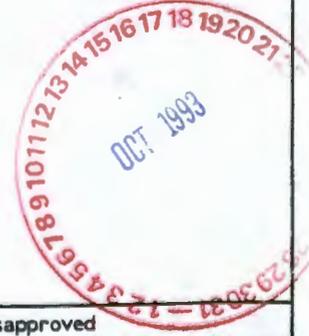


Date Received: <i>12-14-92 CW</i>	INFORMATION RELEASE REQUEST	Reference: WHC-CM-3-4	
Complete for all Types of Release			
Purpose <input type="checkbox"/> Speech or Presentation <input type="checkbox"/> Full Paper <input type="checkbox"/> Summary <input type="checkbox"/> Abstract <input type="checkbox"/> Visual Aid <input type="checkbox"/> Speakers Bureau <input type="checkbox"/> Poster Session <input type="checkbox"/> Videotape	(Check only one suffix) <input type="checkbox"/> Reference Technical Report <input type="checkbox"/> Thesis or Dissertation <input type="checkbox"/> Manual <input type="checkbox"/> Brochure/Flier <input type="checkbox"/> Software/Database <input type="checkbox"/> Controlled Document <input checked="" type="checkbox"/> Other <i>Ecology</i>	ID Number (include revision, volume, etc.) <i>2W-92-01164/W</i> List attachments. Date Release Required	
Title <i>241-T Repair The 101-T PIC JCS WORK PACKAGE FOR SAMPLING TANK FARMS DRUMS</i>		Unclassified Category <i>UC-</i> Impact Level	
New or novel (patentable) subject matter? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", has disclosure been submitted by WHC or other company? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes Disclosure No(s).		Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Identify)	
Copyrights? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", has written permission been granted? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Attach Permission)		Trademarks? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Identify)	
Complete for Speech or Presentation			
Title of Conference or Meeting <i>N/A</i>		Group or Society Sponsoring <i>N/A</i>	
Date(s) of Conference or Meeting <i>N/A</i>	City/State <i>N/A</i>	Will proceedings be published? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Will material be handed out? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Title of Journal <i>N/A</i>			
CHECKLIST FOR SIGNATORIES			
Review Required per WHC-CM-3-4	Yes	No	Reviewer - Signature Indicates Approval
			Name (printed) Signature Date
Classification/Uncontrolled Nuclear Information	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Patent - General Counsel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>S.W. Bengtson</i> <i>[Signature]</i> <i>12/1/92</i>
Legal - General Counsel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>S.W. Bengtson</i> <i>[Signature]</i> <i>12/1/92</i>
Applied Technology/Export Controlled Information or International Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
WHC Program/Project	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>G. BERLIN OR J. BIAGINI</i> <i>[Signature]</i> <i>12-1-92</i>
Communications	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
RL Program/Project	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>E. SENAT</i> <i>[Signature]</i> <i>12/10/92</i>
Publication Services	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Other Program/Project	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Information conforms to all applicable requirements.			The above information is certified to be correct.
References Available to Intended Audience	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP Stamp is required before release. Release is contingent upon resolution of mandatory comments.  
Transmit to DOE-HQ/Office of Scientific and Technical Information	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Author/Requestor (Printed/Signature)	Date		
<i>Steven A Szende</i> <i>S. A Szende</i>	<i>11-24-92</i>		
Intended Audience	<input type="checkbox"/> Internal <input type="checkbox"/> Sponsor <input checked="" type="checkbox"/> External		
Responsible Manager (Printed/Signature)	Date		
<i>B.G. Erlandson</i>	<i>11/24/92</i>		
Date Cancelled		Date Disapproved	

Attachment
Ecology 101-T

1. Work Release Sheet 2W-92-01164-W
2. Craft/Resource Usage Log and Maintenance Record
3. Mid Interval Data Sheet.
4. Operating Specifications OSD-T-151-00030 REV/MOD A-1
5. Maintenance Engineering Services, Maintenance Procedure, Verification of FIC Reference Elevation. 6-TF-058

*** RECORD COPY ***

*** RECORD COPY ***

-----J-2 WORK REQUEST (W120)-----

Page: 1

13:55:48 13 NOV 1992

- 1. Document Number 2W-92-01164/W GENERIC WORK ITEM
- 2. Work Item Title 241-T REPAIR THE 101-T FIC

3. System 93F FIC UNIT

4. Components

Component Number	Name
N/A	

Temporary Number	Name
N/A	

5. Location

Facility 2W WEST TANK FARMS	
Bldg/Rm 241-T	Other 101-T

6. Associated Components

Component Number	Name
N/A	

7. Originator Name DEATON,DE	
Telephone No. 373-2920	SIN 55-04

Date 11/12, 1992

8. Charge Code

9. Work Item Description

THE 101-T LEVEL IS STARTING TO INCREASE. THE SLACK TAPE SWITCH WIRES ARE BROKEN AT THE AMPHENOL CONNECTOR. THE SLACK TAPE SWITCH REQUIRES REPAIR. TROUBLE SHOOT THE 101-T FIC. THIS WORK IS A HIGH PRIORITY DUE TO 101-T POTENTIAL LEAKER STATUS!!!! DEFICIENCY TAG HUNG

10. Operations Review

Signature	
X AHRENS, JL	

Date	
11/12/92	

11. Priority

2

12. Phase Designator

P4 FOURTH QUARTER(OCT 1 - DEC 31)

13. Correct Maint. Assessment

Y

14. Personnel Safety Related

N

15. Mode

A

16. Resolution/Retest

 ---NOTE--- THIS IS A FERROCYNIDE TANK. TAKE SPECIAL PRECAUTIONS WHEN PERFORMING TASK. REFER TO OSD-T-151-00030 PAGES 9-11. (THE SCOPE OF THIS PACKAGE DOES NOT FALL INTO THE HAZARD VARIABLES OR SPECIFICATIONS AT THIS TIME.)

-----J-2 WORK REQUEST (W120)-----

*** RECORD COPY ***

*** RECORD COPY ***

SERVICE REQUIRED

Date 11-12-92

Name J.L. Ahrens

Component ID 241-T-101-T

FIC

Info 2W-92-01164/W

Description of Problem Repair Slack Tape Switch

- 1. Document Number 2W-92-01164/W GENERIC WORK ITEM
- 2. Work Item Title 241-T REPAIR THE 101-T FIC

USE SPARK RESISTANT TOOLS.

WORK HAZARD IDENTIFICATION AND PRECAUTIONS

- 1. WORK WILL BE DONE ON 120 VOLT AC ENERGIZED CIRCUIT.
- 2. BE AWARE THAT ELECTRIC SHOCK HAZARD EXISTS.
- 3. BE AWARE THAT ELECTRIC ARC HAZARD EXISTS FROM SHORTING ENERGIZED WIRES TO GROUND.
- 4. USE GOOD ELECTRICAL WORK PRACTICES.
- 5. USE AC VOLTMETER/INDICATOR TO IDENTIFY ENERGIZED WIRES.
- 6. USE BUDDY SYSTEM.

