANCE TEST REPORT
FOR THE
241-AN-107 ENRAF ADVANCED TECHNOLOGY GAUGES

June 1995

J.L. Dowell
V.R. Enderlin

Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

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ENGINEERING TEST REPORT
FOR THE
241-AN-107 ENRAF ADVANCED TECHNOLOGY GAUGES

1.0 INTRODUCTION

The Acceptance Test Procedure for the 241-AN-107 Enraf Advanced Technology Gauges, WHC-SD-WM-ATP-120, was completed May 11, 1995. K.G. Carothers of Tank Waste Remediation Engineering requested the test procedure and ICF Kaiser Engineers' Engineering Technical Support Services wrote the test procedure and executed it in the 305 Test Facility of the Hanford Site.

Additional testing was done to verify the accuracy and the sensitivity of the gauges. The results are reported in WHC-SD-WM-TRP-240, *Performance Requirements and Verification for Enraf 854 ATG Density Gauges for AN-107 Caustic Addition*, June 1995.

2.0 DESCRIPTION OF TEST

The purpose of the test procedure was to verify the proper function of the four major components of the level and density data acquisition system to be used for the Tank 241-AN-107 Caustic Addition program. Testing was intended to verify that the hardware and software function according to the manufacturer's instructions and specifications and that the equipment is properly set up prior to being delivered to the tank farm for installation. Each component was evaluated against the corresponding criteria:

- Two Enraf 854 Advanced Technology Gauges (ATGs),
serial No. 854-15-772 and 854-15-774
 - Measure a density change from 1.39 to 1.41 g/cm³.
 - Generate an analog output that corresponds to the varying levels.
- LOGvrl8 Software
 - Display status of gauges.
 - Predictably control the gauges.
 - Obtain data in a usable state.
- Panel Meters
 - Display the analog output signals generated by the gauges.
- One Enraf Series 858 Communications Interface Unit
 - Distribute commands from the computer workstation/LOGvrl8 software to the appropriate gauge.
 - Return data and messages from the gauges to the workstation/software.

3.0 TEST METHOD AND TEST EQUIPMENT

The Enraf 854 Advanced Technology Gauges (ATGs) were mounted on a piece of floor grating approximately 40 inches above the floor. The gauges were connected to the computer workstation through the Communications Interface Unit (CIU). The gauges were also connected directly to the panel meters. The Portable Enraf Terminal was connected to each gauge as needed. When required by the test procedure, 36 inch high cylinders containing the appropriate medium were placed under each gauge. The mediums were tap water, a standard density solution of magnesium chloride hexahydrate with a specific gravity of 1.29, and a column of stratified layers of vegetable oil, tap water, and rock salt.

4.0 TEST RESULTS

The master copy of the test procedure is in Appendix A. The data sheets containing all data taken are included with the test procedure master copy.

Communication between the gauges, CIU, and computer workstation was without problems. The gauges performed well. The values obtained for the standard density solution were within 0.7 percent of the known density. Repeatability in both level position and weight frequency showed differences of less than 0.2 percent. The interface levels were evident in the changes in density; the accuracies were dependent on how large the range was over which the scans were taken.

The batch files successfully directed the gauges and obtained the data. The "IP" interface profile scan (about 5 minutes per scan) took considerably less time than the "TP" density profile scan (about 20 minutes per scan). Each reply file was successfully converted into a legible log file. Copies of the log files are included in Appendix A.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the Acceptance Test Procedure show that the gauges function as required for the AN-107 Caustic Addition program. Modifications to the scan level parameters in the batch files will be required prior to installation. The Operational Test Procedure will include verification of these modifications.

Below are several recommendations for the application of the Enraf 854 ATGs in the 241-AN-107 tank.

- 1) Establish a baseline and confidence interval.

A baseline and confidence interval for the density measurements of the actual tank waste is necessary to assure that the measurements reflect changes in density and not noise in the data. The Operational Test Procedure will establish these values.

- 2) Allow time for flow within the tank to stop before measuring densities.

Turbulence within the fluid affects the precision of the density measurements. Informal testing prior to the Acceptance Test showed that in a large pool of water (7 m² surface area, about 0.5 m off center), the precision of the density measurements appeared to improve (the improvement was observed as a smaller standard deviation for the data, and was not statistically verified). The small diameter (8 and 6 inch) cylinders used for the acceptance test are suspected of affecting the measurement; wall effects increase the turbulence caused by displacer movement in the liquid. A larger distance from the walls would reduce these wall effects.

- 3) Determine the solids interface level before running an IP scan.

The lower limit for an IP scan should be set above the point where the displacer is fully supported by the solids layer. If the gauge attempts to send the displacer below such a point, the drop in wire tension will cause the gauge to go into a fault mode.

- 4) Provide a means to gracefully recover from errors.

During the last phase of the batch file testing, the displacer stopped in the salt layer and the wire tension dropped below the minimum allowed by the gauge. This wire tension failure put the gauge in a fault mode which requires entry into the maintenance mode. The manufacturer does not recommend the maintenance mode be common knowledge because of the potential damage (all safety measures are inoperable in maintenance mode). A batch file can contain the necessary sequence of events to recover. The Operational Test Procedure will test these batch files.

6.0 DISPOSITION OF TEST ITEM

The two Enraf gauges, CIU, and panel meters were all accepted as tested and are ready for installation. The calibration weight set, some hand tools, displacers, and drums used during bench and lab testing were passed on to J.H. Huber for use with other Enraf gauges on site.

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APPENDIX A -

**Master Copy
of**

**Acceptance Test Procedure
for the
241-AN-107 Enraf Advanced Technology Gauges
WHC-SD-WM-ATP-120**

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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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1	1	Cog. Eng. J.L. Dowell	<i>J.L. Dowell</i>	4-11-95 16-21	KG Carothers	<i>KG Carothers</i>	5-2-95 21-51	1	2
1	1	Cog. Mgr. RA Dodd	<i>RA Dodd</i>	5-4-95 55-05	VR Enderlin	<i>VR Enderlin</i>	4-16-95 15-70	1	1
1	1	2A JJ Vanderben	<i>JJ Vanderben</i>	4-11-95 51-57	RS Nicholson	<i>RS Nicholson</i>	4-20-95 55-05	1	1
1	1	Safety SM Baker	<i>SM Baker</i>	5-2-95 23-08					
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TECHNOLOGY GAUGES

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WHC Information Release Administration Specialist:

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C. Willingham

5/8/95

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6. Author

Name: V. R. Enderlin

Signature

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Organization/Charge Code N2L11

7. Abstract

This Acceptance Test Procedure (ATP) provides a structured means to test features of the Enraf densitometers. This ATP also provides verification and validation for batch files to be used in the field. The objective of this procedure is to verify proper operation for the intended application of measuring waste density and level in the 241-AN-107 tank.

8. RELEASE STAMP

OFFICIAL RELEASE
BY WHC
DATE MAY 03 1995
35 Station 21

ACCEPTANCE TEST PROCEDURE
FOR THE 241-AN-107
ENRAF ADVANCED TECHNOLOGY GAUGES

March 1995

J. L. Dowell
V. R. Enderlin

Westinghouse Hanford Company
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ACCEPTANCE TEST PROCEDURE FOR
THE 241-AN-107 ENRAF ADVANCED TECHNOLOGY GAUGE

1.0 INSTRUCTION SECTION

1.1 PURPOSE/SCOPE

The purpose of this document is to demonstrate that the Enraf Advanced Technology Gauges (ATG), Communications Interface Unit (CIU), Portable Enraf Terminal (PET), digital panel meters, and LOGVR18 software function as intended by design. Actual test execution steps are in Section 1.6. All portions of the test shall be completed before the system is either accepted or rejected. Testing is expected to be at the 305 Building. Testing is expected to take less than one week to complete.

The purpose of this procedure is to verify correct operation of the level and density data acquisition system to be used for the Tank 241-AN-107 Caustic Addition program. This procedure provides acceptance testing for equipment and software to be used to measure and record the waste density and waste stratification levels in Tank 241-AN-107. Testing will verify that the hardware and software function according to the manufacturer's instructions and specifications and that they are properly set up prior to being delivered to the tank farm for installation.

1.2 DESCRIPTION OF THE SYSTEM

The following items will be tested for functionality: the two (2) Enraf ATGs, Enraf CIU, Portable Enraf Terminal (PET), digital panel meters, LOGVR18 software and the interconnecting cables.

The system being tested consists of:

- Two Enraf Series 854 Advanced Technology Gauges (ATGs)
- One Enraf Series 858 Communications Interface Unit (CIU)
- Enraf LOGVR18 software running on a standard administrative workstation to communicate with the gauges by single command and "batch" files
- Digital panel meters

1.2.1 854 ATG

The Enraf Series 854 Advanced Technology Gauges (Type UEAN854C11F10/LCDZ-US) measure liquid levels, and with the density option, can measure liquid density. The two ATGs purchased for 241-AN-107 installation include the density option and can measure relative density as well as liquid level. The level measurement relies on a change in density and can be made at different

elevations; for tank applications, these elevations would be the air and liquid surface interface, liquid layer, liquid and sediment interface, and sediment layer. The measuring principle (for both level and density) is based on the detection of a variation in the apparent weight of a displacer suspended in the tank. The displacer is connected to a wire wound on a precision machined measuring drum. A change in density causes a change in the apparent weight of the displacer. The weight, or wire tension is detected by a sensitive force transducer.

For level measurement, electronics within the gauge cause a servo motor to adjust the position of the displacer until the apparent weight value and desired weight value are the same. The level is determined from the new position of the displacer drum. The gauge displays the level in decimal inches. The digital level measurement can be transmitted to a remote computer for additional processing. An analog (4-20 mA) output signal is also available with the optional MPU microprocessor controlled board.

For density measurement, the displacer volume and weight in air are used in conjunction with the apparent displacer weight to calculate relative density. The digital density measurement can be transmitted to a remote computer for additional processing.

The Enraf Series 854 gauges are certified by Factory Mutual (FM) for use in National Fire Protection Association (NFPA 70) Class I, Division 1, Groups B, C, and D Hazardous Locations.

1.2.2 Communications Interface Unit

The Series 858 Communications Interface Unit (CIU) provides the communications interface between a workstation and multiple tank instruments. Communications between the workstation and the CIU are via a full duplex EIA RS-232 serial link. Communications between the CIU and tank instruments are over a proprietary, bidirectional, "Bi-Phase Mark" serial bus. The CIU provides the necessary communications signal conversion and retransmission. The CIU also interprets incoming commands and redirects them to the appropriate instrument.

1.2.3 Digital Panel Meters

The digital panel meters display the MPU analog output signal. The MPU will relate a particular level with a particular analog output signal. The relation between level and signal are assigned during the test setup.

1.2.4 LOGVR18 Software

The Enraf LOGVR18 software package is normally used for gauge testing and troubleshooting by single command. The software's "batch" file capabilities will be used for the 241-AN-107 application to measure and record density and sediment levels.

1.3 REFERENCES

1.3.1 Procedures

- *Building Emergency Plan, Building 305, WHC-CM-0253TF.*

1.3.2 Other

- *Instruction Manual, Series 854 ATG level gauge, Part No. 4416.220, Version 2.2, Enraf B.V., The Netherlands.*
- *Installation Info, Model 854 ATG Servo Powered Tank Gauge, Part No. 4416.601, Version 1.0, Enraf B.V., The Netherlands.*
- *Instruction Manual 854 ATG density software package, Part No. 564.4416.221-40, Version 1.0, Enraf B.V., The Netherlands.*
- *Instruction Manual MPU analog output 4-20mA, Part No. 4416.222, Version 2.0, Enraf B.V., The Netherlands.*
- *Instruction Manual, series 847 Portable Enraf Terminal, Part No. 4416.210, Version 1.1, Enraf B.V., The Netherlands.*
- *Instruction Manual, Series 858 Communications Interface Unit, Part No. 4416.500, Version 2.1, Enraf B.V., The Netherlands.*

1.4 RESPONSIBILITIES

Each organization participating in the execution of this ATP will designate personnel for the responsibilities and duties as defined herein for their respective roles. The names of these designees shall be provided to the Recorder for listing on the Recorder's copy of the Test Execution Sheet prior to the performance of any part of this ATP.

All individuals shall carry out their assigned work in a safe manner to protect themselves, others, and the equipment from undue hazards and to prevent damage to property and environment. Facility line managers shall assure the safety of all activities within their areas to prevent injury, property damage, or interruption of operation. Performance of test activities shall always include safety and health aspects as delineated in the operations manuals and as directed by the Project Engineer. Any hazard identified during the performance of the ATP shall be reported to the Test Director.

1.4.1 Project Engineer

- 1.4.1.1 Designate a Test Director.
- 1.4.1.2 Coordinate testing with facility management.
- 1.4.1.3 Act as liaison between the participants in acceptance testing.
- 1.4.1.4 Ensure informal testing and inspection is complete.
- 1.4.1.5 Schedule and conduct a pre-ATP meeting with test participants prior to start of testing.
- 1.4.1.6 Notify the persons performing and witnessing the test prior to the start of testing.
- 1.4.1.7 Notify all concerned parties when a change is made in the testing schedule.
- 1.4.1.8 Approve field changes to the ATP.
- 1.4.1.9 Sign/date Test Execution Sheet (Appendix D) when ATP is approved and accepted.
- 1.4.1.10 Take necessary action to clear exceptions to the ATP.
- 1.4.1.11 Sign/date Test Exception Sheet (Appendix B) when an exception has been resolved.
- 1.4.1.12 Provide a distribution list for the approved and accepted ATP.
- 1.4.1.13 Confirm that all equipment required for performing this test (as listed in Section 1.5.2) will be available for the test duration.
- 1.4.1.14 Provide equipment required for performing this acceptance test, which has not been designated as being provided by others.

