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ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 653555

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	M. J. Holm, Process Control, R2-11, 373-1098	[X] Yes [] No TF-98-1201	04/05/99
	6. Project Title/No./Work Order No.	7. Bldg./Sys./Fac. No.	8. Approval Designator
	Tank Monitor and Control System	2750E, B105	ESQ
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.)	10. Related ECN No(s).	11. Related PO No.
	HNF-3967, Rev. 0	N/A	N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? [] Yes [X] No

The changes incorporated in this ECN correct errors within the Tank Monitor and Control System (TMACS) Acceptance Test Procedure (ATP).

14a. Justification (mark one)

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

14b. Justification Details

During the first official execution of the TMACS Revision 11.0 ATP, several editorial errors were discovered in the test document itself. This revision of the document corrects these errors.

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

See attached distribution.

RELEASE STAMP

DATE: APR 15 1999 STA: 4 HANFORD RELEASE ID: 2

A-7900-013-2 (05/96) GEF095

A-7900-013-1

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16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[ ] Yes	Additional	[ ] $	Additional	[ ] $	Improvement	[ ]
[X] No	Savings	[ ] $	Savings	[ ] $	Delay	[ ]

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	[ ]	Seismic/Stress Analysis	[ ]	Tank Calibration Manual	[ ]
Functional Design Criteria	[ ]	Stress/Design Report	[ ]	Health Physics Procedure	[ ]
Operating Specification	[ ]	Interface Control Drawing	[ ]	Spares Multiple Unit Listing	[ ]
Criticality Specification	[ ]	Calibration Procedure	[ ]	Test Procedures/Specification	[ ]
Conceptual Design Report	[ ]	Installation Procedure	[ ]	Component Index	[ ]
Equipment Spec.	[ ]	Maintenance Procedure	[ ]	ASME Coded Item	[ ]
Const. Spec.	[ ]	Engineering Procedure	[ ]	Human Factor Consideration	[ ]
Procurement Spec.	[ ]	Operating Instruction	[ ]	Computer Software	[ ]
Vendor Information	[ ]	Operating Procedure	[ ]	Electric Circuit Schedule	[ ]
OM Manual	[ ]	Operational Safety Requirement	[ ]	ICRS Procedure	[ ]
FSAR/SAR	[ ]	IEFD Drawing	[ ]	Process Control Manual/Plan	[ ]
Safety Equipment List	[ ]	Cell Arrangement Drawing	[ ]	Process Flow Chart	[ ]
Radiation Work Permit	[ ]	Essential Material Specification	[ ]	Purchase Requisition	[ ]
Environmental Impact Statement	[ ]	Fac. Proc. Samp. Schedule	[ ]	Tickler File	[ ]
Environmental Report	[ ]	Inspection Plan	[ ]		[ ]
Environmental Permit	[ ]	Inventory Adjustment Request	[ ]		[ ]

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

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

21. Approvals

	Signature	Date		Signature	Date
Design Authority	C. C. Scaief, III C. C. Scaief III	4-8-99	Design Agent		
Cog. Eng.	M. J. Holm	4-8-99	PE		
Cog. Mgr.	N. W. Kirch NWKirch	4-14-99	QA		
QA	D. C. Board Don Board	4-8-99	Safety		
Safety	L. E. Thomas Larry E Thomas	4-8-99	Design		
Environ.	P. C. Miller	4/8/99	Environ.		
Other	R. P. Tucker RP Tucker	4/9/99	Other		
	D. A. Selle	4-13-99			
			DEPARTMENT OF ENERGY		
			Signature or a Control Number that tracks the Approval Signature		
			ADDITIONAL		

Tank Monitor and Control System (TMACS) Revision 11 Acceptance Test Procedure

M. J. Holm
Lockheed Martin Hanford Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

ECN: 653555 UC: 605
Org Code: 74B50 Charge Code: 102608/EB00
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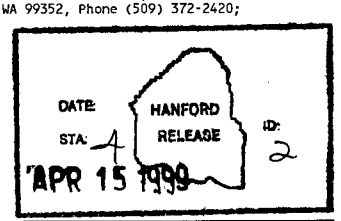
Key Words: Acceptance Test Procedure, ATP, TMACS, Tank Monitor and Control, Rev. 11.0.

Abstract: This document is used to validate Revision 11.0 of the Tank Monitor and Control System (TMACS) and verify its functions as intended by design.

4/14/99
Release Approval Date



Release Stamp

Approved for Public Release

RECORD OF REVISION	(1) Document Number HNF-3967, Rev 1	Page 1

(2) Title

Tank Monitor and Control System (TMACS) Revision 11 Acceptance Test Procedure

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) Initially released EDT-625998.	M. J. Holm 4-14-99	N. W. Kirch
1 RS	Complete revision per ECN 653555.	M. J. Holm	N. W. Kirch 4/14/99

TANK MONITOR AND CONTROL SYSTEM (TMACS) REVISION 11 ACCEPTANCE TEST PROCEDURE

Prepared By
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For

Lockheed Martin Hanford
For
US Department of Energy
Richland Operations Office
Richland, Washington

1. INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe tests performed to validate Revision 11 of the TMACS Monitor and Control System (TMACS) and verify that the software functions as intended by design.

1.2 SCOPE

This document is intended to test the software portion of TMACS. The tests will be performed on the development system. The software to be tested is the TMACS knowledge bases (KB) and the I/O driver/services. The development system will not be talking to field equipment; instead, the field equipment is simulated using emulators or multiplexers in the lab.

1.3 SUPPORTING DOCUMENTS

- "Double-Shell Underground Waste Storage Tanks - Riser Survey," SD-RE-TI-093, Rev. 1, December 2, 1986.
- "Riser Configuration Document for Single-Shell Waste Tanks", SD-RE-TI-053, Rev. 8, August 22, 1991.
- "TMACS I/O Termination Point Listing", WHC-SD-WM-TI-594, Current Revision.
- "TMACS Data File Formats, Release 11.0," Lockheed Martin Services, Inc. External Letter, RGG-SDI-99-001.

1.4 SERVICE REQUESTS

The following are the change request incorporated into the TMACS software for this release.

SR #	Abbreviated Description
80	Temperature values hard to read
82	Tank icons hard to read
99	C106 Sensor Configuration Changes
104	Make TMACS colors readable
114	Convert TX Farm Trend Graphs To Trend Charts
129	Upgrade All Selectable Trend Graphs To Trend Charts
458	Change the time that the nightly flat files are created

SR #	Abbreviated Description
471	Sensor Trends display sensor identifier as tag list identifier
660	Convert TMACS from UNIX[1] to WindowsNT[2]
704	Redirection of I/O Drivers from Production to Development
748	Enraf[3] Driver polls with incorrect message
749	TMACS Alarm Printer gsi[4] interface configuration
757	Enraf® does not handle "FFFFFF" error message properly
762	U-108 Enraf® conversion formula
763	Fix Reference Junction Formulas
769	Sensor Detail Button on Individual Sensor Trends
770	Make TMACS Surface Level function definitions uniform
771	Add Discrete Update Button to TMACS displays containing Discrete I/O points
772	Correct TMACS Data History Recovery
775	Fix Abort Problem When Discrete Values Are Outside Instrument Limits
782	File Read Status On TMACS Start Up
783	Correct Scaling problem with Individual Sensor Trends
784	Modify TMACS continuous point processing to assure at least one reading a day
791	Label Trend Charts that include 2 risers
823	Modify User Trend Charts to support persistence.
828	Re-Span SY101 ENRAF

2. RESPONSIBILITIES

Each organization participating in the conduct of this ATP will designate personnel to assume the responsibilities and duties as defined herein for their respective roles. Prior to the performance of this ATP these designees shall sign the ATP Participation Sheet.