%%%%%%%%NOTE%%%%%%%%NOTE%%%%%%%%NOTE%%%%%%%%NOTE%%%%%%%%
 THE NON-INTRINSIC SLACK TAPE SWITCHES WERE DISCONNECTED ON ALL
 WATCH TANK FIC'S SOME TIME BACK. (PER VD MAUPIN) THERE IS NO
 NEED TO REPAIR THE SLACK TAPE SWITCH SINCE IT IS NOT USED.
 %%%%%%%%%%

OBJECTIVE: CALIBRATE AND REPAIR 101-T AS NEEDED.

SCOPE: 1. TROUBLESHOOT, REPAIR AND CALIBRATE AS NEEDED PER 6-TF-058 AND 6-TF-035.

*****CAUTION*****
 HIGH RADIATION FIELD MAY BE PRESENT ANY TIME THE PLUMMET IS
 RAISED INTO THE SIGHT GLASS.

!!
 NOTE!!!! IF WORK REQUIRES RAISING THE PLUMMET INTO THE SIGHT
 GLASS, OR IF THE PLUMMET IS ALREADY IN THE SIGHT GLASS;
 AN HPT. MUST BE PRESENT TO DETERMINE DOSE RATES.
 !!!

- 2. AFTER REPAIR/CALIBRATION IS COMPLETE OBTAIN AN OPTION 30 FROM CASS. IF OPTION 30 IS CORRECT RECORD LIQUID LEVEL. (IF CALIBRATION WAS DONE, RECORD HERE AND ON PISCES JOB CARD)

*READS 43.8
 No CASS Reading
 FARM Not Reading
 To CASS Properly
 REPAIR 11/14/92*

SIGNATURE _____ LIQUID LEVEL _____ DATE _____

3. IF FURTHER REPAIR, PARTS NEEDED, OR IF CONTAINMENT IS TO BE BROKEN; RETURN THE PACKAGE TO PLANNING FOR A J-7 AND/OR A NEW RWP.

(SEE CRAFT usage Log included in pkg.)

- 1. Document Number 2W-92-01164/W GENERIC WORK ITEM
- 2. Work Item Title 241-T REPAIR THE 101-T FIC

4. DOCUMENT ALL WORK PERFORMED ON THE ENCLOSED CRAFT RESOURCE/USAGE LOG.

- 17. PIC LEGG, RL
- 18. PIC Org. 76312

- 19. Resolution By Signature X RULON, PL Date 11/13/92
- 20. Plant Forces Work Review Required N Number N/A

21. Resources Required

Res Code	Description	No.	Est Hrs	Act Hrs
18	Instrument Technician	1	8	8
04	Operations Personnel	1	8	8
54A	Radiation Protection Technicia	1	2	2
96	Respiratory Protection	1	8	8

- 22. Cognizant Engineer Signature N/A Date _____
- 23. Cognizant Manager Signature N/A Date _____

- 24. Reference Documents Type
- 6-TF-058 PMP
- 6-TF-035 PMP
- T0161-1 PJC
- TF-KEH-001 N/A

- 25. Field Work Complete Signature  Date 11-14-92

MES-010.005X
Craft INSTRUMENT TECH
Facility WEST TANK FARMS

Mid Interval Data Sheet
Funct Test

Data Sheet Sequence #: 2W*9211120044

Instr #: LIT 101 T Appl Code: Procss Cntl-3 Due: 06/28/92
Loop #: T0161 Bldg: 241T Maker: FOOD INSTRUMENT CORP Last Done:
Seq #: 1 Room: Model: X451 Proc#: N/A Iss.Date
Sys #: Locn: TK-101 Serial #: NON-INT SW/CAL Tol Hist:
Interval: 04M DS Key: PLO3 Lin Code: 01 Status: A
Function Desc: TANK 101-T LIQUID LEVEL SYSTEM OSD #:
Dwg/Sht/Coord/Rev#: / / /

<<<<<<<< Data Sheet >>>>>>>>
(Non Intrusion Mode)

- 7.3 Liquid Level reading as-found: 41.8
- 7.9 HOLD POINT. HPT signature: *[Signature]* ^{3m/hr at 1/2" and 1m/hr at 1ft} Date: 11-14-92
- 7.11 Reference elevation as-found: 485.14
- 7.16 Reference elevation as-left: 485.14
- 7.22 Liquid level reading as-left: 43.8

Please Circle: Accept or Reject

Remarks _____

Previous Remarks: LACK OF FUNDING. (ACTION: D. STENKAMP)

Instructions: REFERENCE ELEVATION = 485.14 IN

Revision Required (Y/N) Cal/Procedure _____ Data Sheet _____

Technician *R.E.D. McQuinn* 11/14/92 Hours 6. Manager *[Signature]* 11/14/92
Work Order # _____

30.2.A.4 In-tank Inspection

<u>Variable</u>	<u>Specification Limit</u>
In-tank Inspection	Equipment design must follow the safety related criteria outlined below for TV camera and light assemblies.
	<ul style="list-style-type: none"> • Lighting to be UL listed for use in Class 1, Division 1, Group B; a flammable hydrogen atmosphere. • All other electrical components located inside the tank that are not Class 1, Division 1, Group B will be purged and pressurized with instruments air or inert gas in accordance with the National Fire Protection Association, Inc. (NFPA), Article 496, Type X purging, to conform with the requirements of the National Electrical Code (NEC), Article 501 for use in the flammable hydrogen atmospheres. • Purge gas system to have dual safety instruments to alarm and automatically shut off electrical power to the electrical components served by the purge gas system due to loss of gas pressure. • In tank 101-SY radiation shielding of the replacement plug to be equal to original 42-in. shield plug. • In-Tank inspection using a still photo camera requires approval by TFO and Systems Engineering.

Technical Bases - Operation of video equipment will allow visual information of tank surface to be obtained and analyzed.

The installation, operation and removal of TV camera and lights or lights only assembly were reviewed to determine if a hydrogen explosion, crust reaction, or contamination spread could occur. It was concluded that the likelihood of any of these occurrences is small, with estimated ranges from 10^{-6} to less than 10^{-8} (WHC-SD-WM-SAD-005, page 1).

Detection/Control - The following control shall be in place prior to, and during, photography operations in the tank:

Tanks with active ventilation shall be operating during activity in tank (minimum flow rate of 400 cfm for 101-SY) (WHC-SD-WM-SAD-005, page 31).