1.4.2 Test Director

- 1.4.2.1 Witness the tests.
- 1.4.2.2 Coordinate all acceptance testing.
- 1.4.2.3 Confirm that shop testing (if any) and/or inspection (if any) of the test unit(s) or portion of the test unit(s) have been completed.
- 1.4.2.4 Stop any test which may cause damage to the test unit(s) until the test procedure has been revised.
- 1.4.2.5 Approve field changes to the ATP.
- 1.4.2.6 Obtain revisions to the ATP, as necessary, to comply with authorized field changes or to accommodate existing field conditions.
- 1.4.2.7 Evaluate recorded data, discrepancies, and exceptions.
- 1.4.2.8 Obtain from the Project Engineer, any information or changes necessary to clear or resolve exceptions.
- 1.4.2.9 Sign/date Test Data sheets and Test Execution sheet (Appendix A & D) when execution of the ATP has been completed.
- 1.4.2.10 Sign/date Test Exception Sheet (Appendix B) when acceptable retest has been performed.
- 1.4.2.11 Prepare and obtain required signatures on the Acceptance Test Report prior to reproduction and distribution.

1.4.3 Safety

- 1.4.3.1 Review and approve the Acceptance Test Procedure.

1.4.4 Recorder

- 1.4.4.1 Witness testing and perform all recording using black ink.
- 1.4.4.2 Record names of all designated personnel on the Test Execution sheet (Appendix D) on the Recorder's copy of ATP prior to testing.
- 1.4.4.3 Observe tests, record test data and maintain Test Log (Appendix C).
- 1.4.4.4 Sign/date the Test Execution Sheet, Test Data sheets and Test Exception sheet(s) (Appendices A, B & D) as the Recorder.
- 1.4.4.5 "Check off" every test step on the Recorder's copy as it is completed, next to the step number and under the appropriate gauge identifier.

- 1.4.4.6 Record authorized field changes to the ATP.
 - 1.4.4.7 Record, on a Test Exception Sheet, exceptions and test steps that are not performed. Additional Test Exception Sheets can be reproduced as needed (Appendix B).
 - 1.4.4.8 Orally notify the Test Director at the time an objection is made.
 - 1.4.4.9 After ATP is complete assign page numbers to Test Exception Sheets.
 - 1.4.4.10 Submit the completed ATP to the Test Director for approval signatures and distribution.
- 1.4.5 Quality
- 1.4.5.1 Witness the tests.
 - 1.4.5.2 Evaluate recorded data, discrepancies, and exceptions.
 - 1.4.5.3 Approve field changes to the ATP.
 - 1.4.5.4 Sign/date Test Execution Sheet (Appendix D) when execution of the ATP is completed and again when it is approved and accepted.
 - 1.4.5.5 Sign/date Test Exception Sheet (Appendix B) when an exception is made and again when it has been resolved.
 - 1.4.5.6 Initial/mark Test Data sheets, including Batch File Results data sheets (Appendix A), assuring data is entered correctly.
 - 1.4.5.7 Place a "green tag" on all equipment after successful acceptance and approval of the ATP.

1.5 TEST CONDITIONS & EQUIPMENT REQUIRED

1.5.1 Test Conditions

The testing of the Enraf 854 ATGs will be performed in the 305 Building. No unique or unusual chemical, fire, release of energy, or criticality safety hazards are involved with performing or supporting these tests. Normal laboratory and facility safety rules shall be followed during these tests. All electrical and mechanical apparatus shall be operated as designed.

The test items, equipment, and facilities used in this test procedure are not expected to be affected permanently by this procedure. Test equipment that has been damaged shall be repaired or replaced.

1.5.2 Equipment Required

The Project Engineer shall assure all test equipment is available unless otherwise noted. The following list is provided as an aid and is not intended to be an exhaustive list.

- 3 1/2 digit multi-meter with current valid calibration
- IBM[™] (or compatible) computer/monitor with LOGVR18 software
- *Instruction Manual, Series 854 ATG level gauge*, Part No. 4416.220, Version 2.2, Enraf B.V., The Netherlands.
- *Installation Info, Model 854 ATG Servo Powered Tank Gauge*, Part No. 4416.601, Version 1.0, Enraf B.V., The Netherlands.
- *Instruction Manual 854 ATG density software package*, Part No. 564.4416.221-40, Version 1.0, Enraf B.V., The Netherlands.
- *Instruction Manual MPU analog output 4-20mA*, Part No. 4416.222, Version 2.0, Enraf B.V., The Netherlands.
- *Instruction Manual, series 847 Portable Enraf Terminal*, Part No. 4416.210, Version 1.1, Enraf B.V., The Netherlands.
- *Instruction Manual, Series 858 Communications Interface Unit*, Part No. 4416.500, Version 2.1, Enraf B.V., The Netherlands.
- Assorted hand tools
- Portable Enraf Terminal (PET), Enraf Model No. 847
- Enraf calibration weight set, P/N 1854.061
- Enraf tool kit, P/N 1854.062
- Carpenter's level
- Thermometer, 20 to 100 °C range, 0.01 minor divisions
- Density standard, 1.35 g/cc nominal
- Column, 8 inch diameter, 32 inches high minimum
- Shielded, twisted pair cable, 20 AWG minimum
- NaCl, 99.9+%
- Vegetable oil, s.g. 0.92 nominal
- Water

1.6 ACCEPTANCE TEST SETUP

Step Checkoff and Data Sheet Entries

Spaces for check marks are provided to the left of the step numbers. The gauge identifiers 00 and 01 are at the top of the check mark columns. Check each space as the step is completed for the corresponding gauge.

Each RECORD or RECORD VERIFICATION in a step requires an entry on the data sheets. The data sheets include the step numbers and two separate columns for entries for gauges TA=00 and TA=01.

Where applicable, complete section for gauge TA=00, then gauge TA=01.

1.6.1 Preliminary Conditions

00 / 01

- ✓ / ✓ 1.6.1.1 The test setup has been inspected for workmanship and for compliance with design per Figure 1.
- ✓ / ✓ 1.6.1.2 Continuity and megger tests have been performed on portions of the electrical and instrument systems being tested, as required.
- ✓ / ✓ 1.6.1.3 Test instruments requiring calibration have a currently valid calibration stamp attached, which is traceable to the National Institute of Standards and Testing.
- ✓ 1.6.1.4 The pre-ATP meeting with test participants has been held and the personnel responsible for directing and witnessing the performance of the tests described in this ATP have read and understand their roles.
- ✓ / ✓ 1.6.1.5 All other items have been tested to insure their proper function.
- ✓ / ✓ 1.6.1.6 All nameplates, equipment tags, etc. are installed and/or attached. The ATGs are to be labeled "TA=00" and "TA=01".
- ✓ / ✓ 1.6.1.7 The test unit(s) and associated components have been checked and informally operated to ensure that they are in good general working order.
- ✓ / ✓ 1.6.1.8 All components and equipment are de-energized.

Valerie Enderlin
Test Director

5/10/95
Date

Figure 1
Test Setup

1.6.2 Initializing the Gauge

INFORMATION

This section prepares the gauge for testing. It establishes communications, unlocks the servo motor, and connects power to all systems.

Where applicable, perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

- ✓✓ 1.6.2.1 RECORD VERIFICATION that all the steps in Section 1.6.1 are complete.
- ✓✓ 1.6.2.2 Mount each gauge on a suitable stand or fixture. Refer to the 854 ATG Installation Manual Sections 3 and 4 (pages 13-19).
- ✓✓ 1.6.2.3 Check the stability of the mounting of the ATGs. Ensure the ATGs are level.
- ✓✓ 1.6.2.4 For each displacer, RECORD the DW and DV values inscribed on the individual displacers. Ensure that each displacer stays with its respective ATG.
- ✓✓ 1.6.2.5 For each ATG, RECORD the value of the drum circumference that is inscribed on each drum. The value is between 300 and 500 mm (this information is provided to clarify which of the numbers written on the drum is the correct value).
- ✓✓ 1.6.2.6 Check the measuring wire on the measuring drum. The wire should be straight without any bends when suspended freely using the 25g test weight.

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.
- ✓✓ 1.6.2.7 Install, if necessary, each drum and displacer per 854 ATG Instruction Manual, Section 8.4 (page 32).
- ✓✓ 1.6.2.8 Check the drum/drumshaft positioning. Sufficient axial play should be present (several millimeters forward and backward).
- ✓✓ 1.6.2.9 Unlock, if needed, each ATG's servo motor per 854 ATG Instruction Manual, Section 8.5 (page 33).

- ✓ 1.6.2.10 For each ATG, connect a 15 m (50 ft) length of shielded twisted pair cable to the BPM transmission terminals per 854 ATG Instruction Manual, Section 4.3.2 (page 19).
- ✓ 1.6.2.11 Connect the two shielded twisted pair lines of the ATGs to the CIU's terminal TL1 per Series 858 CIU Instruction Manual Section 6.1. and 6.2. (page 27)
- ✓ 1.6.2.12 Connect, if needed, the analog output terminals 1 and 2 from each ATG to a corresponding panel meter using 5 m (16 ft) lengths of shielded twisted pair cable.
- ✓ 1.6.2.13 Provide a switch controlled 120 VAC electrical connection to the CIU per Sections 2.2 (page 7) and 9.1 (page 32) of the Series 858 CIU Instruction Manual.
- ✓ 1.6.2.14 Provide a switch controlled 120 VAC electrical connection to the panel meters.
- ✓ 1.6.2.15 Provide a switch controlled 120 VAC electrical connection to the computer workstation.
- ✓ 1.6.2.16 Provide a switch controlled 120 VAC electrical connection to the PET.
- ✓ 1.6.2.17 Provide a switch controlled 120 VAC electrical connection to each gauge per 854 ATG Instruction Manual Section 4.3.1 (page 19).
- ✓ 1.6.2.18 Confirm that each fuse or circuit breaker at the power source is 20 amps or less.
- ✓ 1.6.2.19 Confirm that each power source terminal voltage is 120 VAC nominal.
- ✓ 1.6.2.20 Connect the Enraf PET to the TA-00 ATG at the infrared transceiver port located on the left side of the display housing, per the instructions in Section 8.3 (page 31) of the 854 ATG Instruction Manual and Section 2.1 (page 3) of the PET Instruction Manual.
- ✓ 1.6.2.21 Connect the computer's serial port COM2 to the CIU's communications terminals per Series 858 CIU Instruction Manual Section 3.2.
- ✓ 1.6.2.22 Turn on the power to the CIU, PET, panel meters, and to the gauges.
- ✓ 1.6.2.23 Turn the power ON to the computer system. When the menu comes up, select LOGGER, and ENTER. A LOGv18 menu screen will be shown.

1.5.3 Checking for Error Codes

COMMANDS:

The commands typed on either the PET or the 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 key to delete the error. If the input contains an error in format or protocol, the response includes an exclamation point (!). If the command is accepted, the response includes an ampersand (&).

The small x replaces a number where values will differ. Direction is given as to where to find the specific value. Commands require certain formats for the data being entered. They will not be accepted in any other form.

INFORMATION

This section checks that a gauge does not show an error code pertaining to an internal problem. The commands are entered from the Enraf PET.

Record any error codes displayed by the PET on the data sheet. Correct any error, or enter it on the Test Exception Sheet in the appendix. Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

- 1.6.3.1 Turn on the Portable Enraf Terminal (PET).
- 1.6.3.2 Enter command [EP] to obtain the XPU error codes. RECORD the value. For definitions of EP error codes, see Section 12 (pages 60-62) of the 854 ATG Instruction Manual.
- 1.6.3.3 Enter command [ES] to obtain SPU error codes. RECORD the value. For definitions of ES error codes, see Section 12 (pages 63-65) of the 854 ATG Instruction Manual.
- 1.6.3.4 Disconnect the IR-adaptor from the TA=00 ATG. Connect the Enraf PET to the TA=01 ATG's infrared transceiver port located on the left side of the display housing, per the instructions provided in Section 8.3 (page 31) of the 854 ATG Instruction Manual and Section 2.1 (page 3) of the PET Instruction Manual. Repeat Steps 1.6.3.2 and 1.6.3.3.
- 1.6.3.5 Disconnect the IR-adaptor from the TA=01 ATG. The PET has no off button.