2.1 TEST DIRECTOR

- Provides concurrence that the ATP may commence.
- Act as liaison between the test performance group and the test witnesses.
- Shall perform the test as described in this document.
- Record exceptions and test steps that are not performed on the ATP Exception Record sheets. Add additional Exception Record sheets as needed.

[1]UNIX is a trademark of X/Open Company, Ltd.
[2]WindowsNT is a trademark of the Microsoft Corporation.
[3]Enraf is a registered trademark of Enraf, B.V.
[4]GSI is a trademark of the Gensym Corporation.

- Shall obtain final approval signatures and distribute copies of the ATP.

- Stop any test that, in the judgment of the Test Director, may cause damage to the system until the test procedure has been revised.

2.2 TEST PERFORMANCE GROUP

- Shall provide qualified personnel, tools and equipment required to perform test.

2.3 TEST WITNESS AND APPROVAL PERSONNEL

- Shall observe the testing and data recording to verify that their group's requirements are met.

- If any representative of the witness and approval personnel objects to the results obtained during the acceptance test, he shall notify the Test Director. Any such notice, if not resolved directly to the representative's satisfaction, shall be recorded as an exception.

2.4 TEST RECORDER

- Get signatures on the Recorder's copy of the Acceptance Test Procedure Participation sheet prior to testing.

- Observe tests and record test data (if any).

- Initial every test step on the Recorder's copy as it is completed, next to the step number or table, when provided.

- Record exceptions and test steps, which are not performed on the Exception Sheet.

- Notify the Test Director of an exception at time the exception is made.

- Transfer Recorder's copy of the completed ATP with the final test results and signatures to the Test Director for Final Approval signatures and disposition.

2.5 FINAL APPROVAL

- Approval personnel shall indicate, by their signature on the ATP Acceptance Record Sheet that the ATP result's are accepted. Any questions or objections shall be referred to the Test Director for resolution.

If the approval personnel find an exception to the test that is of sufficiently small magnitude, a test approval may be given. In this case, a list of such exceptions shall be entered in the

exception page as "Test Approved with Exceptions," signed and dated. **This signature shall indicate that the exceptions are of such a nature that a rerun of the ATP is not necessary to demonstrate that the exceptions have been adequately resolved.**

2.6 OCCUPATIONAL SAFETY AND HEALTH

- Individuals shall perform their assigned tasks in a safe manner to protect themselves and others from undue hazards and to prevent damage to property and environment.

3. TEST PROCEDURE CHANGE CONTROL

Acceptance testing shall be conducted in accordance with the steps and requirements specified in this procedure. In the event minor changes are required to successfully complete the Acceptance Test Procedure the change shall be noted as an exception and testing continued, only if the change will not effect the test acceptance criteria. The exception shall be incorporated into this document in accordance with HNF-PRO-440, "Engineering Document Change Control, Requirements."

4. PREREQUISITES

This section describes the prerequisites required to perform this ATP. The section contains general prerequisites that apply to this test procedure as well as specific prerequisites for individual test procedures.

4.1 GENERAL

The following are the prerequisites for running any of the test sections described in this procedure.

1. The Test Director should bring up G2[5] with the TMACS_Main.KB and log in using the mode "t2-user" prior to running the formal test.

2. The Test Director should bring up a G2[®] telewindows6 session and log in using the mode "t2-user" prior to running the formal test.

3. The Test Director should verify that following bridges/services are started as services on WindowsNT™.

[5]G2 is a registered trademark of the Gensym Corporation.
[6]Telewindows is a registered trademark of the Gensym Corporation.

Common Name	Executable	Service Name
Acromag[7] I/O driver	Acromag_driver.exe	AcromagDriver 22200 AcromagDriver 22201 AcromagDriver 22202 AcromagDriver 22203 AcromagDriver 22204 AcromagDriver 22205
Alarm Printer driver	Tmacs_printer_driver.exe	TMACSPrtDriver 22300
Enraf® I/O driver	Enraf_driver.exe	EnrafDriver 22206
Panalarm[8] I/O driver	Panalm_driver.exe	PanalmDriver 22207
Westronic[9] I/O driver	Westronic.driver	WestronicDriver 22212
G2® ODBC Bridge		G2® ODBC Bridge

4. The Test Director shall have available the latest version of the following reference materials:

   - "TMACS I/O Termination Point Listing", (WHC-SD-WM-TI-594, current revision), document written by Instrument & Control (I&C). The electronic version is available at \\AP014\TMACS.

   - "Riser Configuration Document for Single-Shell Waste Tanks", (SD-RE-TI-053, Rev. 8).

   - Double-Shell Underground Waste Storage Tanks - Riser Survey", (SD-RE-TI-093, Rev. 1).

5. The serial multiplexers or emulators for the Acromag™, Enraf®, Panalarm,® and Westronic® devices are available. At least one serial multiplexer (or emulator) is attached to the test computer and that the appropriate driver can function through the appropriate serial port.

4.2 GRAPHICS

No additional prerequisites are needed.

4.3 TRENDING

To give a proper display of trending it is strongly advised that 1 or more days of history files be copied from production to the system to be tested (*give enough time for the files to be processed)* and run into the development TMACS.

[7]Acromag is a trademark of Acromag Incorporated, Wixom, Michigan.
[8]Panalarm is a registered trademark of Ametek, Inc.
[9]Westronics is a registered trademark of Westronics, Inc.

4.4 EXTERNAL INTERFACES

No additional prerequisites are needed.

4.5 POINT PROCESSING

1. This test requires the system to be in a state in which no other alarm activity is generated externally. The Test Director may need to disable the collection of sensor readings from the lab equipment and clear alarm messages generated by the system start up.

2. The individual Test Cases are built using tank "Test-201", which contains one discrete and one continuous sensor. The current values for these sensors are entered programmatically; the tests assume that the following parameters have been set for sensor Continuous-200001. Verify that the sensor has the parameters in Table 1.

Table 1. Parameters for Sensor Continuous-200001

Parameter	Value
High Instrument Limit	22
High Alarm Limit	15
Low Alarm Limit	10
Low Instrument Limit	4
Delta Band	0.0
Alarm Deadband	0.9
Rate of Change	1.2
ROC Limit	2.2

3. Verify that the discrete sensor, Discrete-200001, has the values for the parameters listed in Table 2.

Table 2. Parameters for Sensor Discrete-200001

State 0 = Normal	Color = Green	Annotation = OPEN
State 1 = Alarm	Color = Yellow	Annotation = CLOSING
State 2 = Alarm	Color = Red	Annotation = CLOSED
State 3 = Normal	Color = Green	Annotation = OPENING
High Instrument Limit > 3	Low Instrument Limit < 0	

4. To set up the tests in this section the Test Director must:

   - Load the testing knowledge base (KB)
   - Bring up the Point Processing Functional Tests workspace
   - Enter the test document revision number (i.e. 11.0).

5. The functional tests will be run individually in the test cases. The tester must be logged in to G2® in "administrator" mode.

4.6 PERFORMANCE

1. This purpose of this test section is to bench mark the production software using the development computer. The tests will be performed on the computer with the minimum TMACS processes running. The development computer will be running the following software during the test:

   - WindowsNT™ and related system programs that will be running in production
   - G2® with the production TMACS knowledge bases. There should be no data recovery operations in place during the test!!!
   - All driver services that would be running in production. None of these services should be receiving data from the field, lab, or emulators.

2. To set up the tests in this section the Test Director must:

   - Acknowledge all the alarms from the startup process
   - Load the testing knowledge base (KB)
   - Hide all the workspaces until only the G2® background bricks appear
   - Bring up the Point Processing Performance Tests workspace
   - Enter the test document revision number (i.e. 11.0).