Recovery Action - If criteria for camera and lights are not met or ventilation system fails, stop work on tank and stabilize the operation. Notify shift manager and Systems Engineering.

30.2.B FERROCYANIDE TANK

30.2.B.1 General

<u>Variable</u>	<u>Specification Limit</u>
A. Installation and removal of equipment.	Requires written approval from Waste Tank Safety Assurance, Tank Farm Operations, Systems Engineering.
B. Work in primary ventilation space (including dome space) or in associated exhaust ventilation system.*	Use spark resistant tools. Flammable gas concentrations < 20% LFL (lower flammability limit)
C. Planned drain-back into a Watch List Tank from transfer of waste.	Requires written approval from Secretary of Energy.

* Limit applies to work done inside air space of associated exhausters systems, not on outside work.

Technical Bases - For a significant release of radioactivity to occur, there must be combustion and/or an explosion in the tank and loss of confinement. Potential combustion and/or explosion sources in the tanks are flammable gases, salt cake containing organic and sludge containing ferrocyanide-nitrate mixtures. Work around or in the tank could cause sparks or heat generation sufficient to ignite the tanks. Public Law 101-510, Section 3137, Subsection (c) prohibits additions of high level waste to a Watch List Tank. Drain backs must be approved by the Secretary of Energy to insure compliance with this law.

Detection/Control - The following controls shall be in place prior to, and during, work around or in tank:

The riser or pit vapor space shall be sampled to verify it is below limits for flammable gases. Use of a portable combustible gas meter with an extension is acceptable.

If the flammable gas concentration is > 10% of the LFL, but < 20% of the LFL, a sample will be taken to the lab to determine the type of flammable gases present. The gas sampling shall include: Hydrogen, Nitrogen dioxide, Hydrogen cyanide, Hydrazine, Ammonia and Organics.

All tanks with active ventilation shall have the ventilation systems operational during activities in or on the tank.

Physical restraints shall be in place to prevent dropping objects into the tank.

Hazardous Work Permit or a Job Safety Analysis shall be completed prior to work in the primary tank vapor space.

Recovery Action - If flammability reading is $\geq 20\%$ of the LFL or a tool causes a spark, stop all work to the tank and place tank in safe configuration. Immediately notify TFO and System Engineering.

30.2.B.2 Sampling

Variable

Specification Limit

Core or Solid Sampling

Written approval by Tank Waste Remediation Systems Division and Waste Tanks Safety Assurance.

Technical Bases - Samples are used to acquire data that will be used in future safety and risk assessments. The data will also be used to determine recovery and stabilization plans for the tank.

Sampling operations have been reviewed to determine if a spark or static buildup could lead to a contamination spread. It was concluded that the likelihood of an occurrence was $\leq 10^{-4}$ (WHC-SD-WM-SAD-011, page 1).

Sampling of the liquid in the tank must be done using the approved Plant Operating Procedure (POP) for sampling non-aging waste tanks.

Detection/Control - The following controls shall be in place prior to, and during sampling:

The vapor space shall be sampled to verify it is below 20% of the Lower Flammability Limit (LFL). Use of a portable combustible gas meter with an extension is acceptable.

If the flammable gas concentration is $> 10\%$ of the LFL, but $< 20\%$ of the LFL, a sample will be taken to the lab to determine the type of flammable gases present. The gas sampling shall include the toxic gases Hydrogen, Nitrogen dioxide, Hydrogen cyanide, Ammonia and Organics.

Use only spark resistant tools unless specified by TFO and Waste Tanks Safety Assurance when working in tank air space.

Recovery Action - If approval is not received or revoked, stop all work and close the tank back up. Notify TFO and System Engineering.

30.2.B.3 Transfer of WasteVariableSpecification Limit

Transfer waste out of a double-shell tank or a single-shell tank

Written approval by Tank Waste Remediation Systems Divisions, Waste Tanks Safety Assurance and by DOE.

Sample analysis from both receiving and sending tanks.

Transfer waste into tank

Written approval by Secretary of Energy.

Technical Bases - The sample results, from both the receiving and the sending tank, after comparison to the Tank Farm Waste Compatibility Program, WHC-SD-WM-OCD-015, indicate that there will not be a compatibility problem.

High-level waste shall not be transferred into a single-shell tank per SD-WM-SAR-006. Any addition of liquid to a single-shell tank could aggravate a potential release of radionuclides in the event of a tank leak (OSR 11.4.2.2). No High-level waste shall be added to a Watch List Tank without the approval of the Secretary of Energy (Public Law 101-510, Section 3137 (c)).

Detection/Control - All administrative and physical controls established in Plant Operating Procedure T0-025-001, Perform Tank Farm Transfer-General, shall be in place.

Operating Specification 13.2.3.A Process Transfers in OSD-T-151-00013 and a transfer specific operating procedure, apply to the single-shell Watch List Tanks.

The vapor space shall be sampled to verify it is below 20% of the Lower Flammable Limit (LFL). Use of a portable combustible gas meter with an extension is acceptable.

Recovery Action - If a compatibility question arises from the sample analysis, do not transfer waste or stop all transfers of waste to the tank. Notify TFO and Systems Engineering.

DATE

<u>Author:</u>	T. M. Horner, Engineer Waste Tank Maintenance Engineering, I/C	
<u>Cognizant Engineer Approval:</u>	V. D. Maupin, Engineer Surveillance & Data Acquisition	10/22/92
<u>Cognizant Engineer Manager Approval:</u>	G. T. Frater, Manager Surveillance & Data Acquisition	10/21/92
<u>Quality Assurance:</u>	J. J. Verderber Waste Tank Quality Engineering	10/22/92
<u>Safety:</u>	D. L. Kelly Waste Tank Health Physics	10/21/92
<u>Validation Performed by:</u>	F. P. Franklin Waste Tank Craft Maintenance	10/20/92
<u>Released By Procedure Coordination:</u>	G. A. Buel PDCME	10/29/92
<u>Other:</u>	E. F. Gray, Manager Manager, Waste Tank Maintenance & Production Management	10/29/92

Signatures for approval and validation as listed above are recorded in this procedure's record file.

Concurrence and approval to make other than minor changes to this procedure must be obtained from the original reviewers and approval authority (organizations) listed above.

Revision Bars found in this procedure (when applicable) indicate field changes and will be incorporated into the next revision.

This procedure is due for periodic review 5 years from release date of last revision or prior to use.

Revision Status

<u>Change Level</u>	<u>Date</u>	<u>Change Document</u>	<u>Page(s)</u>	<u>Description</u>
Rev. 0	10/29/92	N/A	A11	Original Issue

1.0 PURPOSE AND SCOPE

This procedure provides a safe, uniform method to perform preventive maintenance and verify the existing reference elevation value of an FIC liquid level gauge and to reset the elevation if it differs from the established level.