1.6.4 Testing the Display

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. Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

- ✓ 1.6.4.1 Select item 2) SEND ITEMS from the LOGv18 menu.
 - ✓ 1.6.4.2 Press F2, enter 00, and press ENTER to change the active ATG to TA=00. The transmission address of the active gauge is displayed in the second column at the bottom of the screen.
 - ✓ / ✓ 1.6.4.3 Enter command [W1=ENRAF1] to enter protection level 1.
 - ✓ / ✓ 1.6.4.4 Enter command [DF=J] to enter the analog display format J.
 - ✓ / ✓ 1.6.4.5 Enter command [EX] to exit protection level 1, store the changed data and initialize the 854 ATG.
 - ✓ / ✓ 1.6.4.6 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.
- ✓ / ✓ 1.6.4.7 Enter command [W1=ENRAF1] to enter protection level 1.
 - ✓ / ✓ 1.6.4.8 Enter command [DF=8] to enter the display format 8.
 - ✓ / ✓ 1.6.4.9 Enter command [EX] to exit protection level 1, store the changed data and initialize the 854 ATG.
 - ✓ / ✓ 1.6.4.10 RECORD VERIFICATION that the level display (format 8) screen is displayed on the gauge after initialization (See Figure 7.3, page 26, in the 854 ATG Instruction manual).
 - ✓ 1.6.4.11 Switch to the TA=01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.6.4.3 through 1.6.4.10 for the TA=01 ATG.
 - ✓ 1.6.4.12 Press F2, enter 00, and press ENTER to change the active ATG to TA=00.

1.7 ACCEPTANCE TEST CALIBRATION

1.7.1 Analog Output Setup

INFORMATION

The values set into AM and AN (4 and 20 mA level values respectively) correlate an amperage value to an elevation level in the tank.

Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

- ✓ / ✓ 1.7.1.1 Enter command [W2=ENRAF2] to enter protection level 2.
 - ✓ / ✓ 1.7.1.2 Enter command [LD=I] to change the length units to inches.
 - ✓ / ✓ 1.7.1.3 Enter command [EX] to exit protection level 2.
 - ✓ / ✓ 1.7.1.4 Enter command [W1=ENRAF1] to enter protection level 1.
 - ✓ / ✓ 1.7.1.5 Enter command [AM=+00034.00] to assign the value of the level which corresponds to the 4 mA output level. RECORD VERIFICATION of proper AM value entry.
 - ✓ / ✓ 1.7.1.6 Enter command [AN=+00002.00] to assign the value of the level which corresponds to the 20 mA output level. RECORD VERIFICATION of proper AN value entry.
 - ✓ / ✓ 1.7.1.7 Enter command [DF=J] to enter the analog display format J.
 - ✓ / ✓ 1.7.1.8 Enter command [EX] to exit protection level 1, store the changed data and initialize the 854 ATG.
 - ✓ / ✓ 1.7.1.9 RECORD both lines of the analog display.
- NOTE: The terminal display will not show the format change until the F2 key is pressed and then the ENTER key.
- ✓ / ✓ 1.7.1.10 RECORD the value shown on the panel display.
 - ✓ / ✓ 1.7.1.11 Enter command [W1=ENRAF1] to enter protection level 1.
 - ✓ / ✓ 1.7.1.12 Enter command [DF=8] to enter the display format 8.
 - ✓ / ✓ 1.7.1.13 Enter command [EX] to exit protection level 1, store the changed data and initialize the 854 ATG.

✓ 1.7.1.14 Switch to the TA=01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.7.1.1 through 1.7.1.13.

✓ 1.7.1.15 Press F2, enter 00, and press ENTER to change the active ATG to TA=00.

1.7.2 Density Calibration Setup

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.

Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

✓ 1.7.2.1 Enter command [DC] to display the preprogrammed drum circumference.

✓ 1.7.2.2 RECORD VERIFICATION that the drum circumference value shown is the same as the drum circumference found engraved on the wire drum recorded in Step 1.6.2.5.

✓ 1.7.2.3 Enter command [W2=ENRAF2] to enter protection level 2.

✓ 1.7.2.4 Enter command [SM] to enter the maintenance mode.

✓ 1.7.2.5 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.

✓ 1.7.2.6 Enter command [SO] to exit the maintenance mode.

✓ 1.7.2.7 Enter command [MZ=+xxxxx.xx] to enter the level value recorded in Step 1.7.2.5 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.

✓ 1.7.2.8 Enter command [WT=EDD] to disable the wire-rupture detection. RECORD VERIFICATION of proper value entry. The disabling allows for calibration.

- ✓ 1.7.2.9 Enter command [EX] to exit protection level 2, store all entered data and initialize the 854 ATG.
- ✓ 1.7.2.10 Switch to the TA 01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.7.2.1 through 1.7.2.9.
- ✓ 1.7.2.11 Press F2, enter 00, and press ENTER to change the active ATG to TA 00.

1.7.3 Density Calibration

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.

Perform this test sequence for gauge TA 00 first then gauge TA 01.

00 / 01

- ✓ 1.7.3.1 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.

- ✓ 1.7.3.2 Enter command [UN] to release the test weight.

- ✓ 1.7.3.3 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.

- ✓ 1.7.3.4 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.

- ✓ 1.7.3.5 Enter command [UN] to release the test weight.

- ✓ 1.7.3.6 Enter command [LT] to raise the test weight to the MZ level.

- ✓✓✓ 1.7.3.7 Add the 75g weight to the 25g weight.
- ✓✓✓ 1.7.3.8 Enter command [UN] to release the test weight.
- ✓✓✓ 1.7.3.9 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.
- ✓✓✓ 1.7.3.10 Enter command [BF] to request the measured average frequency after completion of the balance test. RECORD the frequency.
- ✓✓✓ 1.7.3.11 Enter command [UN] to release the test weight.
- ✓✓✓ 1.7.3.12 Enter command [LT] to raise the test weight again.
- ✓✓✓ 1.7.3.13 Replace the 75g weight with the 150g.
- ✓✓✓ 1.7.3.14 Enter command [UN] to release the test weight.
- ✓✓✓ 1.7.3.15 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.
- ✓✓✓ 1.7.3.16 Enter command [BF] to request the measured average frequency after completion of the balance test. RECORD the frequency.
- ✓✓✓ 1.7.3.17 Enter command [UN] to release the test weight.
- ✓✓✓ 1.7.3.18 Enter command [LT] to raise the test weight again.
- ✓✓✓ 1.7.3.19 Replace the 150g weight with the 225g weight.
- ✓✓✓ 1.7.3.20 Enter command [UN] to release the test weight.
- ✓✓✓ 1.7.3.21 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.
- ✓✓✓ 1.7.3.22 Enter command [BF] to request the measured average frequency after completion of the balance test. RECORD the frequency.
- ✓✓✓ 1.7.3.23 Enter command [UN] to release the test weight.
- ✓✓✓ 1.7.3.24 Enter command [LT] to raise the test weight again.
- ✓✓✓ 1.7.3.25 Enter command [W2=ENRAF2] to enter protection level 2.
- ✓✓✓ 1.7.3.26 Enter command [FO=+.xxxxxxxxE+xx] to input the frequency value recorded in Step 1.7.3.4. RECORD VERIFICATION of proper value entry.

- ✓ 1.7.3.27 Enter command [F1=+.xxxxxxxxE+xx] to input the frequency value recorded in Step 1.7.3.10. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.3.28 Enter command [F2=+.xxxxxxxxE+xx] to input the frequency value recorded in Step 1.7.3.16. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.3.29 Enter command [F3=+.xxxxxxxxE+xx] to input the frequency value recorded in Step 1.7.3.22. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.3.30 Enter command [DW=+.xxxxxxxxE+xx] to assign the value for DW, which is engraved on the density displacer and recorded in Step 1.6.2.4. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.3.31 Enter command [DV=+.xxxxxxxxE+xx] to assign the value for DV, which is engraved on the density displacer and recorded in Step 1.6.2.4. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.3.32 Enter command [DA=+.16000000E+02] to assign the value for the displacer area. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.3.33 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.
- ✓ 1.7.3.34 Enter command [WT=EDE] to enable the wire rupture detection. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.3.35 Enter command [RM=+.24500000E+03] to assign the value for wire tension during execution of the AR command. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.3.36 Enter command [EX] to exit protection level 2.
- ✓ 1.7.3.37 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.

- ✓ 1.7.3.38 Switch to the TA=01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.7.3.1 through 1.7.3.37.
- ✓ 1.7.3.39 Press F2, enter 00, and press ENTER to change the active ATG to TA=00.

1.7.4 Level Calibration

INFORMATION

This section calibrates the gauge for correct level measurements when the gauge is equipped with a tank top reference stop at a known level.

Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

 1.7.4.1 Place a cylinder filled with water below the displacer.

 1.7.4.2 Be sure the density displacer is installed as described in Section 8.4 (page 32) of the 854 ATG Instruction Manual.

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.

 1.7.4.3 Install the reference stop on the displacer.

 1.7.4.4 Enter command [UN] to release the displacer.

 1.7.4.5 Enter command [CA] to move the displacer to the tank top reference level.

 1.7.4.6 Enter command [W2=ENRAF2] to enter protection level 2.

 1.7.4.7 Enter command [RL=+00036.38] to assign the known tank top reference level. RECORD VERIFICATION of proper value entry.

 1.7.4.8 Enter command [AR] to have the 854 ATG accept the new RL value.

 1.7.4.9 Enter command [EX] to exit protection level 2, store the assigned value, and initialize the gauge.

 1.7.4.10 Remove the reference stop from the displacer.

 1.7.4.11 Enter command [UN] to release the displacer.

 1.7.4.12 Enter command [I1] to move the displacer to the fluid level.

 1.7.4.13 Enter command [LQ] to obtain the current displacer level. RECORD the value shown.

 1.7.4.14 Enter command [W2=ENRAF2] to enter protection level 2.

1.1 1.7.4.15 Enter command [RL=+xxxxx.xx] to enter the LQ value recorded in Step 1.7.4.13 as the Reference Level. RECORD VERIFICATION of proper value entry.

1.1 1.7.4.16 Enter command [AR] to have the 854 ATG accept the new RL value.

1.1 1.7.4.17 Enter command [EX] to exit protection level 2, store the assigned value, and initialize the gauge.

1.1 1.7.4.18 Switch to the TA=01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.7.4.1 through 1.7.4.17.

1.1 1.7.4.19 Press F2, enter 00, and press ENTER to change the active ATG to TA=00.

1.7.5 Displacer Weight

INFORMATION

This section measures the weight of the displacer. The maximum displacer weight is 300 grams.

Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

1.1 1.7.5.1 Enter command [UN] to release the displacer.

1.1 1.7.5.2 Enter command [CA] to initiate displacer movement.

1.1 1.7.5.3 After the displacer leaves the water, enter command [FR] to stop the displacer.

1.1 1.7.5.4 Enter command [MF] to measure the motor frequency.

1.1 1.7.5.5 After "FR" appears on the gauge's LCD display, enter command [WQ] to derive the weight of the displacer. RECORD the WQ value that is displayed.

1.1 1.7.5.6 Enter command [W2=ENRAF2] to enter protection level 2.

1.1 1.7.5.7 Enter command [DW] to display the current displacer weight value. RECORD the value. This step is for comparing the inscribed value on the displacer to the weight determined by the ATG. This is for information only.

- ✓ 1.7.5.8 Enter command [DW=+.xxxxxxxxE+03]. Enter the WQ value recorded in Step 1.7.5.5 to assign a value to the weight of the displacer. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.5.9 Enter command [EX] to exit protection level 2, store all entered data and initialize the 854 ATG.
- ✓ 1.7.5.10 Switch to the TA=01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.7.5.1 through 1.7.5.9.
- ✓ 1.7.5.11 Press F2, enter 00, and press ENTER to change the active ATG to TA=00.

1.7.6 Gauge Reference Elevations (Test Setup)

INFORMATION

This section assigns elevation values to the parameters of the level gauge. These values tailor the gauge's response for a specific tank. The relative levels of these parameters are shown in Figure 2.

Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

- ✓ 1.7.6.1 Enter command [W2=ENRAF2] to enter protection level 2.
- ✓ 1.7.6.2 Enter command [UR=+00036.00] to enter the "UPPER REFERENCE" parameter. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.6.3 Enter command [MH=+00034.00] to enter the "MOTOR HIGH" parameter. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.6.4 Enter command [MZ=+00033.00] to enter the "LOCK TEST LIMIT SWITCH" parameter. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.6.5 Enter command [HH=+00032.10] to enter the "HIGH HIGH ALARM" parameter. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.6.6 Enter command [HA=+00032.00] to enter the "HIGH ALARM" parameter. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.6.7 Enter command [LA=+00003.10] to enter the "LOW ALARM" parameter. RECORD VERIFICATION of proper value entry.

Figure 2
Parameter Elevations

- ✓ 1.7.6.8 Enter command [LL=+00003.00] to enter the "LOW LOW ALARM" parameter. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.6.9 Enter command [ML=+00002.00] to enter the "MOTOR LIMIT SWITCH LOW" parameter. RECORD VERIFICATION of proper value entry.
- ✓ 1.7.6.10 Enter command [EX] to exit protection level 2, store all entered data, and initialize the 854 ATG.
- ✓ 1.7.6.11 Enter command [UN] to return the gauge to the operational mode.
- ✓ 1.7.6.12 Enter command [I1] to send the displacer to level I1.
- ✓ 1.7.6.13 After the gauge stabilizes, RECORD the level displayed and RECORD VERIFICATION that the level is within 0.10 inch of the RL value set in Step 1.7.4.15.
- ✓ 1.7.6.14 Enter command [TG] to perform a repeatability test on the gauge.
- ✓ 1.7.6.15 Make sure the displacer rises a couple of inches and then goes back down to I1/RL level. RECORD the level displayed and RECORD VERIFICATION that the level is within 0.10 inch of the value recorded in Step 1.7.6.13. If not, record as an exception.
- ✓ 1.7.6.16 Enter command [LT] to perform a lock test on the gauge.
- ✓ 1.7.6.17 Enter command [MF] to measure the motor frequency.
- ✓ 1.7.6.18 After "BL" appears on the gauge's LCD display, enter command [WQ] to derive the weight of the displacer. RECORD the value displayed and RECORD VERIFICATION that the value is within 3 grams of the WQ value recorded in Step 1.7.5.5. If not, record as an exception.
- ✓ 1.7.6.19 Switch to the TA=01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.7.6.1 through 1.7.6.18.
- ✓ 1.7.6.20 Press F2, enter 00, and press ENTER to change the active ATG to TA=00.