4.7 LOGGING

The Test Director may want to start and have the TMACS system running overnight to create the automated data files for this test.

4.8 SERVICE REQUESTS

4.8.1 SR 772 – Correct TMACS Data History Recovery

The Test Director shall generate, on the production computer, a hard copy of one or two trend charts that have an easily identifiable trend.

The Test Director shall have loaded history data (more than one day) from the production system prior to running this test. *Note: It takes approximately 1-2 hours to read in one day's worth of data.*

4.8.2 SR 748 – Enraf® Driver polls with incorrect message

The hardware required is:

- The TMACS development computer(s)
- A serial multiplexer (or emulator) attached to the test computer through the serial port monitored by the Enraf® driver.
- A serial analyzer used to monitor the communication between TMACS and the emulator.

To set this test up the Test Director must perform the following steps:

- Connect the Enraf® CIU RS-232 serial line to a serial port of TMACS. You will need to use a NULL modem to reverse the Receive/Transmit lines since both the workstation and the CIU are DTE devices.
- Connect a Serial Analyzer between the serial port and the serial line to the CIU
- All the Enraf® CIU Station Objects in the G2® knowledge base are using the same GSI™ interface
- Make sure G2® is running and not paused.

4.8.3 SR 784 – Modify TMACS continuous point processing to assure at least one reading a day

The Test Director may want to start and have the TMACS system running overnight to create the automated data files for this test.

5. ACCEPTANCE CRITERIA

5.1 GENERAL

The system shall provide multiple security levels that are password protected.

5.2 GRAPHICS

The acceptance criteria for graphics is:

- Provide real-time display of numeric values of sensors
- Communicate with a minimum of 2 graphics CRTs
- Provide "PRINT" facility for graphic window displays.

5.3 TRENDING

The acceptance criteria trending is:

- Provide real-time trend graphs, with the following selected time intervals: 1 hour, 7 days.

5.4 EXTERNAL INTERFACES

The system shall be capable of providing sensor information to the Surveillance Analysis Computer System (SACS) for sensors configured in both SACS and TMACS.

The acceptance criteria sensor conversion is:

- The system shall convert the data read by the field equipment in a user readable format.

5.5 POINT PROCESSING

The acceptance criteria trending is:

- Provide real-time alarming on high and low level for any analog point
- Provide alarm deadband filtering for analog points
- Display the following alarm colors: red for highest priority, requiring immediate action; yellow for an abnormal condition requiring attention but not an immediate hazard; white for status indication; green for normal condition
- Provide alarm summary display with date, time, tag, description, alarm status with color-coding (green for normal). Remove message from display upon acknowledgement and reset/return to normal
- Display tanks and sensors with unacknowledged alarms as blinking
- Provide operator alarm acknowledgement. Acknowledgement action shall cease blinking of alarmed item
- Provide logging of alarms, return to normal, and alarm acknowledgements, to printer and to disk
- Provide alarming when error codes are returned from data acquisition system.

5.6 PERFORMANCE

The acceptance criteria trending is:

- The TMACS G2® program shall process input from 50 points per second while using less than 80% of the CPU time.

5.7 LOGGING

The acceptance criteria trending is:

- The system shall have the capability to log any sensor value
- A sensor logging shall include the time stamp and the sensor's value.

5.8 SERVICE REQUESTS

The acceptance criteria for the service request (SR) are contained in the description of the SR. The test director will have available a copy of the service request for viewing.

6. TEST PROCEDURES

6.1 GENERAL

6.1.1 Startup

Note: The Test Director prior to witness testing may have completed this test.

Step	Perform	Verify	Initial
1.	Start TMACS On the TMACS screen, type Control-Y Edit the 'User' to be t2-user Edit the 'Password' to be the password for t2-user Edit the 'G2® user mode' to be t2-user	Verify the TMACS starts up (approximately four minutes) and verify the following: • A message is displayed indicating what days worth of data is being recovered. • A status bar is displayed indicating what percentage of the days readings have been read into memory.	

6.1.2 Security

6.1.2.1 *Telewindows® Session*

Step	Action	Verify	Initial
1.	On the TMACS screen, type Control-Y.	Verify that the user mode selection workspace appears on the screen with "t2-user" in the name field.	
2.	Edit the 'G2® user mode' to be something other than t2-user or shut down. (i.e. "administrator".) Click on the END button in the user mode selection workspace.	Verify that TMACS does not enter selected mode.	
3.	Edit the 'G2® user mode' to be "t2-user" and click on the END button.	Verify that the user mode selection workspace disappears from the screen (indicating a successful login).	

6.1.2.2 Central Console

Step	Action	Verify	Initial
1.	On the TMACS screen, type Control-Y.	Verify that the user mode selection workspace appears on the screen with "t2-user" in the name field.	
2.	Edit the 'G2® user mode' to be something other than t2-user or shut down. (i.e. "administrator".) Click on the END button.	Verify that TMACS does not enter selected mode.	
3.	Edit the 'G2® user mode' to be "t2-user" and click on the END button.	Verify that the user mode selection workspace disappears from the screen (indicating a successful login).	

6.2 GRAPHICS

This section is performed after the system has been started and the clock is functional. This test should be performed on both the main console and Telewindows®.

6.2.1 T2-User Abilities within TMACS

6.2.1.1 Central Console or Telewindows®

Step	Action	Verify	Initial
		Main Display	
1.	Click on the Show Main Display button on the Control Panel.	Verify that the following workspaces appear on the screen: • Control Panel. • Monitored Systems • Most Recent Alarm. • Hanford Tank Farm Facilities *Note: Working window (may appear if Data Recovery is still running)*	
2.	Attempt to move each of the following: • Workspaces • Date and time display. • Labels (workspace title, farm and tank) • Farm backgrounds • Tank icons GOTO button on the Most	Verify that they do not move.	

Step	Action	Verify	Initial
	Recent Alarm workspace.		
3.	Click anywhere in the empty space on each workspace.	Verify that no menus appear.	
		Tank Status Display	
4.	Click on the tank icon for any active tank.	Verify that the Tank Status workspace appears.	
5.	Click on the Shrink Window button on the Tank Status workspace.	Verify that the workspace size is reduced.	
6.	Move by dragging the Tank Status Window.	Verify that the workspace moves; verify that no part of the workspace can be moved off-screen.	
7.	Attempt to move several objects chosen at random on the Tank Status workspace by doing a click-and-drag.	Verify that none of the objects move.	
		Sensor Trend Display	
8.	Click on the digital display for any sensor.	Verify that the trend workspace for that sensor appears.	
9.	Click at random at several places on the trend workspace.	Verify that no menu appears.	
10.	Attempt to move several objects chosen at random on the trend workspace.	Verify that none move.	
11.	Click on the Hide Workspace button on the trend workspace.	Verify that the workspace disappears.	
		Control Panel	
12.	Move Tank Status over a portion of the Control Panel workspace. Click on the background of the Control Panel workspace.	Verify that doing so brings the Control Panel to the top.	
13.	Click on the Hide Window button on the Tank Status workspace.	Verify that the workspace disappears.	
		Monitored Systems	
14.	Click on any of the button on the MONITORED SYSTEMS workspace.	Verify that the monitored system chosen workspace appears.	
15.	Click at random at several	Verify that no menu appears.	

Step	Action	Verify	Initial
	places on the workspace.		
16.	Attempt to move several objects chosen at random on the workspace.	Verify that none move.	
17.	Click on the Hide Window button on the workspace.	Verify that the workspace disappears.	