2.0 REFERENCES

- 2.1 WHC-CM-4-3, Industrial Safety Manual, Section TE, "Tools and Equipment", Standard No. PP-7, "Personal Protective Equipment".
- 2.2 WHC-CM-4-10, Radiation Protection, Section 8.0, "Radiation Work Permits".
- 2.3 Tank Farm Plant Operating Procedures T0-040-180, "Operate FIC's at East/West Tank Farms" and T0-020-420, "Replacement and/or Repair of FIC Tapes and Plummets".

3.0 PERSONNEL REQUIREMENTS

- 3.1 Instrument Technician.
- 3.2 Health Physics Technician (HPT).

4.0 PRECAUTIONS AND LIMITATIONS

- 4.1 If during the performance of this procedure, any of the following conditions are found, immediately stop work, place equipment in a safe condition, and notify Supervision:
- Any equipment malfunction which could prevent the fulfillment of its functional requirements.
 - Personnel error or procedural inadequacy which could prevent the fulfillment of procedural requirements.
 - Plummets exposures exceed RWP Whole-Body Exposure Limits.

5.0 SPECIAL TOOLS, EQUIPMENT AND MATERIALS

5.1 Clean cloth or soft eraser.

6.0 PREREQUISITES

6.1 Obtain release from Operations management prior to beginning performance of this procedure.

6.2 Notify CASS Operator by phone (3-2618) of intent to perform this procedure.

7.0 INSTRUCTIONS

7.1 Verify that reference elevation and intrusion baseline (if applicable) specified on the Component Based Recall System (CBRS) Data Sheet match the values found in the attached table. Consult Maintenance Supervisor/PIC if a discrepancy exists.

7.2 IF power is off, APPLY power to FIC AND allow it to stabilize.

7.3 Record counter reading on the CBRS Data Sheet as the as-found liquid level reading for non-intrusion type FIC's as-found intrusion baseline for intrusion type FIC's.

7.4 Turn Manual/Comp switch to Manual.

7.5 For Intrusion type FIC's, turn Intrusion/Liquid-Level switch to Liquid Level.

7.6 Turn Off/Man-Rise switch to Man-Rise.

7.7 Press Bob button. Plummet should rise at 5 to 10 inches per minute.

7.8 As plummet rises, OBSERVE for proper operation of mechanical linkage.

CAUTION

Plummet is potentially contaminated.

- HP
- 7.9 When plummet rises to within approximately 50 to 75 inches of expected reference elevation, request HPT to verify whole-body exposure as the plummet rises the final distance. Using the radiation limits established in the RWP, HPT will determine whether procedure can be completed immediately or actions must first be taken to flush plummet and tape. If necessary, Operations will perform flush using procedure TO-020-420.
- 7.10 When plummet bottom reaches the reference elevation mark on the siteglass, turn Off the FIC using the Off/On switch.
- 7.11 Record counter reading on the CBRS Data Sheet as the as-found reference elevation.

CAUTION

110 V is present on the terminal strip at the bottom of the cabinet, even when power switch is off. Lock and Tag is not required, as instrument technician completely controls FIC power at the instrument. Exercise caution when adjusting counter and cleaning components.

- 7.12 IF as-found reference elevation matches the reference elevation, no adjustment is necessary. Proceed with Step 7.13 (skip Steps 7.12.1 through 7.12.5).
- 7.12.1 Loosen the sprocket gear set screw.
- 7.12.2 Remove the chain from the counter shaft.

- 7.12.3 Turn counter shaft to reset counter to match the reference elevation value.
- 7.12.4 Reinstall chain.
- 7.12.5 Tighten sprocket gear set screw. **DO NOT** over-tighten.
- 7.13 Tighten any loose set screws. **DO NOT** over-tighten.
- 7.14 Clean contacts and reel with emery cloth.
- 7.15 Clean connectors with clean cloth or soft eraser.
- 7.16 Record counter reading on the CBRS Data Sheet as the as-left reference elevation value.
- 7.17 Turn Off/Man-Rise switch to Off.
- 7.18 Turn Manual/Comp switch to Comp.
- 7.19 Turn FIC power On using the Off/On switch.
- 7.20 Verify plummet descends.

NOTE

Plummet should stabilize automatically for non-intrusion type FIC's.

- 7.21 Stop plummet descent for intrusion type FIC's by switching Intrusion/Liquid-Level switch to Intrusion when counter reaches the target intrusion baseline.

7.22 Record counter reading on the CBRS Data Sheet as the as-left liquid level reading for non-intrusion type FIC's as-left intrusion baseline for intrusion type FIC's.

8.0 RESTORATION

8.1 Return all switches to their pre-work positions.

9.0 TESTING AND ACCEPTANCE

None.

10.0 DISPOSITION

10.1 Report any discrepancy between as-found and as-left readings to Supervision and Shift Manager (East 3-2689, West 3-2920.)

10.2 Record any deficiencies on the CBRS Data Sheet AND assist Maintenance Supervisor/PIC in preparing J-series work requests to correct them.

10.3 Return Data Sheet(s) to Supervision and inform Supervision maintenance is complete.

Tank #	FIC IEFD #	CBRS #	Intrusion Baseline	Reference Elevation
102-A	LIT-102-A	A0041 1	16.5	681.3
103-A	LIT-103-A	A0018 1	137.4	680.1
106-A	LIT-106-A	A0042 1	46.5	678.1
101-AN	LIT-101-AN	AN011 2	N/A ¹	700.7
102-AN	LIT-102-AN	AN143 2	N/A	700.8
103-AN	LIT-103-AN	AN165 2	N/A	700.8
104-AN	LIT-104-AN	AN065 2	N/A	700.4
105-AN	LIT-105-AN	AN179 2	N/A	700.8
106-AN	LIT-106-AN	AN200 2	N/A	701.1
107-AN	LIT-107-AN	AN219 2	N/A	704.8
101-AP	LIT-101-1	AP102 2	N/A	702.1
102-AP	LIT-102-1	AP103 2	N/A	701.3
103-AP	LIT-103-1	AP104 2	N/A	701.9
104-AP	LIT-104-1	AP105 2	N/A	701.8
105-AP	LIT-105-1	AP106 2	N/A	701.6
106-AP	LIT-106-1	AP107 2	N/A	701.8
107-AP	LIT-107-1	AP108 2	N/A	701.8
108-AP	LIT-108-1	AP109 2	N/A	701.9
101-AW	LIT-101-1	AW062 2	N/A	699.5
102-AW	LIT-102-1	AW088 2	N/A	699.8
103-AW	LIT-103-1	AW094 2	N/A	700.2
104-AW	LIT-104-1	AW095 2	N/A	700.0
105-AW	LIT-105-1	AW117 2	N/A	699.3
106-AW	LIT-106-1	AW118 2	N/A	699.1

¹ Intrusion Baseline is specified as "N/A" for those tanks in the non-intrusion mode.