1.8 ACCEPTANCE TEST

1.8.1 Density Profile Measurement

INFORMATION

Procedures in this section test the capabilities of the 854 ATG to obtain density profiles. The density "scans" make density measurements at 10 discrete elevation points uniformly spaced over the prescribed scan distance.

Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

- ✓ / ✓ 1.8.1.1 Prepare the test medium by filling the column with water and positioning it under the displacer.
- ✓ / ✓ 1.8.1.2 Enter command [UN] to return the gauge to the operational mode.
- ✓ / ✓ 1.8.1.3 Enter command [I1] to move the displacer to the fluid surface level.
- ✓ / ✓ 1.8.1.4 Enter command [LQ] to obtain the current level. RECORD the value shown for LQ.
- ✓ / ✓ 1.8.1.5 Enter command [W2=ENRAF2] to enter protection level 2.
- ✓ / ✓ 1.8.1.6 Enter command [RL=+xxxxx.xx] to assign the innage level value recorded in Step 1.8.1.4 as the measured reference level (RL). RECORD VERIFICATION of proper value entry.
- ✓ / ✓ 1.8.1.7 Enter command [AR] to have the 854 ATG accept the new RL value.
- ✓ / ✓ 1.8.1.8 Enter command [W1=ENRAF1] to enter protection level 1.
- ✓ / ✓ 1.8.1.9 Enter command [DB=+00008.00] to set the upper bound for the elevations for the density scan. DB is the density profile start distance from Y4, the surface level. RECORD VERIFICATION of proper value entry.
- ✓ / ✓ 1.8.1.10 Enter command [DZ=+00010.00] to set the lower bound for the elevations for the density scan. DZ is the default density profile stop level. RECORD VERIFICATION of proper value entry.
- ✓ / ✓ 1.8.1.11 Enter command [EX] to exit protection level 1.

- ✓✓✓ 1.8.1.12 Enter command [UN] to release the displacer.
- ✓✓✓ 1.8.1.13 Enter command [I1] to send the displacer to Interface 1 to obtain a Y4 value.
- ✓✓✓ 1.8.1.14 Enter command [Y4] to assure Y4 has a value. RECORD the Y4 value.
- ✓✓✓ 1.8.1.15 Enter command [TP] to initiate the density scan. The scan may take several minutes to complete.
- ✓✓✓ 1.8.1.16 Enter command [Dx], where x is replaced sequentially with numbers 0 through 9. The values shown are the density measurement elevations. RECORD values D0 through D9.
- ✓✓✓ 1.8.1.17 Enter command [Rx], where x is replaced sequentially with numbers 0 through 9. The values shown are the density measurements. RECORD values R0 through R9.
- ✓✓✓ 1.8.1.18 Enter command [SC] to display the average density. RECORD the value.
- ✓ 1.8.1.19 Switch to the TA=01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.8.1.1 through 1.8.1.18.
- ✓ 1.8.1.20 Press F2, enter 00, and press ENTER to change the active ATG to TA=00.

1.8.2 Batch Mode Density Profile Measurement

INFORMATION

Procedures in this section test the batch mode capabilities of obtaining the density profiles. This section serves as the verification and validation for the batch file CYL_ATP.RQS.

Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

- ✓✓✓ 1.8.2.1 Prepare the test medium by using the same water column as in Section 1.8.1, and positioning it under the displacer.
- ✓✓✓ 1.8.2.2 Press the ESC key to return to the main menu of LOGVR18 software. Select 5) File-to-Field Utility.
- ✓✓✓ 1.8.2.3 From the File-to-Field menu, select item 2) .RQS file.

- ✓ 1.8.2.4 Select the CYL ATP.RQS file and press ENTER. **RECORD VERIFICATION** of the correct file name. This should return you to the File-to-Field menu with your selected file.
- ✓ 1.8.2.5 Select 3) .RPL file and press ENTER. Enter the file name as the month, day, underscore and test run number (a.g., MAR7_3 represents March 7, test run 3). **RECORD** the file name.
- ✓ 1.8.2.6 Select item 7) Send CYL ATP.RQS file and press ENTER. The file will be tested then sent to the ATG. Using the PET, obtain the D0 through D9 and R0 through R9 values after completion of each of the three profiles. Record the values on the Batch File Results record sheet (Appendix A). **RECORD VERIFICATION** of the completion of the Batch File Results data record on the Test Data Sheet.
- ✓ 1.8.2.7 Select item 9) Convert .RPL to .LOG and press ENTER.
- ✓ 1.8.2.8 Select the file created in Step 1.8.2.5 to be converted from the reply file to a log file and press ENTER. **RECORD** the file name.
- ✓ 1.8.2.9 Include a copy of the .LOG file with the Test Data. To obtain a copy, Select 8) DOS Shell and change directory to C:\LOGGER\LOG. Copy the .LOG file to a disk and transfer it to another computer to print.
- ✓ 1.8.2.10 Type EXIT to return to the FILE-TO-FIELD menu.
- ✓ 1.8.2.11 Select C) to return to the main menu of the LOGVR18 software.
- ✓ 1.8.2.12 Compare the values of the batch .LOG file against the values recorded in Step 1.8.2.6. **RECORD VERIFICATION** that the values match.
- ✓ 1.8.2.13 Select 2) SEND ITEMS. Press F2, enter 01, and press ENTER to change the active gauge to TA=01. Repeat Steps 1.8.2.1 through 1.8.2.12.
- ✓ 1.8.2.14 Select 2) SEND ITEMS. Press F2, enter 00, and press ENTER to return the active gauge to TA=00.

1.8.3 Density Measurement Using Standard Density Solution

INFORMATION

Procedures in this section test the 854 ATG density measurement accuracy using a standard density solution.

Perform this test sequence for gauge TA=00 first then gauge TA=01 from the SEND ITEMS window.

00 / 01

- ✓ / ✓ 1.8.3.1 Prepare the test medium. Fill the column with a standard density solution. RECORD the density. Position the column under the displacer.
- ✓ / ✓ 1.8.3.2 Enter command [UN] to return the gauge to the operational mode.
- ✓ / ✓ 1.8.3.3 Enter command [I1] to move the displacer to the fluid surface level.
- ✓ / ✓ 1.8.3.4 Enter command [LQ] to obtain the current level. RECORD the value shown for LQ.
- ✓ / ✓ 1.8.3.5 Enter command [W2=ENRAF2] to enter protection level 2.
- ✓ / ✓ 1.8.3.6 Enter command [RL=+xxxxx.xx] to assign the innage level value recorded in Step 1.8.3.4 as the measured reference level (RL). RECORD VERIFICATION of proper value entry.
- ✓ / ✓ 1.8.3.7 Enter command [AR] to have the 854 ATG accept the new RL value.
- ✓ / ✓ 1.8.3.8 Enter command [W1=ENRAF1] to enter protection level 1.
- ✓ / ✓ 1.8.3.9 Enter command [DB=+00008.00] to set the upper bound for the elevations for the density scan. DB is the density profile start distance from Y4, the surface level. RECORD VERIFICATION of proper value entry.
- ✓ / ✓ 1.8.3.10 Enter command [DZ=+00010.00] to set the lower bound for the elevations for the density scan. DZ is the default density profile stop level. RECORD VERIFICATION of proper value entry.
- ✓ / ✓ 1.8.3.11 Enter command [EX] to exit protection level 1.
- ✓ / ✓ 1.8.3.12 Enter command [UN] to release the displacer.

- ✓✓✓ 1.8.3.13 Enter command [I1] to send the displacer to Interface 1 to obtain a Y4 value.
- ✓✓✓ 1.8.3.14 Enter command [Y4] to assure that Y4 has a value. RECORD the Y4 value.
- ✓✓✓ 1.8.3.15 Enter command [TP] to initiate the density scan. The scan may take several minutes to complete.
- ✓✓✓ 1.8.3.16 Enter command [Dx], where x is replaced sequentially with numbers 0 through 9. The values shown are the density measurement elevations. RECORD values D0 through D9.
- ✓✓✓ 1.8.3.17 Enter command [Rx], where x is replaced sequentially with numbers 0 through 9. The values shown are the density measurements. RECORD values R0 through R9.
- ✓✓✓ 1.8.3.18 Enter command [SC] to display the average density. RECORD the value.
- ✓ 1.8.3.19 Switch to the TA=01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.8.3.1 through 1.8.3.18.
- ✓ 1.8.3.20 Press F2, enter 00, and press ENTER to change the active ATG to TA=00.

1.8.4 Interface Density Profile Measurement

INFORMATION

Procedures in this section test the 854 ATG's ability to identify liquid/liquid and liquid/sediment interface levels.

Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

- ✓✓✓ 1.8.4.1 Prepare the test medium. Fill the column with about 8 inches of NaCl, 12 inches of water and about 10 inches of vegetable oil. Measure and RECORD the interface levels starting at the floor (zero level). Position the column under the displacer.
- ✓✓✓ 1.8.4.2 Enter command [UN] to return the gauge to the operational mode.
- ✓✓✓ 1.8.4.3 Enter command [I1] to move the displacer to the fluid surface level.

- ✓✓✓ 1.8.4.4 Enter command [LQ] to obtain the current level. RECORD the value shown for LQ.
- ✓✓✓ 1.8.4.5 Enter command [W2=ENRAF2] to enter protection level 2.
- ✓✓✓ 1.8.4.6 Enter command [RL=+xxxxx.xx] to assign the innage level value recorded in Step 1.8.4.4 as the measured reference level (RL). RECORD VERIFICATION of proper value entry.
- ✓✓✓ 1.8.4.7 Enter command [AR] to have the 854 ATG accept the new RL value.
- ✓✓✓ 1.8.4.8 Enter command [EX] to exit protection level 2, store the assigned value, and initialize the gauge.
- ✓✓✓ 1.8.4.9 Enter command [UN] to release the displacer.
- ✓✓✓ 1.8.4.10 Enter command [DK=+00030.00] to set the upper bound for the elevations for the interface density scan. DK is the interface density profile start level. RECORD VERIFICATION of proper value entry.
- ✓✓✓ 1.8.4.11 Enter command [DN=+00004.00] to set the lower bound for the elevations for the interface density scan. DN is the interface density profile stop level. RECORD VERIFICATION of proper value entry.
- ✓✓✓ 1.8.4.12 Enter command [I1] to send the displacer to Interface 1 to obtain a Y4 value.
- ✓✓✓ 1.8.4.13 Enter command [Y4] to assure that Y4 has a value. RECORD the Y4 value.
- ✓✓✓ 1.8.4.14 Enter command [IP] to initiate the interface profile density scan. The profile will start above the surface and end 4 inches above the bottom. The scan may take several minutes to complete.
- ✓✓✓ 1.8.4.15 Enter command [Dx], where x is replaced sequentially with numbers 0 through 9. The values shown are the density measurement elevations. RECORD values D0 through D9.
- ✓✓✓ 1.8.4.16 Enter command [Rx], where x is replaced sequentially with numbers 0 through 9. The values shown are the density measurements. RECORD values R0 through R9.
- ✓✓✓ 1.8.4.17 Enter command [SC] to display the average density. This value is relatively meaningless since it is the average of a range of densities. RECORD the value anyway.
- ✓✓✓ 1.8.4.18 Switch to the TA=01 ATG by pressing F2, entering 01 and pressing ENTER. Repeat Steps 1.8.4.1 through 1.8.4.17.

✓ 1.8.4.19 Press F2, enter 00, and press ENTER to change the active ATG to TA=00.

1.8.5 Batch Mode Interface Density Profile Measurement

INFORMATION

Procedures in this section test the batch mode capabilities of obtaining the interface levels and the density profiles. This section serves as the verification and validation for the batch file IP_ATP.RQS.

Perform this test sequence for gauge TA=00 first then gauge TA=01.

00 / 01

✓ 1.8.5.1 Prepare the test medium by using the same column as in Section 1.8.4. Position the column under the displacer. Measure and RECORD the interface levels starting at the floor (zero level).

✓ 1.8.5.2 Press the ESC key to return to the main menu of LOGVR18 software. Select 5) File-to-Field Utility.

✓ 1.8.5.3 From the File-to-Field menu, select item 2) .RQS file.

✓ 1.8.5.4 Select the IP_ATP.RQS file and press ENTER. This should return you to the File-to-Field menu with your selected file. RECORD VERIFICATION of the correct file name.

✓ 1.8.5.5 Select 3) .RPL file and press ENTER. Enter the month, day, underscore and test run number (e.g., MAR7_3 represents March 7, test run 3). Make sure the test run number is different than in Step 1.8.2.5. RECORD the file name.