6.2.1.2 Central Console Only

Step	Action	Verify	Initial
1.	Click on the Show Main Display button on the Control Panel.	Verify that the following workspaces appear on the screen: • Control Panel. • Monitored Systems • Most Recent Alarm. • Hanford Tank Farm Facilities *Note: Working window may appear if Data Recovery is still running.*	
2.	Click on the tank icon for any active tank.	Verify that the Tank Status workspace appears.	
		User Selectable Trends	
3.	Click on a TREND GRAPH button (located at the bottom of the Tank Workspace).	Verify that a User Configurable Trend Graph workspace appears.	
4.	Click at random at several places on the Trend Graph workspace.	Verify that no menu appears.	
5.	Attempt to move several objects chosen at random on the Trend Graph workspace	Verify that no objects move.	
6.	Click on the Hide Window button on the Trend Graph workspace.	Verify that the workspace disappears.	
7.	Click on the Hide Window button on the Tank Status workspace.	Verify that the workspace disappears.	
		Current Alarms	
8.	Click on the CURRENT ALARMS button on the Control Panel.	Verify that the Current Alarms workspace appears.	
9.	Click at random at several places on the Current Alarms workspace.	Verify that no menu appears.	

Step	Action	Verify	Initial
10.	Attempt to move several objects chosen at random on the Current Alarms workspace.	Verify that none move.	
11.	Click on the Hide Window button on the Current Alarms workspace.	Verify that the workspace disappears.	

6.2.2 Control Panel

6.2.2.1 Operation of the SHOW MAIN DISPLAY button

Step	Perform	Expected Result	Initial
1.	Click on any enabled Tank Icon in the Hanford Tank Farm Facilities. (The icon will not be gray.) *If the Tank Status Window is not already shrunk then click it's Shrink Window button (an ▼ as a symbol).*	Verify that a Tank Status workspace appears for the selected tank and that the Control Panel is visible.	
2.	Click on the Show Main Display button on the Control Panel.	Verify that the Tank Status workspace disappears. Verify that the following workspaces appear on the screen: • Hanford Tank Farm Facilities • Control Panel • Most Recent Alarm (may be partially covered by the Hanford Tank Farm Facilities workspace) • Monitored Systems *Note: Working window may appear if Data Recovery is still running.*	
3.	Examine the TMACS display.	Verify that the Control Panel workspace is located in the upper right-hand corner.	
		Verify that the following objects appear in the workspace in order, top to bottom: • Label "Control Panel" • SHOW MAIN DISPLAY button • CURRENT ALARMS button (Not available to Telewindows® sessions) • Number of Current Alarms digital display • HIDE SENSOR TRENDS button • PRINT SCREEN button (Not available to	

Step	Perform	Expected Result	Initial
		Telewindows® sessions) • A date and time display	
		Verify that MONITORED SYSTEMS workspace is displayed on the middle right-hand side of the screen and is displaying the following: • AY/AZ Exhauster • C-106 Sluicing • K-Basins	
		Verify that the Most Recent Alarm workspace is in the lower right-hand corner and that the GOTO button appears at the top center of the workspace.	
		Verify that the Number of Current Alarms digital display is located at the top right of the Most Recent Alarm workspace.	
		Verify that the Hanford Tank Farm Facilities workspace occupies the left portion of the screen.	
		Verify that a brown background appears behind these workspaces and that no other workspaces are visible.	

6.2.2.2 Operation of CURRENT ALARMS Button and Screen

Note: The CURRENT ALARMS button is not available in a Telewindows® session.

Step	Perform	Expected Result	Initial
1.	*Click on the CURRENT ALARMS button.*	Verify that the Current Alarms workspace appears on the left-hand side of the screen and contains the following: • HIDE WINDOW (with an x as a symbol) • SHRINK WINDOW (*an ▼ as a symbol*) • EXPAND WINDOW (*an ▲ as a symbol*) • CURRENT-ALARMS title box • UP ONE ALARM • UP ONE PAGE • REFRESH ALARMS • DOWN ONE PAGE • DOWN ONE ALARM • GO TO TOP of LIST • GO TO END of LIST • ACKNOWLEDGE ALL WHITE	

Step	Perform	Expected Result	Initial
		ALARMS • ACKNOWLEDGE ALL BLUE MESSAGES	
		Operation of the **SHRINK WINDOW** button	
2.	Note: If the Current Alarms workspace is already shrunk then expand first. Click on the SHRINK WINDOW button in the Current Alarms workspace.	Verify the Current Alarms workspace: • Decreases in size • Moves to the left-hand side of the screen • Has space to show 10 alarms. *(Only 9 alarms will be visible if the first alarm in the list is visible.)*	
		Operation of the **EXPAND WINDOW** button	
3.	Click on the EXPAND WINDOW button in the Current Alarms workspace.	Verify the Current Alarms workspace: • Increases in size • Moves to the left-hand side of the screen • Has space to show 6 alarms. *(Only 5 alarms will be visible if the first alarm in the list is visible.)*	
		Operation of the **HIDE WINDOW** button	
4.	Click on the HIDE WINDOW button in the Current Alarms workspace.	Verify that the workspace disappears	

6.2.2.3 Operation of the HIDE SENSOR TRENDS button

Step	Perform	Expected Result	Initial
1.	Click on an enabled Tank Icon on the Hanford Tank Farm Facilities workspace. (The icon will not be gray.)	Verify that the Tank Status workspace for this tank appears.	
2.	Click on several sensor trend icons selected at random.	Verify that Sensor Trend workspaces for the selected sensors appear.	
3.	Lift the Control Panel to the top by clicking in the blank background on the Control Panel workspace. Click on the HIDE SENSOR TRENDS button on the Control Panel.	Verify that the Tank Status workspace and any Sensor Trend workspaces are hidden.	

6.2.2.4 Operation of the PRINT SCREEN button

Note: The CURRENT ALARMS button is not available in a Telewindows® session.

Step	Perform	Expected Result	Initial
1.	Click on the PRINT SCREEN button	Verify that the Control Panel workspace is printed.	

6.2.3 Hanford Tank Farm Facility

6.2.3.1 Operation of a TANK ICON button

Step	Perform	Expected Result	Initial
1.	Click any enabled Tank Icon in the Hanford Tank Farm Facilities. *(The icon will not be gray.)*	Verify that the Tank Status workspace appears on the screen and contains the following: • TITLE (correctly identifying the tank) • HIDE WINDOW button (x as a symbol) • SHRINK WINDOW button (an▼ as a symbol) • EXPAND WINDOW button (an ▲ as a symbol) • ACK ALARMS button	
		• UPDATE button (if available, not all tanks have discrete sensors). • Riser Location Drawing (Refer to the appropriate Tank Riser Configuration Documents for correct location) • Print Screen button • Riser Identifier(s) (displayed over the riser(s)) • Sensor Icons (i.e. thermocouple, level) • User Selectable Trend button(s).	
		Thermocouple Operation	
2.	Use the document "TMACS I/O Termination Point Listing" (Tag list) as a reference. Choose several thermocouples for the tank.	Verify the following: • The thermocouples are positioned on the tank display in a way that approximates their physical location in the tank. • Sensor labels and current values are displayed next to the thermocouple icons • Sensor icon is overlaid with the sensor alarm status color	

Step	Perform	Expected Result	Initial
Operation of Tank Level Indication			
3.		Verify the following: • The surface level icon(s) is positioned proportionally to the maximum tank height and at the current level displayed by the reading. • Sensor labels and current values are displayed next to the surface level icons *The label should identifying the source of this reading. (ENRAF® or SACS)* • Sensor icon is overlaid with the sensor alarm status color	
Operation of Print button Not available in a Telewindows® session			
4.	Click on the PRINT SCREEN button.	Verify that the tank workspace prints.	
Operation of Shrink Window button			
5.	Click on the SHRINK WINDOW button (*an ▼ as a symbol*).	Verify that the workspace *shrinks*.	
6.	Drag the Tank Status workspace to the upper right hand corner.	Verify that the Tank Status workspace stops at the edge of the screen when dragged to the top or to the right.	
Operation of Expand Window button			
7.	Click on the EXPAND WINDOW button (*an ▲ as a symbol*).	Verify that the workspace enlarges.	
Operation of the HIDE button			
8.	Click on the HIDE WINDOW.	Verify that the workspace is hidden.	
Note: Operation of the Acknowledge Alarm button is performed in section 6.5.7 (Miscellaneous Alarm Tests)			
Note: Operation of the Trends is performed in section 6.3 (Trending).			