TABLE 1. TANK INTRUSION BASELINE AND REFERENCE ELEVATION VALUES

Tank #	FIC IEFD #	CBRS #	Intrusion Baseline	Reference Elevation
101-AX	LIT-101-AX	AX179 1	278.2	676.3
103-AX	LIT-103-AX	AX180 1	41.5	676.7
101-AY	LIT-101-AY	AY085 1	N/A	720.1
102-AY	LIT-102-AY	AY040 1	N/A	720.1
101-AZ	LIT-101-AZ	AZ096 2	N/A	710.9
102-AZ	LIT-102-AZ	AZ085 2	N/A	713.0
101-B	LIT-101-B	B0169 1	36.7	492.0
102-B	LIT-102-B	B0163 1	N/A	498.1
103-B	LIT-103-B	B0164 1	17.4	497.1
106-B	LIT-106-B	B0165 1	N/A	497.7
108-B	LIT-108-B	B0166 1	30.3	491.6
111-B	LIT-111-B	B0167 1	84.4	498.2
112-B	LIT-112-B	B0168 1	N/A	497.1
103-BX	LIT-103-BX	BX121 1	N/A	514.2
104-BX	LIT-104-BX	BX122 1	N/A	515.1
105-BX	LIT-105-BX	BX123 1	25.8	518.9
106-BX	LIT-106-BX	BX124 1	N/A	513.2
107-BX	LIT-107-BX	BX125 1	N/A	514.9
108-BX	LIT-108-BX	BX126 1	N/A	515.0
109-BX	LIT-109-BX	BX127 1	68.8	514.5
112-BX	LIT-112-BX	BX128 1	N/A	514.9
109-BY	LIT-109-BY	BY022 1	N/A	600.0
102-C	LIT-102-C	C0012 1	152.0	492.3
103-C	LIT-103-C	C0013 1	N/A	486.1
104-C	LIT-104-C	C0014 1	N/A	485.8
105-C	LIT-105-C	C0015 1	N/A	486.7
106-C	LIT-106-C	C0016 1	N/A	491.7

TABLE 1. TANK INTRUSION BASELINE AND REFERENCE ELEVATION VALUES



Tank #	FIC IEFD #	CBRS #	Intrusion Baseline	Reference Elevation
107-C	LIT-107-C	C0017 1	N/A	479.8
101-S	LIT-101-S	S0101 1	162.3	580.0
102-S	LIT-102-S	S0102 1	N/A	581.3
103-S	LIT-103-S	S0103 1	103.2	581.4
105-S	LIT-105-S	S0105 1	158.0	582.2
106-S	LIT-106-S	S0106 1	N/A	581.3
107-S	LIT-107-S	S0107 1	N/A	581.6
108-S	LIT-108-S	S0108 1	172.8	581.4
109-S	LIT-109-S	S0109 1	173.8	581.5
110-S	LIT-110-S	S0110 1	149.3	584.8
111-S	LIT-111-S	S0111 1	N/A	582.5
112-S	LIT-112-S	S0112 1	196.4	580.8
101-SX	LIT-101-SX	SX101 1	172.0	663.6
102-SX	LIT-102-SX	SX102 1	205.0	663.4
103-SX	LIT-103-SX	SX103 1	N/A	663.6
104-SX	LIT-104-SX	SX104 1	237.0	663.9
105-SX	LIT-105-SX	SX105 1	257.0	663.5
106-SX	LIT-106-SX	SX106 1	N/A	663.2
101-SY	LIT-101-1	SY042 2	N/A	695.7
102-SY	LIT-102-1	SY089 2	N/A	696.2
103-SY	LIT-103-1	SY122 2	N/A	696.5
101-T	LIT-101-T	T0161 1	N/A	485.1
102-T	LIT-102-T	T0162 1	N/A	486.3
103-T	LIT-103-T	T0163 1	N/A	487.7
105-T	LIT-105-T	T0165 1	30.1	487.3
106-T	LIT-106-T	T0166 1	4.2	486.1
107-T	LIT-107-T	T0167 1	N/A	487.5

TABLE 1. TANK INTRUSION BASELINE AND REFERENCE ELEVATION VALUES



Tank #	FIC IEFD #	CBRS #	Intrusion Baseline	Reference Elevation
108-T	LIT-108-T	T0168 1	N/A	487.3
109-T	LIT-109-T	T0169 1	16.7	487.2
110-T	LIT-110-T	T0170 1	147.7	487.2
111-T	LIT-111-T	T0171 1	N/A	487.2
112-T	LIT-112-T	T0172 1	N/A	487.2
101-TX	LIT-101-TX	TX101 1	N/A	602.4
103-TX	LIT-103-TX	TX103 1	58.6	613.3
104-TX	LIT-104-TX	TX104 1	N/A	612.5
107-TX	LIT-107-TX	TX107 1	N/A	612.2
108-TX	LIT-108-TX	TX108 1	57.1	612.6
109-TX	LIT-109-TX	TX109 1	148.6	602.4
118-TX	LIT-118-TX	TX118 1	117.7	603.4
101-TY	LIT-101-TY	TY101 1	51.4	581.3
102-TY	LIT-102-TY	TY102 1	N/A	581.2
103-TY	LIT-103-TY	TY103 1	67.5	580.8
104-TY	LIT-104-TY	TY104 1	N/A	581.6
102-U	LIT-102-U	U0232 1	131.6	488.0
103-U	LIT-103-U	U0233 1	N/A	488.6
105-U	LIT-105-U	U0235 1	N/A	489.1
106-U	LIT-106-U	U0236 1	N/A	488.9
107-U	LIT-107-U	U0237 1	N/A	489.0
108-U	LIT-108-U	U0238 1	166.8	489.2
109-U	LIT-109-U	U0239 1	N/A	489.3
110-U	LIT-110-U	U0240 1	61.8	489.1
111-U	LIT-111-U	U0241 1	118.0	489.6

TABLE 1. TANK INTRUSION BASELINE AND REFERENCE ELEVATION VALUES

Tank #	FIC IEFD #	CBRS #	Intrusion Baseline	Reference Elevation
151 CATCH	LIT-151-AZ	AZ187 2	N/A	383.4
ER-311	LIT-ER-311	ER301 1	N/A	TBD
S-302A	LIT-S-302A	S3001 1	N/A	420.0
S-302	LIT-S-302	S3003 1	N/A	421.3
U-301B	LIT-U-301B	U3001 1	N/A	402.8
UX-302A	LIT-UX-302A	UX301 1	N/A	387.0
TX-302C	LIT-TX-302C	TX401 1	N/A	466.6

TABLE 1. TANK INTRUSION BASELINE AND REFERENCE ELEVATION VALUES



		<u>DATE</u>
<u>Author:</u>	T. M. Horner, Engineer Waste Tank Maintenance Engineering, I/C	
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<u>Released By Procedure Coordination:</u>	G. A. Buel, Manager PDCME	10/1/92
<u>Other:</u>	E. F. Gray, Manager Waste Tank Maintenance & Production Management	9/23/92

Signatures for approval and validation as listed above are recorded in this procedure's record file.