✓ 1.8.5.6 Select item 7) Send IP_ATP.RQS file and press ENTER. The file will be tested then sent to the ATG. Using the PET, obtain the D0 through D9 and R0 through R9 values after completion of each of the three profiles. Record the values on the Batch File Results record sheet (Appendix A). RECORD VERIFICATION of the completion of the Batch File Results data record on the Test Data Sheet.

✓ 1.8.5.7 Select item 9) Convert .RPL to .LOG and press ENTER.

✓ 1.8.5.8 Select the file created in Step 1.8.5.5 to be converted from the reply file to a log file and press ENTER. RECORD the file name.

- ✓ 1.8.5.9 Include a copy of the .LOG file with the Test Data. To obtain a copy, Select B) DOS Shell and change directory to C:\LOGGER\LOG. Copy the .LOG file to a disk and transfer it to another computer to print.
- ✓ 1.8.5.10 Type EXIT to return to the FILE-TO-FIELD menu.
- ✓ 1.8.5.11 Select C) to return to the main menu of the LOGVR18 software.
- ✓ 1.8.5.12 Compare the values of the batch .LOG file against the values recorded in Step 1.8.5.6. RECORD VERIFICATION that the values match.
- ✓ 1.8.5.13 Select 2) SEND ITEMS. Press F2, enter 01, and press ENTER to change the active gauge to TA=01. Repeat Steps 1.8.5.1 through 1.8.5.12.
- ✓ 1.8.5.14 Select item 9) END PROGRAM to exit.

1.9 ACCEPTANCE TEST CLOSURE

1.9.1 Preparing the Gauge for Transport

INFORMATION

This section prepares the gauge for transport. The motor must be locked to prevent possible damage to the force transducer used to measure the weight of the displacer.

00 / 01

- ✓ 1.9.1.1 Turn "OFF" the power at the power panel.
- ✓ 1.9.1.2 Make sure there is no power to the gauges.
- ✓ 1.9.1.3 Disconnect power wiring to the gauge.
- ✓ 1.9.1.4 If needed as deemed by the Test Director, remove the drum and displacer, per 854 ATG Instruction Manual, Section 9.3.2 (page 43), prior to transporting the gauge.
- ✓ 1.9.1.5 "Lock" the servo motor, per 854 ATG Instruction Manual, Section 8.5 (page 33), prior to transporting the gauge.

1.9.2 Review

- ✓ 1.9.2.1 RECORD VERIFICATION that steps 1.6.1.1 through 1.9.1.5 inclusive have been completed.
- ✓ 1.9.2.2 The Quality Assurance person shall "green tag" the following equipment as "Accepted" upon the successful acceptance and approval of the ATP:
 - y Two Enraf Series 854 Advanced Technology Gauges (ATGs).
 - y One Enraf Series 858 Communications Interface Unit (CIU).
 - y Standard administrative workstation running Enraf LOGVR18 software
 - y Digital panel meters
- ✓ 1.9.2.3 The person(s), by their signature below state the Enraf Advanced Technology Gauges (ATG), Communications Interface Unit (CIU), Portable Enraf Terminal (PET) and LOGVR18 software is functional and ready for its intended use.

Valerie R. Endel 5/11/95 [Signature] 5-11-95
Test Director Date Project Engineer Date

1.10 TEST DATA SHEETS

The Test Data Sheets are used to document any procedure step requiring verification or recording of a value. All entries are made in black ink. A description of the data sheet format follows. Upon successful completion of testing activities, the master copy of the test execution data sheets shall be signed by the Test Witnesses. Witness signatures at the bottom of the data sheets indicate that the witness agrees to the accuracy of the data recorded and comparisons made.

1. Date of Test--Record the date the test is performed.
2. Gauge Transmission Address--The transmission address of the gauge is prerecorded as TA=00 and TA=01.
3. Equipment Serial Number(s)--Record the serial numbers of any device used during the tests.
4. Test Performed By--Print the name of the person performing the test.
5. Procedure Step Number--This column contains the test steps requiring verification.
6. Item--This column contains the item or parameter being verified or recorded.
7. Expected Result--This column indicates the acceptable value of the item being recorded.
8. Value--Record the quantitative or qualitative measure (i.e., a line voltage may have a value of 120V, whereas a pump may have a value of ON or OFF) of the item being verified in this column.
9. Accept/Reject--Indicate whether the value obtained is acceptable in comparison with the Expected Value.
10. Comment--If the value is rejected, give a justification for denial.
11. QA--This column indicates that QA concurred with the items recorded or verified.

The second test data sheet is for the batch file profile results. These sheets are used to document values obtained through the PET during batch file profiles. These PET values and the batch file values are compared to make sure the batch file is getting the correct values generated by the gauge.

1. Date of Test--Record the date the test is performed.
2. Test Performed By--Print the name of the person performing the test.
3. Procedure Step Number--This column contains the test steps requiring verification.

4. Item--This column contains the item or parameter being verified or recorded.
5. Gauge Transmission Address--The transmission address of the gauge is prerecorded as TA=00 and TA=01.
6. Level Dx--This column contains the levels at which the corresponding densities are taken.
7. Density Rx--This column contains the density values taken at the corresponding levels.
8. QA--This column indicates that QA concurred with the items recorded.

Test data sheets are in Appendix A.

1.11 TEST LOG SHEET

Test Log Sheets are used to document test start and stop times and to document any other notes concerning the execution of the Acceptance Test Procedure. A Test Log Sheet is included in Appendix C.

2.0 CHANGE CONTROL AND EXCEPTIONS TO ACCEPTANCE TEST SECTION

2.1 ACCEPTANCE TEST PROCEDURE CHANGE CONTROL

Acceptance testing is to be conducted in accordance with the steps and requirements specified in this procedure. Any required field changes must be per Sections 1.4.1, 1.4.2, and 1.4.5. Field changes shall also be recorded as an exception.

2.2 TEST EXECUTION

The acceptance test procedures detailed in Sections 1.6, 1.7, 1.8, and 1.9 shall be performed in sequential steps starting with Section 1.6.1. As required by Section 1.4.4, the Recorder will check off every test step in the space provided on the Recorder's copy of the ATP as each step is completed. Any step that requires a value recording or verification must also be recorded on the Test Data Sheet.

2.2.1 Without Exception

2.2.1.1 Check applicable space on the Test Execution Sheet (Appendix D) to show that the ATP has been performed and no exceptions have been recorded.

2.2.1.2 Sign and date the Test Execution Sheet in the spaces provided.

2.2.1.3 Distribute requisite copies of ATP.

2.2.2 With Exception/Resolved

2.2.2.1 Check applicable space on the Test Execution Sheet to show that the ATP has been performed with exceptions recorded and resolved.

2.2.2.2 Sign and date the Test Execution Sheet in the spaces provided.

2.2.2.3 Distribute requisite copies of ATP.

2.2.3 With Exception/Outstanding

2.2.3.1 Check applicable space on the Test Execution Sheet to show that the ATP has been performed with exceptions recorded, part or all of which are presently outstanding, unresolved.

2.2.3.2 Sign and date the Test Execution Sheet in the spaces provided.

2.2.3.3 Distribute requisite copies of ATP.

3.0 RECORDING AND RESOLVING EXCEPTIONS

3.1 GENERAL

Exceptions to the ATP are sequentially numbered and recorded on individual Exception Sheets. This enables case-by-case resolution, recording, approval, and distribution of each exception.

3.2 RECORDING

- 3.2.1 Number each exception sequentially as it occurs in the comments column on the Test Data sheet, if applicable, and record it on a Test Exception Sheet. If the exception occurs without a reference to the data sheet, record the exception on a Test Exception Sheet.
- 3.2.2 Enter name and organization of objecting party for each exception.
- 3.2.3 Enter planned action to resolve each exception when determined.

3.3 RETEST/RESOLUTION

- 3.3.1 Record the action taken to resolve each exception on the Test Exception Sheet. Action taken might not be the same as planned action.
- 3.3.2 When action taken results in an acceptable retest, sign and date Acceptable Retest section of the Test Exception Sheet.
- 3.3.3 When action taken does not involve an acceptable retest, mark the N/A block. Resolve exception per Section 3.4 below.

3.4 APPROVAL AND ACCEPTANCE

- 3.4.1 The Project Engineer provides final approval and acceptance of exception by checking one of the following on the Test Exception Sheet:
 - Retest Approved and Accepted: Applicable when Retest Execution and Acceptance section is completed.
 - Exception Accepted-As-Is: Requires detailed explanation.
 - Other: Requires detailed explanation.
- 3.4.2 The Project Engineer signs and dates the Test Exception Sheet and obtains other internal approval, if required.

3.5 DISTRIBUTION

Distribute requisite copies of completed Test Exception Sheets to the ATP participants.

APPENDIX A - TEST DATA SHEETS

Test Data Sheets

Date of test: MAY 10 95			Gauge Transmission Address: 1A=00				Gauge Transmission Address: 1A=01			
Test Performed By: VR ENDERLIN			Equipment Serial Number(s) 854-15-772				Equipment Serial Number(s) 854-15-774			
Procedure Step Number	Item	Expected Result	Value	(A/R)	Comment	QA	Value	(A/R)	Comment	QA
1.6.2.1	Sect. 1.6.1	Yes	yes			DNH	yes			DNH
1.6.2.4	DW	Record value	290.7g			DNH	291.7			DNH
	DV	Record value	149 cm ³			DNH	151 cm ³			DNH
1.6.2.5	DC	Record value	338.020 ^{mm}			DNH	338.012 ^{mm}			DNH
1.6.3.2	EP Error	000	EP000			DNH	EP000			DNH
1.6.3.3	ES Error	0000	ES0000			DNH	ES0000			DNH
1.6.4.6	ANALOG DISPLAY	Yes	yes			DNH	yes			DNH
1.6.4.10	LEVEL DISPLAY	Yes	yes			DNH	yes			DNH
1.7.1.5	AM	34.00	34.00			DNH	34.00			DNH
1.7.1.6	AN	2.00	2.00			DNH	2.00			DNH
1.7.1.9	Line 1	Record value	ANAL OUT			DNH	ANAL OUT			DNH
	Line 2	Record value	.430E+01 mA			DNH	.430E+01 mA			DNH
1.7.1.10	Panel Display	Value of 1.7.1.9	-4.32			DNH	4.08			DNH
1.7.2.2	DC	Value of 1.6.2.5	.33802E+00			DNH	.338012 ^{E+0}			DNH
1.7.2.5	Access Level	30 - 34	33.40			DNH	33.43			DNH
1.7.2.7	MZ	Value of 1.7.2.5	33.40			DNH	33.43			DNH
1.7.2.8	WI	EDD	EDD			DNH	EDD			DNH

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Date of test:			Gauge Transmission Address: 1A-00				Gauge Transmission Address: 1A-01			
Test Performed By:			Equipment Serial Number(s)				Equipment Serial Number(s)			
Procedure Step Number	Item	Expected Result	Value	(A/R)	Comment	QA	Value	(A/R)	Comment	QA
1.7.3.4	F25	Record Value	.11374632E+5			PAH	.11714368E+5			PAH
1.7.3.10	F100	Record Value	.12153825E+5			PAH	.12499621E+5			PAH
1.7.3.16	F175	Record Value	.12878611E+5			PAH	.13225486E+5			PAH
1.7.3.22	F250	Record Value	.13560385E+5			PAH	.13907255E+5			PAH
1.7.3.26	F0	Value of 1.7.3.4	.11374632E+5			PAH	.11714368E+5			PAH
1.7.3.27	F1	Value of 1.7.3.10	.12153825E+5			PAH	.12499621E+5			PAH
1.7.3.28	F2	Value of 1.7.3.16	.12878611E+5			PAH	.13225486E+5			PAH
1.7.3.29	F3	Value of 1.7.3.22	.13560385E+5			PAH	.13907255E+5			PAH
1.7.3.30	DW	Value of 1.6.2.4	.2907E+3			PAH	.29170E+3			PAH
1.7.3.31	DV	Value of 1.6.2.4	.149E+3			PAH	.151E+3			PAH
1.7.3.32	DA	.16 E+02	.16 E+2			PAH	.16 E+2			PAH
1.7.3.33	S1	.245 E+03	.245 E+3			PAH	.245 E+3			PAH
1.7.3.34	WT	EDE	EDE			PAH	EDE			PAH
1.7.3.35	RM	.245 E+03	.245 E+3			PAH	.245 E+3			PAH
1.7.4.7	RL	36.38	36.38			PAH	36.38			PAH
1.7.4.13	LQ	Record value	28.02			PAH	26.12			PAH
1.7.4.15	RL	Value of 1.7.4.13	28.02			PAH	26.12			PAH