6.2.4 Operation Of The Print Button

Note: The CURRENT ALARMS button is not available in a Telewindows® session.

Step	Perform	Expected Result	Initial
1.	Click on the PRINT SCREEN button in the lower right hand corner of workspace. *(May have to*	Verify that the workspace is printed.	

Step	Perform	Expected Result	Initial
	click on HTTF workspace to see button)		

6.2.5 Monitored Systems

6.2.5.1 Operation Of The Monitored System Button

Step	Perform	Expected Result	Initial
1.	Click on the any system displayed on the MONITORED SYSTEMS workspace.	Verify that a workspace is displayed representing the monitored system.	
2.	Click on the sensor objects.	Verify that no graphic workspaces or menu boxes are displayed.	
3.	For alarm panels, click on any graphic "borders".	Verify that no graphic workspaces or menu boxes are displayed.	
	Operation of Shrink Window button		
	Click on the SHRINK WINDOW button (*an ▼ as a symbol*).	Verify that the workspace shrinks.	
	Drag the workspace to the upper right hand corner.	Verify that the workspace stops at the edge of the screen when dragged to the top or to the right.	
	Operation of Expand Window button		
	Click on the EXPAND WINDOW button (*an ▲ as a symbol*).	Verify that the workspace enlarges.	
	Operation of the HIDE button		
	Click on the HIDE WINDOW.	Verify that the workspace is hidden.	

6.3 TRENDING

6.3.1 Operation of Sensor Trends

Have the Test Director verify that the TMACS is running in Development Mode of operation and is generating variable sensor data. The steps within this test case will be performed for each of two tanks that are selected at random. Note: G2® will only display trend data that varies over time. The Test Director will place TMACS in t2-user mode.

Step	Perform	Expected Result	Initial
1.	Click any enabled Tank Icon in the Hanford Tank Farm Facilities. *(The icon will not*	Verify that a Sensor Trend workspace for the sensor chosen and contains the following. A graph or chart	

Step	Perform	Expected Result	Initial
	be gray.) Click on the portion of any sensor icon that looks like a little graph.	HIDE WINDOW button (*with an x as a symbol*) DETAIL button (*upper right of the workspace*).	
2.	Examine the Graph/Char.	Verify the following: • The current value on the trend graph approximates the current value on the digital display. • The values line color is black. • Lines for the low and high alarm limits appear at roughly one-tenth (1/10) and nine tenths (9/10) of the distance on the vertical axis. *Note: Only if trend is within limits.* • Alarm limit bands match the alarm color (Yellow or Red). • The trend title (above) and label (below) agree with the sensor tag name and descriptor. • The time scale of the horizontal time axis is 7 days and that some dates are shown.	
3.	Click on the Sensor Detail button at the upper right of the Sensor Trend workspace.	Verify the detailed information for the chosen sensor is correctly displayed and includes the following: • Current Reading • Last Good Reading At • Units • High Alarm Limit • Low Alarm Limit • Deadband • Point Processing • ROC Processing • Polling Freq. Index • Polling Freq. Sec. • Validity Interval • Expiration Time • Formula Expression • Formula Parameter • Type (Temperature Only) • Upper Instrument Limit • Lower Instrument Limit • Delta	

Step	Perform	Expected Result	Initial
		• Alarm Processing • Logging • Raw Value • Station Status SACS LEVEL SENSORS • Current Reading • Last Good Reading At • Units • High Alarm Limit • Low Alarm Limit • Deadband • Point Processing • ROC Processing • Suspect Status • Sensor Type Name • Slvl_dttm • Upper Instrument Limit • Lower Instrument Limit • Delta • Alarm Processing • Logging	
4.	Click on the Sensor Detail button at the upper right of the Sensor Trend workspace.	Verify the sensor detail information is updated.	
		Operation of the HIDE button	
5.	Click on the HIDE WINDOW button.	Verify that the workspace is hidden.	

6.3.2 Operation of User Selectable trends

Note: User selectable sensor trends cannot be performed in a Telewindows® session.

Step	Perform	Expected Result	Initial
1.	Click any enabled Tank Icon in the Hanford Tank Farm Facilities. *(The icon will not be gray.)* Click on a USER SELECTABLE TRENDS button. *(located at the bottom of the Tank Status workspace.)*	Verify that the USER SELECTABLE TRENDS workspace appears and contains the following. • Title (identifying what Tank trend is associated with) • Trend graph or chart. • HIDE WINDOW button (with an x as a symbol) • SHRINK WINDOW button (an▼ as a symbol)	

Step	Perform	Expected Result	Initial
		• EXPAND WINDOW button (an ▲ as a symbol) • PRINT SCREEN button • UPDATE GRAPH button (below the graph). • SELECT TIME INTERVAL OPTIONS • 1 hour • 8 hours • 24 hours • 7 days • 31 days. • List of sensors associated with user selectable trend with the following • Check box (indicates if sensor is displayed on graph/chart; default is all sensors displayed) • Sensor symbol (identifies sensor on graph/chart) • Current, Low, and High readings (based on the SELECT TIME INTERVAL chosen.) • Sensor Reading Description containing the following information • Type of readings (i.e. temperature) • Time period of readings (based on the SELECT TIME INTERVAL chosen) • Units of readings (i.e. Degrees Fahrenheit) • Date and Time	
2.	Click on the UPDATE GRAPH button	Verify the Graph/Chart has the following: • The current value for each sensor on the trend graph approximates the current value on the digital display. • The values line matches the symbol for each sensor. • Trend graph label *(below the x-axis of the graph)* reads: "TANK **xx-yyy** SELECTED SENSORS INDICATED BY X" Where "**xx-yyy**" represents the name of the tank. • The time scale of the horizontal time axis is based on the SELECT TIME INTERVAL chosen.	

Step	Perform	Expected Result	Initial
		Operation of Sensor Check Box	
3.	Click on the box of any sensor that contains an X.	Verify that the X is removed from the box.	
4.	Click on the UPDATE GRAPH button below the graph.	Verify the trend graph displays only lines for the sensors that are checked.	
5.	Click on the box of any sensor that does not contain an X.	Verify that the X is displayed in the box.	
6.	Click on the UPDATE GRAPH button below the graph.	Verify the trend graph displays only lines for the sensors that are checked.	
		Operation of Sensor Time Interval Options *Note: May want to repeat using different time intervals.*	
7.	Click any "SELECT TIME INTERVAL" option.	Verify the following: • A black dot appears in the circle of the time interval selected. • The Sensor Reading Description is modified according to the SELECT TIME INTERVAL chosen. (Note: Trend graph is not updated automatically)	
8.	Click on the UPDATE GRAPH button below the graph.	Verify the horizontal time scale of the trend graph is reset to the SELECT TIME INTERVAL chosen.	
		Operation of Shrink Window button	
9.	Click on the SHRINK WINDOW button (*an ▼ as a symbol*).	Verify that the workspace shrinks.	
10.	Drag the workspace to the upper right hand corner.	Verify that the workspace stops at the edge of the screen when dragged to the top or to the right.	
		Operation of Expand Window button	
11.	Click on the EXPAND WINDOW button (*an ▲ as a symbol*).	Verify that the workspace enlarges.	
		Operation of Print button **Not available in a Telewindows® session**	
12.	Click on the PRINT SCREEN button.	Verify that the User Selectable Trend workspace prints.	
		Operation of the HIDE button	
13.	Click on the HIDE WINDOW.	Verify that the workspace is hidden.	