Concurrence and approval to make other than minor changes to this procedure must be obtained from the original reviewers and approval authority (organizations) listed above.

! Revision Bars found in this procedure (when applicable) indicate field changes and will be incorporated into the next revision.

This procedure is due for periodic review 5 years from release date of last revision or prior to use.

MAINTENANCE ENGINEERING SERVICES IMPACT LEVEL 3Q
MAINTENANCE PROCEDURE
TROUBLESHOOTING AND REPAIR OF LIQUID LEVEL GAUGES
(FIC'S) IN 200 EAST AND 200 WEST AREAS

PROC. NO. 6-TF-035
REV. 2, CHG. 0
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Revision Status

<u>Change Level</u>	<u>Date</u>	<u>Change Document</u>	<u>Page(s)</u>	<u>Description</u>
Rev. 2	10/1/92	N/A	ALL	This is a complete rewrite.

1.0 PURPOSE AND SCOPE

- 1.1 This procedure provides a safe and uniform method for troubleshooting and repair for the majority of the problems encountered in the Liquid Level Gauges in the 200 East and West Areas.
- 1.2 This procedure allows for the following types of repairs to be made:
1. Replacement of the following boards:
 - Gauge Interface Board,
 - Level Transmitter Board,
 - Intrusion Motor Board,
 - Liquid Level Board,
 - Counter.
 2. Replacement of inter-connecting wires (when wire pulls are not required).
 3. Replacing broken or damaged lugs.
 4. Cleaning of connectors/terminals.
 5. General minor mechanical adjustments, which will not effect the calibrations of the gauge.
 6. Motor replacement.

2.0 REFERENCES

- 2.1 Drawings H-2-71800, 71801, 71802, and 71803.
- 2.2 VI-12120, Vendor Information, "FIC Industries INC. Instruction Manual."
- 2.3 WHC-CM-4-3, Industrial Safety Manual, Section TE, "Tools and Equipment", Standard No. PP-7, "Personal Protective Equipment".
- 2.4 WHC-CM-4-10, Radiation Protection, Section 8.0, "Radiation Work Permits".
- 2.5 Maintenance Procedure, 6-TF-27, "Automatic Liquid Level Gauge Functional Test".
- 2.6 WHC-CM-8-9, Workmanship Standards, Section 200.

3.0 PERSONNEL REQUIREMENTS

- 3.1 Instrument Craft (IC).
- 3.2 Health Physics Technician (HPT), as required.
- 3.3 Operations Personnel (OP), as required.

4.0 PRECAUTIONS AND LIMITATIONS

- 4.1 If procedure cannot be performed as written, stop work. Return equipment to safe configuration and inform Maintenance Supervisor that procedure cannot be performed as written. Initiate a change as required.
- 4.2 Use power switch to cut power to the FIC during circuit board and motor replacement.

CAUTION

110 V is present on the terminal strip, even when power switch is off. Exercise caution when replacing circuit boards or motor.

5.0 SPECIAL TOOLS, EQUIPMENT AND MATERIALS

NOTE

All Measuring and Test Equipment (M&TE) used to collect qualitative data during performance of this procedure shall meet the following requirements:

- Be within its current calibration cycle as evidenced by an affixed calibration label.
- Be capable of desired range.
- Have an accuracy consistent with state-of-the-art limitations:
 - equal to or greater than the input tolerance specified on the PISCES Data Sheet,

OR, if device being calibrated is not PISCES associated,

 - at least four times greater than the specified device tolerance.

- 5.1 Digital Multimeter.
- 5.2 Test Transmitter (located in 272-AW and 272-WA Instrument Shops).
- 5.3 CASS Troubleshooting Box (located in 272-AW and 272-WA Instrument Shops).
- 5.4 Replacement board, if required.
- 5.5 Replacement motor, if required.
- 5.6 PISCES Mid-Interval Data Sheet for the FIC being serviced.
- 5.7 Maintenance Procedure 6-TF-027, "Automatic Liquid Level Gauge Function Test."

6.0 PREREQUISITES

- 6.1 Obtain written release from Operations management prior to beginning performance of this procedure.
- 6.2 If potential for radiological contamination exists, then request HPT to perform survey prior to beginning maintenance, or prior to removal of equipment or component from installed location.
- 6.3 Record M&TE name, equipment number, and calibration due date on CRAFT/RESOURCE USAGE LOG.
- 6.4 Prior to working on the Liquid Level Gauge listed on the work authorization, obtain a CASS readout from operations to verify EXACTLY what is the malfunction, and perform that portion of this procedure that pertains to that particular problem.
- 6.5 If motor replacement is anticipated, obtain QC verification of the replacement motor and removal of its Acceptance Tag (Green Tag) prior to installation.
- 6.6 Notify CASS Operator by phone (3-2618) of intent to troubleshoot the system.

7.0 INSTRUCTIONS

NOTES

- a. CASS error messages are listed below. The numbers listed are for identification within this troubleshooting procedure **ONLY** and do not appear on the CASS report.
 1. TRANS ERROR ON FIC READ
 2. MOTOR SENSE CIRCUIT FAILURE
 3. FIC MOVING WHEN READ
 4. READING OUTSIDE LIMITS
 5. FIC FAILED TO LOWER
 6. FIC FAILED TO RAISE
 7. FIC SWITCH IS IN MANUAL
- b. In addition to the above alarm messages, the message "NO FIC TAPE TENSION" will also be reported when appropriate. Lack of tape tension is not normally considered an alarm. Alarms 1-6 cause the data to be zeroed on all liquid level reports, except the Current Status Individual Tank Report.
- c. Most FIC equipment problems will generate one or more of the above alarm messages. The troubleshooting guide is divided into isolated and common gauge problems. Isolated problems are then categorized as either a gauge interface (CASS) failure or a gauge failure. Common problems are CASS related and are categorized as gauge interface or computer interface failures.
- d. Alarm messages which are common to all, or the majority of gauges connected to a Farm Interface are generally caused by a CASS interface problem. It is necessary to first determine whether the problem is in one or more gauges, the Farm Interface, or the Microcomputer. Since the liquid level interface is a bussed system, a single gauge problem can effect many or all of the gauges on the buss. Isolation of the problem is therefore much more difficult.
- e. Most common problems will be caused by a failure in the farm, and is therefore important to first determine if this is the case.