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Date of test:			Gauge Transmission Address: 1A=00				Gauge Transmission Address: 1A=01			
Test Performed By:			Equipment Serial Number(s)				Equipment Serial Number(s)			
Procedure Step Number	Item	Expected Result	Value	(A/R)	Comment	QA	Value	(A/R)	Comment	QA
1.7.5.5	WQ	Record value	.29292759 ^{E3}			DK	.29258849 ^{E3}			DK
1.7.5.7	DW	Record value	.2907 E+3			DK	.2917 E+03			DK
1.7.5.8	DW	Value of 1.7.5.5	.29292759 ^{E3}			DK	.29258849 ^{E3}			DK
1.7.6.2	UR	36.00	36.00			DK	36.00			DK
1.7.6.3	MI	34.00	34.00			DK	34.00			DK
1.7.6.4	MZ	33.00	33.00			DK	33.00			DK
1.7.6.5	MI	32.10	32.10			DK	32.10			DK
1.7.6.6	HA	32.00	32.00			DK	32.00			DK
1.7.6.7	LA	3.10	3.10			DK	3.10			DK
1.7.6.8	LL	3.00	3.00			DK	3.00			DK
1.7.6.9	ML	2.00	2.00			DK	2.00			DK
1.7.6.13	11/RL	Record value	27.97			DK	26.12			DK
	Value of 1.7.4.15	Transfer value	28.02			DK	26.12			DK
	Difference	< 0.1 inches	.05			DK	00			DK
1.7.6.15	IG	Record value	27.98			DK	26.10			DK
	Value of 1.7.6.13	Transfer value	27.97			DK	26.11			DK
	Difference	< 0.1 inch	.01			DK	.02			DK
1.7.6.18	WQ	Record value	.29236146 ^{E3}			DK	.29284551 ^{E3}			DK
	Value of 1.7.5.5	Transfer value	.29292759			DK	.29258849 ^{E3}			DK
	Difference	< 3.0 g	.64g			DK	.26 g			DK

Date of test:		Test Performed By:		Procedure Step Number	
Expected Results		Item		Value	
Comment		(A/R)		Value	
Gauge Transmission Address: 1A-00		QA		Value	
Equipment Serial Number(s)		Comment		Value	
Gauge Transmission Address: 1A-01		QA		Value	
Equipment Serial Number(s)		Comment		Value	
1.8.1.4	Record value	27.99	OK	26.10	OK
1.8.1.6	Value of 1.8.1.4	27.99	OK	26.10	OK
1.8.1.9	8.00	8.00	OK	8.00	OK
1.8.1.10	10.00	10.00	OK	10.00	OK
1.8.1.14	Record value	28.00	OK	26.11	OK
1.8.1.16	Record value	9.99	OK	9.99	OK
01	Record value	11.11	OK	10.90	OK
02	Record value	12.22	OK	11.80	OK
03	Record value	13.33	OK	12.70	OK
04	Record value	14.44	OK	13.60	OK
05	Record value	15.56	OK	14.50	OK
06	Record value	16.67	OK	15.40	OK
07	Record value	17.78	OK	16.31	OK
08	Record value	18.89	OK	17.21	OK
09	Record value	20.01	OK	18.11	OK

Date of test: MAY 10, 1995		Gauge Transmission Address: 1A-00				Gauge Transmission Address: 1A-01				
Test Performed By: VR ENDERLIN		Equipment Serial Number(s)				Equipment Serial Number(s)				
Procedure Step Number	Item	Expected Result	Value	(A/R)	Comment	QA	Value	(A/R)	Comment	QA
1.8.1.17	R0	Record value	1007.21			PA	1009.65			PA
	R1	Record value	1008.10			PA	1008.06			PA
	R2	Record value	1007.66			PA	1008.98			PA
	R3	Record value	1006.93			PA	1010.39			PA
	R4	Record value	1007.17			PA	1010.86			PA
	R5	Record value	1007.17			PA	1008.66			PA
	R6	Record value	1002.48			PA	1010.41			PA
	R7	Record value	1002.25			PA	1010.37			PA
	R8	Record value	1005.73			PA	1010.17			PA
	R9	Record value	1002.96			PA	1003.96			PA
1.8.1.18	SC	Record value	1005.81			PA	1009.25			PA
1.8.2.4	.RQS file	CYL_AIP				PA	CYL_AIP			PA
1.8.2.5	.RPL file	Record filename	MAY10-1			PA	MAY10-1			PA
1.8.2.6	Results record sheet	Complete	Complete			PA	Complete			PA
1.8.2.8	.LOG file	Value in 1.8.2.5	MAY10-1			PA	MAY10-1			PA
1.8.2.12	PEI vs Batch	Values match	yes			PA	yes			PA

Date of test:			Gauge Transmission Address: 1A=00				Gauge Transmission Address: 1A=01			
Test Performed By:			Equipment Serial Number(s)				Equipment Serial Number(s)			
Procedure Step Number	Item *	Expected Result	Value	(A/R)	Comment	QA	Value	(A/R)	Comment	QA
1.8.3.1	Density	Record value	1.296			DK	1.296			DK
1.8.3.4	LQ	Record value	18.32			DK	18.34			DK
1.8.3.6	RL	Value of 1.8.3.4	18.32			DK	18.34			DK
1.8.3.9	D8	8.00	8.00			DK	8.00			DK
1.8.3.10	D2	10.00	10.00			DK	10.00			DK
1.8.3.14	Y4	Record value	18.33			DK	18.34			DK
1.8.3.16	D0	Record value	9.99			DK	9.99			DK
	D1	Record value	10.03			DK	10.03			DK
	D2	Record value	10.07			DK	10.07			DK
	D3	Record value	10.11			DK	10.11			DK
	D4	Record value	10.14			DK	10.15			DK
	D5	Record value	10.18			DK	10.19			DK
	D6	Record value	10.22			DK	10.22			DK
	D7	Record value	10.25			DK	10.26			DK
	D8	Record value	10.29			DK	10.30			DK
	D9	Record value	10.33			DK	10.34			DK

MHC-SD-MM-ATR-120
Revision 0

Date of test:			Gauge Transmission Address: 1A=00				Gauge Transmission Address: 1A=01			
Test Performed By:			Equipment Serial Number(s)				Equipment Serial Number(s)			
Procedure Step Number	Item	Expected Result	Value	(A/R)	Comment	QA	Value	(A/R)	Comment	QA
1.8.3.17 Density should be within $\pm 15\text{kg/m}^3$ of value of 1.8.3.1	R0	Record value	1294.74			DK	1302.21			DK
	R1	Record value	1296.13			DK	1285.54			DK
	R2	Record value	1295.62			DK	1300.75			DK
	R3	Record value	1294.50			DK	1297.97			DK
	R4	Record value	1292.77			DK	1297.05			DK
	R5	Record value	1281.06			DK	1296.39			DK
	R6	Record value	1292.02			DK	1273.92			DK
	R7	Record value	1286.15			DK	1290.78			DK
	R8	Record value	1286.22			DK	1289.66			DK
	R9	Record value	1285.97			DK	1287.75			DK
1.8.3.18	SC	Record value	1291.45			DK	1285.54			DK
						DK	1294.06			DK

Date of test:			Gauge Transmission Address: 1A-00				Gauge Transmission Address: 1A-01			
Test Performed By:			Equipment Serial Number(s)				Equipment Serial Number(s)			
Procedure Step Number	Item	Expected Result	Value	(A/N)	Comment	QA	Value	(A/N)	Comment	QA
1.8.4.1	Net'l level	Record value	4.0			DK	4.0			DK
	Water level	Record value	21.5			DK	2.0			DK
	Oil level	Record value	30			DK	29			DK
1.8.4.4	LQ	Record value	28.22			DK	27.48			DK
1.8.4.6	RL	Value of 1.8.4.4	28.22			DK	27.48			DK
1.8.4.10	DK	30.00	30.00			DK	30.00			DK
1.8.4.11	DN	4.00	4.00			DK	4.00			DK
1.8.4.13	Y4	Record value	28.29			DK	27.46			DK
1.8.4.15	00	Record value	3.99			DK	3.99			DK
	01	Record value	6.88			DK	6.88			DK
	02	Record value	9.77			DK	9.77			DK
	03	Record value	12.66			DK	12.66			DK
	04	Record value	15.55			DK	15.55			DK
	05	Record value	18.44			DK	18.44			DK
	06	Record value	21.33			DK	21.33			DK
	07	Record value	24.22			DK	24.22			DK
	08	Record value	27.11			DK	27.11			DK
	09	Record value	29.99			DK	29.99			DK

WIC-SD-WM-ATR-120
Revision 0

Date of test:			Gauge Transmission Address: 1A=00				Gauge Transmission Address: 1A=01			
Test Performed By:			Equipment Serial Number(s)				Equipment Serial Number(s)			
Procedure Step Number	Item*	Expected Result	Value	(A/R)	Comment	QA	Value	(A/R)	Comment	QA
1.8.4.16	R0	Record value	1062.20			PXH	1135.70			PXH
	R1	Record value	1027.85			PXH	1028.85			PXH
	R2	Record value	1032.19			PXH	1025.97			PXH
	R3	Record value	1031.89			PXH	1033.31			PXH
	R4	Record value	1024.74			PXH	1037.45			PXH
	R5	Record value	991.80			PXH	971.50			PXH
	R6	Record value	932.39			PXH	927.77			PXH
	R7	Record value	126.28			PXH	420.28			PXH
	R8	Record value	601.10			PXH	404.67			PXH
	R9	Record value	999999			PXH	999999			PXH
1.8.4.17	SC	Record value	958.94			PXH	942.84			PXH

Date of test:			Gauge Transmission Address: TA=00			Gauge Transmission Address: TA=01		
Test Performed By:			Equipment Serial Number(s)			Equipment Serial Number(s)		
Procedure Step Number	Item	Expected Result	Value	(A/R)	Comment	Value	(A/R)	Comment
1.8.5.1	NaCl level	Record value	4.0			4.0		
	Water level	Record value	21.5			20		
	Oil level	Record value	30			29		
1.8.5.4	.ROS file	IP_ATP	IP-ATP			IP-ATP		
1.8.5.5	.RPL file	Record filename	MAY11-1			MAY11-1		
1.8.5.6	Results record sheet	Complete	complete		exception #1	not complete		exception #1
1.8.5.8	.LOG file	Value of 1.8.5.5	MAY11-1			MAY11-1		
1.8.5.12	PEF vs Batch	Values match	yes			yes		exception #1
1.9.2.1	Completed	Yes	yes			yes		

Val P. Endel 5/11/95
 Test Director Date
Val P. Endel 5/11/95
 Recorder Date

DT Hammer 5/11/95
 Quality Date

Batch File Results

Date of Test: 5/10/95		Test Performed by: VR ENDERLIN					
Procedure Step Number	Item (x)	Gauge TA=00			Gauge TA=01		
		Level Dx	Density Rx	QA	Level Dx	Density Rx	QA
1.3.2.5 Top profile	0	15.99	1007.20	DRH	15.99	1008.35	DRH
	1	16.44	1003.33	DRH	16.23	1008.10	DRH
	2	16.88	1004.55	DRH	16.46	1008.00	DRH
	3	17.33	1001.17	DRH	16.69	1007.21	DRH
	4	17.77	1007.51	DRH	16.93	1008.55	DRH
	5	18.22	1006.63	DRH	17.16	1008.50	DRH
	6	18.66	1006.58	DRH	17.39	1008.90	DRH
	7	19.11	1003.53	DRH	17.63	1009.14	DRH
	8	19.55	1003.22	DRH	17.86	1007.59	DRH
	9	20.00	998.07	DRH	18.09	1004.15	DRH
1.3.2.6 Middle Profile	0	12.99	1007.29	DRH	12.99	1007.84	DRH
	1	13.77	1001.25	DRH	13.23	1008.21	DRH
	2	14.55	1004.34	DRH	13.46	1010.22	DRH
	3	15.33	1007.52	DRH	13.69	1010.42	DRH
	4	16.11	1005.08	DRH	13.92	1009.32	DRH
	5	16.89	1007.48	DRH	14.16	1007.83	DRH
	6	17.67	1004.89	DRH	14.39	1009.48	DRH
	7	18.45	1006.82	DRH	14.62	1009.67	DRH
	8	19.22	1001.28	DRH	14.85	1009.95	DRH
	9	20.00	1003.84	DRH	15.08	1009.81	DRH
1.3.2.6 Bottom profile	0	9.99	1005.74	DRH	9.99	1008.82	DRH
	1	10.44	1006.61	DRH	10.23	1009.18	DRH
	2	10.88	1001.46	DRH	10.46	1009.13	DRH
	3	11.32	1004.00	DRH	10.69	1007.54	DRH
	4	11.76	1006.87	DRH	10.92	1009.37	DRH
	5	12.20	1006.50	DRH	11.15	1009.23	DRH
	6	12.64	1000.90	DRH	11.38	1009.23	DRH
	7	13.08	1004.03	DRH	11.61	1009.23	DRH
	8	13.53	1006.82	DRH	11.84	1007.67	DRH
	9	13.97	1001.39	DRH	12.07	1009.61	DRH