6.4 EXTERNAL INTERFACES

6.4.1 Acromag™

The tests in this section require the use of an Acromag™ emulator. The test should be run on the development machine.

6.4.1.1 Conversion of Acromag™ Temperature Output to Engineering Units

Step	Perform	Expected Result	Initial
1.	From the tag list, choose an Acromag™ temperature sensor at random.	Write the sensor tag name here _____	
2.	Use the Formula expression and Raw Value from the sensor details button on the sensor's trend to calculate the current reading for the sensor.	Write the value here _____	
3.	Compare the Current Reading with the reading in Step 2.	Verify that the readings are the same.	
4.	Examine the trend chart for this sensor.	Verify that the value graphed approximates the temperature recorded in Step 2. *(Note: Three or more points are needed for auto scaling.)*	

6.4.1.2 Conversion of Acromag™ 4 to 20 ma Output to Engineering Units

Step	Perform	Expected Result	Initial
1.	From the tag list, choose an Acromag™ non-temperature sensor at random, e.g., pressure, flow, surface level, ...	Write the sensor tag name here _____	
2.	Use the Formula expression and Raw Value from the sensor details button on the sensor's trend to calculate the current reading for the sensor.	Write the value here _____	

Step	Perform	Expected Result	Initial
3.	Compare the Current Reading with the reading in Step 2.	Verify that the readings are the same.	
4.	Examine the trend chart for this sensor.	Verify that the value graphed matches the temperature recorded in Step 2. *(Note: Three or more points are needed for auto scaling.)*	

6.4.1.3 Conversion of Acromag™ Digital Data to Discrete States

The Acromag™ emulator does not directly support digital input for the Acromag™. A digital value of 0 may be simulated with a temperature value of 32.0 F. A digital 1 is simulated with a temperature of 32.18 F. Any other value will be an unknown state.

Step	Perform	Expected Result	Initial
1.	Using the tag list, choose an enabled Acromag™ digital sensor at random.	Write the sensor tag name here _____	
2.	Use the emulator to simulate a value of digital 0 for this sensor. *After an appropriate delay for the TMACS to poll the emulator for this sensor.*	Verify that the sensor is in alarm.	
3.	Use the emulator to simulate a value of digital 1 for this sensor. *After an appropriate delay for the TMACS to poll the emulator for this sensor.*	Verify that the sensor is reset.	
4.	Return to the main screen.		

6.4.2 Enraf®

The tests in this section require the use of an Enraf® emulator. The test should be run on the development machine.

6.4.2.1 Conversion of Enraf® CIU Output to Engineering Units

Step	Perform	Expected Result	Initial
1.	From the tag list, choose an Enraf® CIU sensor at random.	Write the sensor tag name here _____	

Step	Perform	Expected Result	Initial
2.	Use the Formula expression and Raw Value from the sensor details button on the sensor's trend to calculate the current reading for the sensor.	Write the value here _____	
3.	Compare the Current Reading with the reading in Step 2.	Verify that the readings are the same.	
4.	Examine the trend chart for this sensor.	Verify that the value graphed approximates the value recorded in Step 2. *(Note: Three or more points are needed for auto scaling.)*	

6.4.3 Westronics®

The tests in this section require the use of a Westronics® emulator. The test should be run on the development machine.

6.4.3.1 Conversion of Westronics® Temperature Output to Engineering Units

Step	Perform	Expected Result	Initial
1.	From the tag list, choose a Westronics® temperature sensor at random.	Write the sensor tag name here _____	
2.	Use the Formula expression and Raw Value from the sensor details button on the sensor's trend to calculate the current reading for the sensor.	Write the value here _____	
3.	Compare the Current Reading with the reading in Step 2.	Verify that the readings are the same.	
4.	Examine the trend chart for this sensor.	Verify that the value graphed approximates the temperature recorded in Step 2. *(Note: Three or more points are needed for auto scaling.)*	

6.4.4 Panalarm®

The tests in this section require the use of a Panalarm® emulator. The test should be run on the development machine.

6.4.4.1 Conversion of Panalarm® Output to Digital Data to Discrete States

Step	Perform	Expected Result	Initial
1.	Using the tag list, choose a Panalarm® sensor at random.	Write the sensor tag name here _____	
2.	Use the emulator to simulate a value of digital 1 for this sensor. *After an appropriate delay for the TMACS to poll the emulator for this sensor.*	Verify that the sensor is in alarm.	
3.	Use the emulator to simulate a value of digital 0 for this sensor. *After an appropriate delay for the TMACS to poll the emulator for this sensor.*	Verify that the sensor is reset.	
4.	Return to the main screen.		

6.4.5 SACS

TMACS retrieves surface level data from SACS whenever TMACS starts and at 2000 every evening thereafter. The "last SACS reading" will be the last reading taken and marked good (the quality status was set to "G") before TMACS retrieves that data.

Step	Perform	Expected Result	Initial
1.	Select a surface-level sensor has been configured for polling from SACS.	Record the sensor and tank names. Sensor _____ Tank _____	
2.	On the Hanford Tank Farm Facilities workspace, click on the tank icon for the selected tank. Click on the surface-level icon.	Verify that the Sensor Trend workspace appears.	
3.	Click on the detail button. (Upper right-hand corner of the Sensor Trend workspace.)	Verify that the details about the surface-level sensor appear. Record the: Current Reading _____ Last Good Reading _____ Sensor Type Name _____ slvl_dttm _____	
4.	Close the Sensor Trend workspace.		

Step	Perform	Expected Result	Initial
5.	Obtain the last SACS database reading for the selected tank. *(Note: This will be on the UDO server most likely.)* This may be obtained from the system administrator using the following code: lp_LastSLVLReading '[Tank Name]' select * from TMACS_LASTSLVLREADING	Verify that the values obtained in this step match the values recorded in Step 3.	

6.5 POINT PROCESSING

6.5.1 Continuous Sensor (Non Rate of Change) Automated Functional Test

This procedure automatically tests the state changes for a continuous sensor.

Step	Perform	Expected Result	Initial
1.	On the POINT PROCESSING FUNCTIONAL TEST workspace click on the **Point Processing for Continuous Point – All Function excepts Rate of Change** button	Verify the CONTINUOUS FUNCTIONAL TEST (*Except ROC*) workspace appears.	
2.	On the CONTINUOUS FUNCTIONAL TEST (*Except ROC*) workspace: • Set the Step Mode to "Off." • Set Print Results to "Last" Activate the "Run Point Processing" button.	Verify that the process continues to completion	
3.	Examine the results	Verify no errors are reported.	
4.	Print the final workspace.	Keep printout for project files.	

6.5.2 Continuous Sensor (Rate of Change) Automated Functional Test

Step	Perform	Expected Result	Initial
1.	On the POINT PROCESSING FUNCTIONAL TEST workspace click on the **Point Processing for Continuous Point –Rate of Change** button.	Verify the CONTINUOUS FUNCTIONAL TEST (*With ROC*) workspace appears.	
2.	On the ROC FUNCTIONAL TEST workspace: Set the Step Mode to "Off." Set Print Results to "Last" Activate the "Run Point Processing" button.	Verify that the process continues to completion.	
3.	Examine the workspace.	Verify no errors are reported.	
4.	Print the final workspace.	Keep printout for project files.	