7.1 ISOLATED NON-INTRUSION FIC REPAIR

NOTE

Refer to drawing H-2-71803 when troubleshooting Isolated Gauge problems.

CAUTION

When removing a gauge interface board or a level transmitter board, the +12 V wire pair should be removed FIRST. Likewise, when installing these boards, the +12 V wire pair should be connected LAST. IF the +12 V power supply is OFF, the order of connection is unimportant.

7.1.1 Motor Locked (Gauge will not raise or lower)

NOTE

IF alarm messages 5 and 6 occur only, it is probably an FIC gauge failure or a CASS interface problem.

- a. REMOVE the green and orange wires for TB-2-13, and 14. IF the gauge will then raise and lower, REPLACE the Gauge Interface board. IF NOT, RECONNECT the orange and green wire and continue troubleshooting the gauge.

7.1.2 Gauge Lowers Constantly (Alarm message 3 will probably be reported).

- a. REMOVE the red wire from the tape reel slip ring.
- b. REMOVE the yellow wire (#18) from TB-1-2 AND CONNECT to the slip ring.
- c. IF gauge operates properly, REPLACE the Gauge Interface board, IF NOT, RECONNECT wires and continue troubleshooting gauge.

7.1.3 Gauge Raises Constantly (Alarm message 3 will probably be reported)

- a. REMOVE the red wire from TB-2-9.
- b. REMOVE the orange/white wire from TB-1-1 AND CONNECT to TB-2-10.
- c. IF gauge operates properly, REPLACE the Gauge Interface board, IF NOT, RECONNECT the wires AND CONTINUE troubleshooting the gauge.

7.1.4 Gauge "BOBS" Constantly (Alarm message 3 will probably be reported).

- a. TEST for -15 to -18 V DC from TB-1-1 to ground AND VERIFY that the orange/white wire to the same terminal is secure. IF the voltage is present, CONTINUE troubleshooting the gauge.
- b. IF -15 to -18 V DC is NOT present at TB-1-1, TEST for the same voltage at TB-2-10 AND VERIFY the white wire and wire 10A are secure.
- c. IF the voltage IS present at TB-2-10 and not at TB-1-1, REPLACE the Gauge Interface board.
- d. IF voltage is NOT present at TB-2-10, CONTINUE troubleshooting the gauge.

7.1.5 Gauge Reads ZERO (Alarm message 1 and possibly 4 will be reported).

- a. CHECK for +12 V DC and common on Gauge Interface board and Terminals 1 and 2 on the Level Transmitter board, if present CONTINUE to next step.
- b. REPLACE the Level Transmitter board.
- c. IF still reading ZERO, REPLACE the Gauge Interface board.
- d. IF still reading ZERO, TROUBLESHOOT Farm Interface board.

7.1.6 FIC Switch in Manual (Alarm message 7 will be reported).

- a. VERIFY the operation of the COMP/MAN switch (S3). IF the status does not change, REPLACE the Gauge Interface board.

7.1.7 Gauge Reading, but Dropping Digits or Erroneous (May not receive any message).

- a. REPLACE Level Transmitter board.

7.1.8 Gauge Failed to Raise, but Reading Date (Alarm message 6 will be reported).

- a. VERIFY that the gauge will raise under MANUAL control, IF NOT, CONTINUE troubleshooting.
- b. IF it does operate under MANUAL control, REPLACE the Gauge Interface board.

7.1.9 Gauge Failed to Lower, but Reading Data (Alarm message 5 will be reported).

- a. VERIFY that resistor R-19 (Drawing H-2-71802) has been clipped open or replaced with a 820K ohm resistor (as per FCN 51438), IF NOT, CLIP one end to create an open circuit.
- b. RETEST the LOWER command at the Farm Interface board.
- c. IF R-19 has been clipped or replaced, REMOVE the red wire from the tape spool slip ring.
- d. REMOVE the yellow wire (#13) from TB-1-2 and connect to the slip ring.
- e. VERIFY that the gauge will lower under MANUAL control.
- f. IF NOT, RECONNECT the wires and continue troubleshooting.
- g. IF it does operate under MANUAL control, REPLACE the Gauge Interface board.

7.1.10 FIC Moving When Read (Alarm message 3 will be reported)

- a. VERIFY that the gauge is actually moving by using the Farm Interface.
- b. IF gauge is not moving, PERFORM a Current Status request and see if message 3 is still reported.
- c. IF yes, REPLACE the Gauge Interface board.
- d. IF the gauge is actually moving, TROUBLESHOOT the CASS Interface, or gauge according to the appropriate problem - Gauge Lowers Constantly, Gauge Raises Constantly, or Gauge "BOBS" Constantly.

7.1.11 Motor Sense Circuit Failure (Alarm message 2 will be reported).

- a. VERIFY that -5 to -10 V DC is present at TB-2-14 (reference to AC ground) when the gauge is raising and at TB-2-13 when the gauge is lowering.
- b. IF NOT, CHECK the wiring to TB-2-13 and 14.
- c. IF voltage is present for both UP and DOWN, REPLACE Gauge Interface board.

7.1.12 No FIC Tape Tension This is NOT an alarm message, but is reported on the Alarm Report separately from alarm messages. It is also reported on the Current Status Report. This would only be considered a problem when the tank in question is known to have a liquid with no potential for Salt Cake near the surface.

- a. REMOVE the tape slack switch wire from TB-1-2 AND verify that there is an open circuit (through the switch to ground. IF there is a short, CHECK the slack switch AND ADJUST if necessary.
- b. IF there is an open circuit, the switch is indicating a non-slack condition.
- c. With the wire disconnected from TB-1-2, PERFORM a Current Status on the gauge. IF NO FIC tape tension is still reported, RECONNECT the wires AND REPLACE the Gauge Interface board.

- 7.1.13 Failed to Raise and No FIC Tape Tension (Alarm message 6 will be reported).
- CHECK for AC power failure at the gauge.
 - IF** power is present, CONTINUE troubleshooting with the "Failed to Raise" section.

7.1.14 Motor Does Not Function

- HOOK sprocket to prevent plummet from going to the tank bottom.
- REPLACE motor.
- VERIFY motor gear and sprocket are engaged but not tight. The gear teeth tips should not touch the valleys of the other gear.

7.2 Common Non-Intrusion FIC Repair

7.2.1 No Data Received or Attempt Failed

NOTE

On B and T Substations the connectors are: 9, 10, 12, and 13.

- VERIFY the blue connectors at Substation are properly seated in Slots 7, 8, 9, 10, 12, and 13.
- VERIFY power is ON at the Farm Interfaces.