Date of Test:		Test Performed by:					
Procedure Step Number	Item (x)	Gauge TA=00			Gauge TA=01		
		Level Dx	Density Rx	QA	Level Dx	Density Rx	QA
1.3.5.6 Top profile	0	17.99	1001.79	DTA	17.99	982.37	DTA
	1	18.88	986.33	DTA	18.88	962.00	DTA
	2	19.77	959.67	DTA	19.77	932.63	DTA
	3	21.5 ^{20.66}	928.72 ^{928.12}	DTA	21.55 ^{20.66}	928.81 ^{928.53}	DTA
	4	21.55	928.92	DTA	22.44	926.53	DTA
	5	22.44	922.27	DTA	22.44	926.53	DTA
	6	23.33	931.27	DTA	23.33	921.08	DTA
	7	24.22	925.75	DTA	24.22	918.56	DTA
	8	25.11	917.65	DTA	25.11	860.32	DTA
	9	25.99	870.28	DTA	25.99	656.33	DTA
1.3.5.6 Middle Profile	0	10.99	1026.49	DTA	10.99	1027.62	DTA
	1	11.88	1029.11	DTA	11.88	1026.06	DTA
	2	12.77	1030.74	DTA	12.77	1029.62	DTA
	3	13.66	1024.72	DTA	13.66	1029.74	DTA
	4	14.55	1027.70	DTA	14.55	1033.73	DTA
	5	15.44	1026.99	DTA	15.44	1035.57	DTA
	6	16.33	1026.20	DTA	16.33	1024.09	DTA
	7	17.22	1027.81	DTA	17.22	1002.31	DTA
	8	18.11	1001.02	DTA	18.11	976.93	DTA
	9	18.99	980.86	DTA	18.99	962.18	DTA
1.3.5.6 Bottom profile	0	2.09	99999	DTA	2.09	99999	DTA
	1	3.19	99999	DTA	3.19		
	2	4.29	1034.37	DTA	4.29		
	3	5.39	1027.06	DTA	5.39		
	4	6.49	1027.81	DTA	6.49		
	5	7.59	1029.93	DTA	7.59		
	6	8.69	102508	DTA	8.69		
	7	9.79	1028.43	DTA	9.79		
	8	10.89	1030.71	DTA	10.89		
	9	11.99	1029.66	DTA	11.99		

Mal R. Enderli 5/11/95
Test Director Date
Mal R. Enderli 5/11/95
Recorder Date

DT Hammer 5/11/95
Quality Date

```
' LOGv18 RPL_LOG converter v1.00 / 05-10-1995 12:09:56
'THIS IS THE BATCH FILE FOR THE ACCEPTANCE TEST USING THE CYLINDER.
'THE FILE RUN 3 DENSITY PROFILE SCANS, EACH SCAN STARTING AND ENDING 3 INCHES
'PROGRESSIVELY DEEPER THAN THE PREVIOUS SCAN.
'WRITTEN BY V.R. ENDERLIN ON MARCH 9, 1995, LAST REVISED APRIL 20, 1995
'PROGRAM NAME CYL_ATP.RQS
'*****
'GET DATE AND TIME.
' !DATE 05-10-1995 09:34:21
'STATE WHICH GAUGE IS ACTIVE FOR THIS TEST
TA=00
'UNLOCK JUST IN CASE
UN=&
'SEND TO INTERFACE 1
I1=&
'GET SOME INFO WHILE WAITING TO GET TO I1
'STATE NUMBER OF SAMPLES PER LEVEL
DO=5
'CURRENT REFERENCE LEVEL (I1)
RL=+00027.99
'FORCE ON TRANSDUCER AT I1 (TO DETERMINE DENSITY ASSUMPTION OF FLUID)
S1=+.24500000E+03
'STATE WHICH GAUGE IS ACTIVE FOR THIS TEST
TA=01
'UNLOCK JUST IN CASE
UN=&
'SEND TO INTERFACE 1
I1=&
'GET SOME INFO WHILE WAITING TO GET TO I1
'STATE NUMBER OF SAMPLES PER LEVEL
DO=5
'CURRENT REFERENCE LEVEL (I1)
RL=+00026.10
'FORCE ON TRANSDUCER AT I1 (TO DETERMINE DENSITY ASSUMPTION OF FLUID)
S1=+.24500000E+03
'*****UPPER PROFILE*****
'TA=00
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
W1=&
DB=+00008.00&
DZ=+00016.00&
'TA=01
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
W1=&
DB=+00008.00&
DZ=+00016.00&
'WAIT FOR COMMUNICATIONS TO COME BACK
' !PAUSE 30 05-10-1995 09:35:14
'TA=00
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1
```

```
I1=&
'TA=01
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1
I1=&
'MAKE SURE THEY GET THERE
' !PAUSE 60 05-10-1995 09:36:18
'TA=00
'GET INNAGE LEVEL FOR START OF PROFILE SCAN
Y4=@@@--+00028.00
'START SCAN FOR TA=00
TP=&
'TA=01
'GET INNAGE LEVEL FOR START OF PROFILE SCAN
Y4=@@@--+00026.09
'START SCAN FOR TA=01
TP=&
'WAIT FOR 25 MINUTES TO COMPLETE SCANS AND DISPLACERS TO RETURN TO I1
' !PAUSE 1500 05-10-1995 10:01:22
'STATE WHICH GAUGE IS ACTIVE FOR THIS TEST
TA=00
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00015.99
D1=@@+00016.44
D2=@@+00016.88
D3=@@+00017.33
D4=@@+00017.77
D5=@@+00018.22
D6=@@+00018.66
D7=@@+00019.11
D8=@@+00019.55
D9=@@+00020.00
'GET DENSITIES
R0=@+01007.20
R1=@+01003.33
R2=@+01004.55
R3=@+01001.47
R4=@+01007.51
R5=@+01006.63
R6=@+01006.58
R7=@+01003.53
R8=@+01003.22
R9=@+00998.07
'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE
SC=@+01004.21
' !DATE 05-10-1995 10:01:48
'STATE WHICH GAUGE IS ACTIVE FOR THIS TEST
TA=01
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00015.99
D1=@@+00016.23
```

D2=@@+00016.46
D3=@@+00016.69
D4=@@+00016.93
D5=@@+00017.16
D6=@@+00017.39
D7=@@+00017.63
D8=@@+00017.86
D9=@@+00018.09
'GET DENSITIES
R0=@+01008.35
R1=@+01008.10
R2=@+01008.00
R3=@+01007.21
R4=@+01008.55
R5=@+01008.50
R6=@+01008.90
R7=@+01009.14
R8=@+01007.59
R9=@+01004.15
'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE
SC=@+01007.85
' !DATE 05-10-1995 10:02:14
'*****MIDDLE PROFILE*****
'TA=00
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
W1=&
DB=!053
DZ=+00013.00&
'TA=01
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
W1=&
DB=+00011.00&
DZ=+00013.00&
'WAIT FOR COMMUNICATIONS TO COME BACK
' !PAUSE 30 05-10-1995 10:02:54
'TA=00
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1
I1=&
'TA=01
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1
I1=&
'MAKE SURE THEY GET THERE
' !PAUSE 60 05-10-1995 10:03:58
'TA=00
'GET INNAGE LEVEL FOR START OF PROFILE SCAN
Y4=@@-+00028.01
'START SCAN FOR TA=00
TP=&


```
'TA=01
'GET INNGAGE LEVEL FOR START OF PROFILE SCAN
Y4=@@@--+00026.08
'START SCAN FOR TA=01
TP=&
'WAIT FOR 25 MINUTES TO COMPLETE SCANS AND DISPLACERS TO RETURN TO I1
' !PAUSE 1500 05-10-1995 10:29:02
'STATE WHICH GAUGE IS ACTIVE FOR THIS TEST
TA=00
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00012.99
D1=@@+00013.77
D2=@@+00014.55
D3=@@+00015.33
D4=@@+00016.11
D5=@@+00016.89
D6=@@+00017.67
D7=@@+00018.45
D8=@@+00019.22
D9=@@+00020.00
'GET DENSITIES
R0=@+01007.29
R1=@+01001.25
R2=@+01004.34
R3=@+01007.52
R4=@+01005.08
R5=@+01007.48
R6=@+01004.89
R7=@+01006.82
R8=@+01001.28
R9=@+01003.84
'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE
SC=@+01004.98
' !DATE 05-10-1995 10:29:27
'STATE WHICH GAUGE IS ACTIVE FOR THIS TEST
TA=01
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00012.99
D1=@@+00013.23
D2=@@+00013.46
D3=@@+00013.69
D4=@@+00013.92
D5=@@+00014.16
D6=@@+00014.39
D7=@@+00014.62
D8=@@+00014.85
D9=@@+00015.08
'GET DENSITIES
R0=@+01007.84
R1=@+01008.21
R2=@+01010.22
R3=@+01010.42
```

```
R4=@+01009.32
R5=@+01007.83
R6=@+01009.48
R7=@+01009.67
R8=@+01009.95
R9=@+01009.81
'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE
SC=@+01009.28
' !DATE 05-10-1995 10:29:54
'*****BOTTOM PROFILE*****
'TA=00
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
W1=&
DB=+00014.00&
DZ=+00010.00&
'TA=01
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
W1=&
DB=+00014.00&
DZ=+00010.00&
'WAIT FOR COMMUNICATIONS TO COME BACK
' !PAUSE 30 05-10-1995 10:30:34
'TA=00
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1
I1=&
'TA=01
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1
I1=&
'MAKE SURE THEY GET THERE
' !PAUSE 60 05-10-1995 10:31:38
'TA=00
'GET INNAGE LEVEL FOR START OF PROFILE SCAN
Y4=@@@-+00027.97
'START SCAN FOR TA=00
TP=&
'KEEP THE DISPLACER AT THE LOWER LEVEL WHEN DONE WITH SCAN
I3=&
'TA=01
'GET INNAGE LEVEL FOR START OF PROFILE SCAN
Y4=@@@-+00026.07
'START SCAN FOR TA=01
TP=&
'KEEP THE DISPLACER AT THE LOWER LEVEL WHEN DONE WITH SCAN
I3=&
'WAIT FOR 25 MINUTES TO COMPLETE SCANS AND DISPLACERS TO GET TO I3
' !PAUSE 1500 05-10-1995 10:56:44
'STATE WHICH GAUGE IS ACTIVE FOR THIS TEST
TA=00
```