6.5.3 Discrete Sensor Automated Functional Test

This procedure automatically tests the state changes of a discrete sensor.

Step	Perform	Expected Result	Initial
1.	On the POINT PROCESSING FUNCTIONAL TEST workspace click on the **Point Processing for Discrete Points – All Functions** button	Verify the DISCRETE FUNCTIONAL TEST workspace appears.	
2.	On the Discrete Functional Test workspace: Set the Step Mode to "Off." Set Print Results to "Last" Activate the " Run Point Processing " button.	Verify that the process continues to completion.	
3.	Examine the workspace.	Verify no errors are reported.	
4.	Print the final workspace.	Keep printout for project files.	

6.5.4 Operation of MOST RECENT ALARM and CURRENT ALARMS

Prior to running this test the administrator should do the following:

1. Acknowledge all alarms so Current Alarm count goes to zero. Note: if this is not done, then note the number of current alarms.

2. Verify the following workspaces are visible:

   - DISCRETE FUNCTIONAL TEST
   - MOST RECENT ALARM
   - CONTROL-PANEL
   - CURRENT ALARM

Step	Perform	Expected Result	Initial
1.	On the Discrete Functional Test Workspace Set the Step Mode in ON. Activate the RUN POINT PROCESSING button. Examine the Current Alarm box.	Note the number of current alarms _____	
2.	Enter **4** in Dip-switch type-in box on the **Discrete Functional Test Workspace.**	Verify the following: • A white message for the discrete alarm is generated in the MOST RECENT ALARM workspace. • Sensor Icon Blinking = false • Tank Icon Blinking = false • No Current Alarms = 1 more than Step 1 on the following workspaces: 1. CURRENT ALARMS 2. CONTROL PANEL 3. MOST RECENT ALARM	
3.	Enter **-1** in Dip-switch type-in box on the **Discrete Functional Test Workspace.**	Verify the following: • Sensor Icon Blinking = false • Tank Icon Blinking = false • No Current Alarms = 1 more than Step 1 on the following workspaces: 1. CURRENT ALARMS 2. CONTROL PANEL 3. MOST RECENT ALARM	
4.	Enter **2** in Dip-switch type-in box on the **Discrete Functional Test Workspace.**	Verify the following: • A discrete alarm message is generated in the MOST RECENT ALARM workspace. • Sensor Icon Blinking = true • Tank Icon Blinking = true • No. Current Alarms = 2 more than in Step 1 on the following workspaces:	

Step	Perform	Expected Result	Initial
		1. CURRENT ALARMS 2. CONTROL PANEL 3. MOST RECENT ALARM	
5.	On the Most Recent Alarm workspace activate the GOTO button	Verify the following: • TANK TEST-201 STATUS workspace is brought to the top of the screen. • The sensor is in alarm.	
6.	Enter 0 in Dip-switch type-in box on the **Discrete Functional Test Workspace.**	Verify the following: • Discrete alarm message is reset. • No. Current Alarms = 2 more than Step 1 on the following workspaces: 1. CURRENT ALARMS 2. CONTROL PANEL 3. MOST RECENT ALARM	
7.	Acknowledge alarm message in MOST RECENT ALARM Window by clicking on it.	Verify the following: • Alarm Message disappears. • Sensor Icon Blinking = false • Tank Icon Blinking = false • No. Current Alarms = 1 more than Step 1 on the following workspaces: 1. CURRENT ALARMS 2. CONTROL PANEL 3. MOST RECENT ALARM	
8.	Acknowledge the White alarm message	Verify the following: • Alarm Message disappears • Sensor Icon Blinking = false • Tank Icon Blinking = false • No. Current Alarms = the same as in Step 1 on the following workspaces: 1. CURRENT ALARMS 2. CONTROL PANEL 3. MOST RECENT ALARM	

6.5.5 Operation of Sensor Delta Band and Alarm Deadband

This test will verify that the operation of the sensor band and the alarm deadband for continuous sensors.

Prior to running this test the administrator should do the following:

1. Verify that the Rate of Change processing is disabled for Sensor Continuous-200001.

2. Verify that the parameters for Sensor Continuous-200001 are set to match the parameters in Table 1. (See Prerequisites)

3. Verify that the following workspaces are visible.

   - CONTINUOUS FUNCTIONAL TEST
   - MOST RECENT ALARM

Step	Action	Verify the Alarm Condition is:	Initial
1.	On the Continuous Functional Test Workspace • Set the Step Mode in ON. • Activate the RUN POINT PROCESSING button. • Enter **14.8** in milli-amps type-in box	NORMAL	
2.	Enter **14.4** in milli-amps type-in box	NORMAL	
3.	Enter **14.3** in milli-amps type-in box	NORMAL	
4.	Enter **14.8** in milli-amps type-in box	NORMAL	
5.	Enter **15.2** in milli-amps type-in box	ALARM-HIGH	
6.	Enter **15.3** in milli-amps type-in box	ALARM-HIGH	
7.	Enter **14.9** in milli-amps type-in box	ALARM-HIGH	
8.	Enter **14.6** in milli-amps type-in box	ALARM-HIGH	
9.	Enter **14.0** in milli-amps type-in box	NORMAL	
10.	Enter **13.5** in milli-amps type-in box	NORMAL	
11.	Enter **15.0** in milli-amps type-in box	ALARM-HIGH	
12.	Enter **10.6** in milli-amps type-in box	NORMAL	
13.	Enter **15.0** in milli-amps type-in box	ALARM-HIGH	
14.	Enter **9.9** in milli-amps type-in box	ALARM-LOW	
15.	Enter **10.2** in milli-amps type-in box	ALARM-LOW	
16.	Enter **10.5** in milli-amps type-in box	ALARM-LOW	
17.	Enter **11.0** in milli-amps type-in box	NORMAL	
18.	Enter **11.5** in milli-amps type-in box	NORMAL	

6.5.6 Operation of Enable/Disable Procedures

Verify that the following workspaces are visible.

- Continuous Function Test
- Tank Test-201
- Enable/Disable Point Processing
- Most Recent Alarm
- Discrete-200001 Sensor

Step	Perform	Expected Result	Initial
1.	On the Continuous Functional Test workspace enter 17 in the "milliamps" type-in box.	Verify the following: • Alarm message is displayed • Number of Current Alarms increases by one.	
2.	Position the enable/disable pointer over the Continuous-200001 sensor and activate the button "Toggle Point".	Verify that the following conditions occur: • Blue message is displayed: "The POINT-PROCESSING of CONTINUOUS-200001 has been DISABLED", with the timestamp of this change. • Previous alarm message disappears and the total "Number of Current Alarms" remains the same. • Point processing attribute of sensor changes to false. • Sensor turns gray. • Tank color is the same as the DISCRETE-200001 sensor color.	
3.	With the enable/disable pointer still over the Continuous-200001 sensor, activate the button "Toggle Point".	Verify that the following conditions occur: • Blue message is displayed: "The POINT-PROCESSING of CONTINUOUS-200001 has been ENABLED", with the timestamp of this change. • "Number of Current Alarms" remains the same. • Point processing attribute of sensor changes to true. • Sensor turns white. • Tank color white or the color of the DISCRETE-200001 sensor alarm color (if not green).	
4.	Select a tank on the HTFF workspace that has a good mix of sensor types. Enter the chosen tank in the type-in box labeled "Tank on which to enable / disable point processing". Without moving the enable/disable pointer activate the button "Toggle Point".	Verify that the following conditions occur: • Blue message is displayed: "The POINT-PROCESSING of [the nearest sensor to the pointer—frequently the level sensor] has been DISABLED", with the timestamp of this change; • Point processing attribute of sensor changes to false; • Sensor turns gray; • Tank color is the same as the highest priority sensor alarm	