NOTE

This can also cause the problem of data reading ZERO. (See the appropriate steps below.)

7.2.2 Data ZERO with Transmission Error (Alarm messages 1 and 4 are reported on all or several gauges connected to the same Farm Interface).

NOTE

Probable cause is failure or loading of RESET, CLOCK, or ADDRESS lines.

- a. CONTINUE troubleshooting with the section for Computer Interface/Gauge Interface isolation.

7.2.3 Gauge in Manual with Transmission Error (Alarm messages 1 and 7 received on all or several gauges).

NOTE

IF data is being returned, this is a failure or loading to the F LINE.

- a. CONTINUE troubleshooting with the section for Computer Interface/Gauge Interface Isolation.

7.2.4 FIC Moving and No Tape Tension (Alarm message 3 and "No FIC Tape Tension" reported on all or several gauges).

NOTE

The X line has failed in the logic ZERO or low voltage state.

- a. CONTINUE troubleshooting with the section for Computer Interface/Gauge Interface isolation.

7.2.5 Gauge in Manual and No Transmission Error (Alarm message 7 received on all or several gauges).

NOTE

The X line has failed in the logic ONE or high voltage (10 to 12 V DC) state.

- a. CONTINUE troubleshooting with the section for Computer Interface/Gauge Interface isolation.

7.2.6 Data ZERO and No Transmission Error ("No Data Received", "Attempt Failed", or alarm messages 4, 5, and 6 are reported on all or several gauges).

NOTE

The DATA line has failed in the logic ONE or high voltage (10 to 12 V DC) state. The Farm Interface liquid level display would be BLANK in this case. The computer DATA (if received) would be *1666 on the terminal.

- a. CONTINUE troubleshooting with the section for Computer Interface/Gauge Interface isolation.

7.2.7 Computer Interface/Gauge Interface Isolation

- a. TURN OFF power (red switch) on the Farm Interface board.
- b. REMOVE all wires from the farm bus TB-2 (see drawing H-2-71801).
- c. CONNECT the Test Transmitter to the farm bus, **AND** SET the address switches for a legal address for the Farm Interface in question.
- d. TURN the power back ON, read the transmitter **AND** VERIFY the comp/MAN switch.
- e. **IF** the data reads: 432.1 and the comp/MAN verifies, CONTINUE troubleshooting with the section on Gauge Interface problems. **IF NOT**, CONTINUE troubleshooting with the section on Computer Interface problems.

7.2.8 Gauge Interface Problems

- a. With the Test Transmitter connected as above and the power OFF, CONNECT the +12 V DC and common pair from the farm gauges to the farm bus, TB-2.
- b. TURN the power ON, AND VERIFY that the Test Transmitter operates.
- c. IF NOT, the +12 V DC is being loaded down by something in the farm.
- d. TOUCH each of the signal lines (F, R, C, A, X, and D) one at a time to the appropriate bus terminal and verify operation of the Test Transmitter each time.

NOTES

- a. The common wire of the pair need not be connected for this test.
- b. IF none of the lines causes the transmitter to fail, it is possible that a transmitter in the field is responding to all addresses. This can be verified by connecting all lines to the farm except the A line. IF the Test Transmitter fails, this is probably the case.
- c. After isolating the signal line which causes failure, the particular gauge loading the line must be isolated.
- d. The line in question must be removed from each Gauge Interface board until the system operates. (This requires two people with radios and is quite time consuming).
- e. Once the failed gauge has been isolated, the Gauge Interface board, the Level Transmitter board, or both must be replaced.
- f. IF the problem is associated with the X or D line, replace the Level Transmitter board first, for any other line, replace the Gauge Interface board first.

7.2.9 Computer Interface Problems

- a. RECONNECT the wires from the farm to the farm bus TB-2 AND RESTORE the power to the Farm Interface.
- b. TURN OFF the computer AC power AND REPLACE the PM5001 card in Slot 7, 9, or 12 AND RETEST.
- c. IF NOT successful, TURN OFF the power AND REPLACE the XMTR/RECVR card in Slot 8, 10, or 13.
- d. IF NOT successful, REPAIR OR REPLACE the Farm Interface board.

7.3 Intrusion Mode FIC'S

- 7.3.1 ADJUST FIC to baseline elevation AND VERIFY switches are set for normal Intrusion Mode:

<u>SWITCH</u>	<u>POSITION</u>
POWER	ON
OFF-MAN-RISE	OFF
INTRUSION-LIQ LEVEL	INTRUSION
COMP-MANUAL	MANUAL

NOTE

Normal response: IN. LIQUID LEVEL FOR TANK (ID) IS XXX.XX INCHES (DATE) (TIME).

Error Messages:

1. (LIQUID-LEVEL) "POTENTIAL INTRUSION"
2. (LIQUID-LEVEL) "LEVEL DIFFERS FROM BASELINE"
3. "LEVEL DIFFERS FROM BASELINE" (Gauge reads ZERO).

7.3.2 Potential Intrusion: (Alarm message 1 will be reported).

- a. VERIFY that OFF/MAN-RISE switch is in OFF position.
- b. VERIFY plummet is not contacting liquid.
- c. VERIFY the plummet circuit is not grounded. Resistance reading from plummet circuit to ground should be infinity.

- d. IF NOT, infinity, TROUBLESHOOT plummet circuit.
- e. IF NOT successful, REPLACE Intrusion Motor board.
- f. IF NOT successful, REPLACE Gauge Interface board.

7.3.3 Level Differs from Baseline: (Liquid level is indicated)

- a. VERIFY proper liquid level is entered at gauge.
- b. VERIFY COMP/MAN switch is in MAN position.
- c. REPLACE Liquid-Level board.
- d. IF NOT successful, REPLACE Liquid Level Counter.
- e. IF NOT successful, REPLACE Gauge Interface board.

7.3.4 Level Differs from Baseline (Liquid level reads ZERO)

- a. CHECK for +12 V DC and common on Gauge Interface board and Terminals 1 and 2 on Level Transmitter board. IF present CONTINUE to next step.
- b. REPLACE Liquid-Level board.
- c. IF NOT successful, REPLACE Gauge Interface board.
- d. IF NOT successful, REPAIR/REPLACE Farm Interface board.

8.0 RESTORATION

- 8.1 Ensure all test equipment has been disconnected and removed.
- 8.2 Ensure FIC (Liquid Level Gauge is functioning properly prior to leaving job-site.

9.0 TESTING AND ACCEPTANCE

- 9.1 USING the Mid-Interval Job-Card, PERFORM a functional test in accordance with Maintenance Procedure 6-TF-027.

10.0 DISPOSITION

- 10.1 Report deficiencies or cause of early failure to Supervision.
- 10.2 Return Data Sheet(s) to Supervision and inform Supervision maintenance is complete.