'GET LEVELS AT WHICH DENSITIES WERE TAKEN

D0=@+00009.99

D1=@+00010.44

D2=@+00010.88

D3=@+00011.32

D4=@+00011.76

D5=@+00012.20

D6=@+00012.64

D7=@+00013.08

D8=@+00013.53

D9=@+00013.97

'GET DENSITIES

R0=@+01005.74

R1=@+01006.61

R2=@+01001.46

R3=@+01004.00

R4=@+01006.87

R5=@+01006.50

R6=@+01000.90

R7=@+01004.03

R8=@+01006.82

R9=@+01001.39

'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE

SC=@+01004.43

' !DATE 05-10-1995 10:57:09

'STATE WHICH GAUGE IS ACTIVE FOR THIS TEST

TA=01

'GET LEVELS AT WHICH DENSITIES WERE TAKEN

D0=@+00009.99

D1=@+00010.23

D2=@+00010.46

D3=@+00010.69

D4=@+00010.92

D5=@+00011.15

D6=@+00011.38

D7=@+00011.61

D8=@+00011.84

D9=@+00012.07

'GET DENSITIES

R0=@+01008.82

R1=@+01009.18

R2=@+01009.13

R3=@+01007.54

R4=@+01009.37

R5=@+01009.23

R6=@+01009.23

R7=@+01009.23

R8=@+01007.67

R9=@+01009.61

'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE

SC=@+01008.90

'GET THE FINISH TIME

Path: B:\

Revision 0

File: MAY10_1 .LOG 6.684 .a.. 5-10-95 12:10:54

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' !DATE 05-10-1995 10:57:36

' # END CYL_ATP.RQS 05-10-1995 10:57:36

```
' LOGv18 RPL_LOG converter v1.00 / 05-11-1995 13:44:28
'THIS IS THE BATCH FILE FOR THE ACCEPTANCE TEST USING THE CYLINDER.
'THE FILE RUNS 3 PROFILE SCANS, EACH RUNNING OVER
'OVER AN 8 INCH RANGE, OVERLAPPING 1 INCH WITH THE NEXT SCAN'S RANGE.
'WRITTEN BY V.R. ENDERLIN ON MARCH 9, 1995, LAST REVISED APRIL 20, 1995
'PROGRAM NAME IP ATP.RQS
'*****
'GET DATE AND TIME.
' !DATE 05-11-1995 13:02:33
'STATE WHICH GAUGE IS ACTIVE FOR THIS SECTION
TA=00
'UNLOCK JUST IN CASE
UN=&
'SEND TO INTERFACE 1
I1=&
'GET SOME INFO WHILE WAITING TO GET TO I1
'STATE NUMBER OF SAMPLES PER LEVEL
DO=5
'CURRENT REFERENCE LEVEL (I1)
RL=+00028.22
'FORCE ON TRANSDUCER AT I1 (TO DETERMINE DENSITY ASSUMPTION OF FLUID)
S1=+.24500000E+03
'STATE WHICH GAUGE IS ACTIVE FOR THIS SECTION
TA=01
'UNLOCK JUST IN CASE
UN=&
'SEND TO INTERFACE 1
I1=&
'GET SOME INFO WHILE WAITING TO GET TO I1
'STATE NUMBER OF SAMPLES PER LEVEL
DO=5
'CURRENT REFERENCE LEVEL (I1)
RL=+00027.48
'FORCE ON TRANSDUCER AT I1 (TO DETERMINE DENSITY ASSUMPTION OF FLUID)
S1=+.24500000E+03
'TA=00
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
DK=+00026.00&
DN=+00018.00&
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1 INSTEAD OF DEFAULT I3
I1=&
'TA=01
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
DK=+00026.00&
DN=+00018.00&
'SEND TO I1 INSTEAD OF DEFAULT I3
I1=&
'MAKE SURE THEY GET THERE
' !PAUSE 60 05-11-1995 13:03:55
'START SCAN FOR TA=00
```

```
IP=&
'START SCAN FOR TA=01
IP=&
'WAIT FOR 25 MINUTES TO COMPLETE SCANS AND DISPLACERS TO RETURN TO I1
' !PAUSE 500 05-11-1995 13:12:16
'GET CURRENT TRANSMISSION ADDRESS
TA=00
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00017.99
D1=@@+00018.88
D2=@@+00019.77
D3=@@+00020.66
D4=@@+00021.55
D5=@@+00022.44
D6=@@+00023.33
D7=@@+00024.22
D8=@@+00025.11
D9=@@+00025.99
'GET DENSITIES
R0=D+01001.79
R1=D+00986.33
R2=D+00959.67
R3=D+00934.12
R4=D+00928.92
R5=D+00922.27
R6=D+00931.27
R7=D+00925.75
R8=D+00917.65
R9=D+00870.28
'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE
SC=D+00937.80
' !DATE 05-11-1995 13:12:42
'GET CURRENT TRANSMISSION ADDRESS
TA=01
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00017.99
D1=@@+00018.88
D2=@@+00019.77
D3=@@+00020.66
D4=@@+00021.55
D5=@@+00022.44
D6=@@+00023.33
D7=@@+00024.22
D8=@@+00025.11
D9=@@+00025.99
'GET DENSITIES
R0=D+00982.37
R1=D+00962.00
R2=D+00932.62
R3=D+00924.71
R4=D+00928.02
R5=D+00926.53
```

```
R6=D+00921.08
R7=D+00918.56
R8=D+00860.32
R9=D+00656.33
'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE
SC=D+00901.25
' !DATE 05-11-1995 13:13:08
'*****MIDDLE PROFILE*****
'TA=00
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
DK=+00019.00&
DN=+00011.00&
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1 INSTEAD OF DEFAULT I3
I1=&
'TA=01
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
DK=+00019.00&
DN=+00011.00&
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1 INSTEAD OF DEFAULT I3
I1=&
'MAKE SURE THEY GET THERE
' !PAUSE 60 05-11-1995 13:14:18
'START SCAN FOR TA=00
IP=&
'START SCAN FOR TA=01
IP=&
'WAIT FOR 25 MINUTES TO COMPLETE SCANS AND DISPLACERS TO RETURN TO I1
' !PAUSE 500 05-11-1995 13:22:39
'GET CURRENT TRANSMISSION ADDRESS
TA=00
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00010.99
D1=@@+00011.88
D2=@@+00012.77
D3=@@+00013.66
D4=@@+00014.55
D5=@@+00015.44
D6=@@+00016.33
D7=@@+00017.22
D8=@@+00018.11
D9=@@+00018.99
'GET DENSITIES
R0=D+01026.49
R1=D+01029.11
R2=D+01030.74
R3=D+01024.72
R4=D+01027.70
R5=D+01026.99
```

```
R6=D+01026.20
R7=D+01027.81
R8=D+01001.02
R9=D+00980.86
'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE
SC=D+01020.16
' !DATE 05-11-1995 13:23:05
'GET CURRENT TRANSMISSION ADDRESS
TA=01
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00010.99
D1=@@+00011.88
D2=@@+00012.77
D3=@@+00013.66
D4=@@+00014.55
D5=@@+00015.44
D6=@@+00016.33
D7=@@+00017.22
D8=@@+00018.11
D9=@@+00018.99
'GET DENSITIES
R0=D+01027.62
R1=D+01026.06
R2=D+01029.62
R3=D+01029.74
R4=D+01033.73
R5=D+01035.57
R6=D+01024.09
R7=D+01002.31
R8=D+00976.93
R9=D+00962.18
'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE
SC=D+01014.79
' !DATE 05-11-1995 13:23:32
'*****BOTTOM PROFILE*****
'TA=00
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
DK=+00012.00&
DN=+00002.10&
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1 INSTEAD OF DEFAULT I3
I1=&
'TA=01
'SET UPPER AND LOWER BOUNDS FOR PROFILE SCAN
DK=+00012.00&
DN=+00002.10&
'CLEAR THE DEFAULT FREEZE
UN=&
'SEND TO I1 INSTEAD OF DEFAULT I3
I1=&
'MAKE SURE THEY GET THERE
```



```
' !PAUSE 60 05-11-1995 13:24:42
'START SCAN FOR TA=00
IP=&
'KEEP DISPLACER AT LOWER LEVEL WHEN DONE WITH SCAN
I3=&
'START SCAN FOR TA=01
IP=&
'KEEP DISPLACER AT LOWER LEVEL WHEN DONE WITH SCAN
I3=&
'WAIT FOR 25 MINUTES TO COMPLETE SCANS AND DISPLACERS TO GET TO I3
' !PAUSE 500 05-11-1995 13:33:05
'GET CURRENT TRANSMISSION ADDRESS
TA=00
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00002.09
D1=@@+00003.19
D2=@@+00004.29
D3=@@+00005.39
D4=@@+00006.49
D5=@@+00007.59
D6=@@+00008.69
D7=@@+00009.79
D8=@@+00010.89
D9=@@+00011.99
'GET DENSITIES
R0=F-99999999
R1=F-99999999
R2=D+01034.37
R3=D+01027.06
R4=D+01027.81
R5=D+01029.93
R6=D+01025.08
R7=D+01028.43
R8=D+01030.71
R9=D+01029.66
'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE
SC=F-99999999
' !DATE 05-11-1995 13:33:31
'GET CURRENT TRANSMISSION ADDRESS
TA=01
'GET LEVELS AT WHICH DENSITIES WERE TAKEN
D0=@@+00002.09
D1=@@+00003.19
D2=@@+00004.29
D3=@@+00005.39
D4=@@+00006.49
D5=@@+00007.59
D6=@@+00008.69
D7=@@+00009.79
D8=@@+00010.89
D9=@@+00011.99
'GET DENSITIES
```

R0=F-999999999

R1=F-999999999

R2=D+01036.91

R3=D+01030.49

R4=D+01029.32

R5=D+01025.02

R6=D+01027.87

R7=D+01025.27

R8=D+01029.59

R9=D+01029.38

'GET AVERAGE DENSITY OVER ENTIRE SCAN RANGE

SC=F-999999999

'GET THE FINISH TIME

' !DATE 05-11-1995 13:33:58

' # END IP_ATP.RQS 05-11-1995 13:33:58

APPENDIX B - TEST EXCEPTION SHEET
(Copy as needed)

TEST EXCEPTION # 1

Test Title: WHC-SD-WM-ATR-120, REV 0			Gauge Transmission Address:	
EXCEPTIONS			CORRECTION APPROVAL	
Procedure Step Number	Date	Description	Initials/Date	
			Project Engineer	Quality
1.8.5.6	5/11/95	Density values for lower profile not read by PET. from Default values were written over data before density were accessed.	JED 5-11-95	DTX 5/11/95

OBJECTING PARTY: Test Director

VR Enders 5/11/95
RECORDER Date

ACCEPTABLE RETEST PERFORMED: YES ☐ NO ☒ N/A ☐

DT Hummer 5/11/95
Quality Date

VR Enders 5/11/95
Test Director Date

Retest Approved and Accepted ☐ Exception Accepted As-Is ☒ Other ☐

Explanation Previous 50 density values read from PET were identical without exception. Time precluded a retest.

EXCEPTION RESOLVED:

JL Doad 5-11-95
Project Engineer Date
DT Hummer 5/11/95
Quality Date

APPENDIX C - TEST LOG SHEET
(Copy as needed)

TEST LOG: WHC-SD-WM-ATP-120, REV 0

DATE/TIME	COMMENTS
5/10/95 8 AM	started test w/ JL Dowell ^{TD} , DT Hummer ^{OC} and VR Enderlin present
5/11/95 2:40	ended testing at 2:40. Test to resume 5/11/95 8AM for Sect. 1.8.4 and 1.8.5
5/11/95 1:30	started Test at 1.8.4
5/11/95 2:15	Revised IP-ATP file to reflect more efficient pause value of 500 secs instead of 1500 sec.
5/11/95 3:15	Test exception #1 recorded. Density values of lower-level IP scan in batch mode were replaced with defaults before redd off PET.

APPENDIX D - TEST EXECUTION SHEET

TEST EXECUTION SHEET

Date: 5/11/95

Document Number: WHC-SD-WM-ATP-120, REV 0

Test Unit Number: SN 854-15-772 SN 854-15-774

TEST PERSONNEL

Project Engineer:

J. L. Dowell

Test Director:

V. R. ENDERLIN

Recorder:

Y. R. ENDERLIN

Quality:

D. T. HUMMER (DTH)
ICF-KH QC #58202

TEST EXECUTION

V. R. Enderlin

Test Director

5/11/95

Date

V. R. Enderlin

Recorder

5/11/95

Date

D. T. Hummer

Quality

5/11/95

Date

TEST APPROVAL AND ACCEPTANCE

Without
Exception

☒ With
Exception/Resolved

☐ With
Exception/Outstanding

J. L. Dowell

Project Engineer

5-11-95

Date

D. T. Hummer

Quality

5/11/95

Date

APPENDIX E - OPERATING PARAMETER TABLES

Table 1: ENRAF 854 ATG STATIC OPERATING PARAMETERS

ITEM DESCRIPTION ¹	ITEM	UNITS	DEFAULT	GAUGE SETTING	
				TA-00	TA-01
Displacer area	DA	cm ²	+ .65000000E+02	+ .16000000E+02	+ .16000000E+02
Drum circumference	DC	m	+ .00000000E+00	+ .33802000E+00	+ .33801200E+00
Level measurement type	DE		I	I	I
Display format	DF		A	B	B
Tenth millimetre selection	DG		Y	Y	Y
Displacer volume ^a	DV	cm ³	+ .11000000E+02	+ .14755600E+03	+ .14760500E+03
Displacer weight	DW	g	+ .22300000E+03	+ .29170000E+03	+ .29070000E+03
Error restart	ER		TG11	TG11	TG11
Gauge TOI	GT		B	B	B
Host command mode	HIC		123BCDFILTPU	123BCDFILTPU	123BCDFILTPU
Hydrostatic def. factor	HF	mm/m	+00000000E+00	+00000000E+00	+00000000E+00
Hydrostatic def. level	HL	-LD	+002.0000	+00072.00	+00072.00
Level dimension	LD		M	I	I
Wire tension during AR cmd.	RM	gf	+ .20800000E+03	+ .24500000E+03	+ .24500000E+03
Integration time at I1	T1	s	+ .20000000E+01	+ .20000000E+01	+ .20000000E+01
Integration time at I2	T2	s	+ .20000000E+01	+ .20000000E+01	+ .20000000E+01
Integration time at I3	T3	s	+ .20000000E+01	+ .20000000E+01	+ .20000000E+01
Transmission address for gauge	TA		00	00	01
Field comm. coll. det. enable	TC		E	E	E
Tank identifier	TI			NA	NA

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Table I: ENRAF 854 ATG STATIC OPERATING PARAMETERS					
ITEM DESCRIPTION ¹	ITEM	UNITS	DEFAULT	GAUGE SETTING	
				TA=00	TA=01
Displacer area	DA	cm ²	+.65000000E+02	+.16000000E+02	+.16000000E+02
Transmission speed, field bus	TS	Baud	1200	2400	2400
Security Level 1 Password	W1		ENRAF1	ENRAF1	ENRAF1
Security Level 2 Password	W2		ENRAF2	ENRAF2	ENRAF2
Wire tension protection	WT		EEE	EDE	EDE

1. See *Instruction Manual, Series 854 ATG level gauge*, Part No. 4416.220, Version 2.2, Section 13 for a detailed explanation of the command/item.
- * - Displacer volume and weight values are from the Westinghouse Standards Laboratory Physical and Electrical Report Reference Number 386405.

Table II: ENRAF 854 ATG SETUP DEPENDENT OPERATING PARAMETERS

ITEM DESCRIPTION ¹	ITEM	UNITS	DEFAULT	ACCEPTANCE TEST	
				TA=00	TA=01
High alarm level	HA	=LD	+026.0000	+00032.00	+00032.00
High high alarm	HH	=LD	+026.1000	+00032.10	+00032.10
Level offset for Interface 2	L2	=LD	+000.0000	+00000.00	+00000.00
Level offset for Interface 3	L3	=LD	+000.0000	+00000.00	+00000.00
Low alarm level	LA	=LD	+002.0000	+00003.10	+00003.10
Low low alarm level	LL	=LD	+001.9000	+00003.00	+00003.00
Motor limit high level	MH	=LD	+027.0000	+00034.00	+00034.00
Motor limit low level	ML	=LD	+001.0000	+00002.00	+00002.00
Lock test limit-switch level	MZ	=LD	+050.0000	+00033.00	+00033.00
Reference level	RL	=LD	+026.0000	TBD during test	TBD during test
Setpoint, displacer wt. at I/F 1	S1	g	+ .20800000E+03	+ .24500000E+03	+ .24500000E+03
Setpoint, displacer wt. at I/F 2	S2	g	+ .20800000E+03	+ .15100000E+03	+ .15100000E+03
Setpoint, displacer wt. at I/F 3	S3	g	+ .20800000E+03	+ .12500000E+03	+ .12500000E+03
Tank top level	TT	=LD	+027.0000	+00036.00	+00036.00
Upper reference level	UR	=LD	+027.0000	+00036.00	+00036.00

1. See *Instruction Manual, Series 854 ATG level gauge*, Part No. 4416.220, Version 2.2, Section 13 for a detailed explanation of the command/item.

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