Step	Perform	Expected Result	Initial
5.	Activate the button "Toggle Point" again.	Verify that the following conditions occur: • Blue message is displayed: "The POINT-PROCESSING of [the nearest sensor to the pointer] has been ENABLED", with the timestamp of this change; • Point processing attribute of sensor changes to true; • Sensor turns white; • Tank icon turns white or the color of the highest priority sensor alarm.	
6.	Activate the button "All points in tank off".	Verify that the following conditions occur: • Blue messages are displayed: "The POINT-PROCESSING of [each sensor monitoring this tank] has been DISABLED" with the time of this change; • Point processing attribute of sensors changes to false; • Sensors turn gray; • All sensor alarms associated with this tank are cleared; • Tank color turns gray.	
7.	Activate the button "All points in tank on".	Verify that the following conditions occur: • Blue messages are displayed: "The POINT-PROCESSING of [each sensor monitoring this tank] has been ENABLED" with the time of this change; • Point processing attribute of sensors changes to true; • Sensors turn white; • Tank turns white.	
8.	On the Current Alarms workspace click on the Clear All Blue Messages button.	Verify the Blue Messages disappear from the Current Alarms list.	
9.	Hide the following workspaces: • Tank (selected in test) • Enable/Disable Point Processing • Discrete-200001 Sensor	Verify the workspaces are hidden.	

6.5.7 Miscellaneous Alarm Tests

The purpose of this test is to verify the relationships between the sensor icons, tank icon, Current Alarms Workspace and the annuciator.

Prior to running this test the administrator should do the following:

1. Make sure the following workspaces visible.

   - Functional Test Selection Workspace (Only to see the TANK-ICON-TEST-201 icon)
   - Continuous Functional Test Workspace. Also perform following:
     1. Set Step Mode On
     2. Activate the Run Point Processing button
   - Discrete Functional Test Workspace. Also perform following:
     1. Set Step Mode On
     2. Activate the Run Point Processing button
   - TANK TEST-201 workspace.
   - MOST RECENT ALARM workspace
   - Discrete-200001 Sensor

2. Make sure the enunciator is enabled. This is done by the following:

   - Bring up the TMACS-LIB workspace and its subworkspace labeled STARTUP-WS and Activate the "TOGGLE-AUDIBLE" button and verify that the display of the alarm-audible symbol changes from false to true.

Step	Perform	Expected Result	Initial
1.	Enter **1** in Dip-switch type-in box on the **Discrete Functional Test Workspace.** Enter a **11** in Milli-amp type-in box on the **Continuous Functional Test Workspace** *Note: May have to click on the Run Point Process button on both the Discrete and Continuous Function Test Workspaces.*	**Beep** Beep = true **Most Recent Alarm** • Message Status = Closing • Display Color = Yellow • Text Color = Red **Discrete Functional Test Workspace** **Discrete - 2001** • Discrete Icon Blinking = true • Display Color = YELLOW • Blink-off Color = GRAY • Alarm Aux Color = YELLOW	

Step	Perform	Expected Result	Initial
		Tank Icon Test-201 • Icon Blinking = true • Display Color = YELLOW • Blink-off Color = GRAY **Latest Alarm Message** • Display Color = Yellow --- **Continuous Functional Test Workspace** **Continuous -2001** • Cont. Icon Blinking = false • Display Color = GREEN • Blink-off Color = (N/A - skip) • Alarm Aux Color = TRANSPARENT **Tank Icon Test-201** • Icon Blinking = true • Display Color = YELLOW • Blink-off Color = GRAY **Latest Alarm Message** • Display Color = Yellow	
2.	Activate **ACK ALARMS** Button on Tank Test 201 status	**Beep** Beep = false --- **Most Recent Alarm** • Message Status = Acknowledged • Display Color = Yellow • Text Color = Black --- **Discrete Functional Test Workspace** **Discrete - 2001** • Discrete Icon Blinking = false • Display Color = YELLOW • Blink-off Color = (N/A - skip) • Alarm Aux Color = YELLOW	

Step	Perform	Expected Result	Initial
		Tank Icon Test-201 • Icon Blinking = false • Display Color = YELLOW • Blink-off Color = (N/A - skip) **Latest Alarm Message** • Display Color = Yellow --- **Continuous Functional Test Workspace** **Continuous -2001** • Cont. Icon Blinking = false • Display Color = GREEN • Blink-off Color = (N/A - skip) • Alarm Aux Color = TRANSPARENT **Tank Icon Test-201** • Icon Blinking = false • Display Color = YELLOW • Blink-off Color = (N/A - skip) **Latest Alarm Message** • Display Color = Yellow	
3.	Enter **0** in Dip-switch type-in box on the **Discrete Functional Test Workspace.**	Beep Beep = false --- **Most Recent Alarm** • Message Status = Alarm Disappears --- **Discrete Functional Test Workspace** **Discrete - 2001** • Discrete Icon Blinking = false • Display Color = GREEN • Blink-off Color = (N/A - skip) • Alarm Aux Color = TRANSPARENT **Tank Icon Test-201** • Icon Blinking = false • Display Color = GREEN • Blink-off Color = (N/A - skip)	

Step	Perform	Expected Result	Initial
		Latest Alarm Message • Display Color = YELLOW --- **Continuous Functional Test Workspace** **Continuous -2001** • Cont. Icon Blinking = false • Display Color = GREEN • Blink-off Color = (N/A - skip) • Alarm Aux Color = TRANSPARENT **Tank Icon Test-201** • Icon Blinking = false • Display Color = GREEN • Blink-off Color = (N/A - skip) **Latest Alarm Message** • Display Color = YELLOW	
4.	Enter a 17 in Milli-amp type-in box on the **Continuous Functional Test Workspace**	Beep Beep = true --- **Most Recent Alarm** • Message Status = ALARM HIGH • Display Color = RED • Text Color = YELLOW --- **Discrete Functional Test Workspace** **Discrete – 2001** • Discrete Icon Blinking = false • Display Color = GREEN • Blink-off Color = (N/A - skip) • Alarm Aux Color = TRANSPARENT **Tank Icon Test-201** • Icon Blinking = true • Display Color = RED • Blink-off Color = GRAY **Latest Alarm Message**	

Step	Perform	Expected Result	Initial
		• Display Color = YELLOW **Continuous Functional Test Workspace** **Continuous -2001** • Cont. Icon Blinking = true • Display Color = RED • Blink-off Color = GRAY • Alarm Aux Color = RED **Tank Icon Test-201** • Icon Blinking = true • Display Color = RED • Blink-off Color = GRAY **Latest Alarm Message** • Display Color = RED	
5.	Enter **1** in Dip-switch type-in box on the **Discrete Functional Test Workspace.**	Beep Beep = true **Most Recent Alarm** • Message Status = CLOSING • Display Color = YELLOW • Text Color = RED **Discrete Functional Test Workspace** **Discrete - 2001** • Discrete Icon Blinking = true • Display Color = YELLOW • Blink-off Color = GRAY • Alarm Aux Color = YELLOW **Tank Icon Test-201** • Icon Blinking = true • Display Color = RED • Blink-off Color = GRAY **Latest Alarm Message**	

Step	Perform	Expected Result	Initial
		Latest Alarm Message • Display Color = YELLOW **Continuous Functional Test Workspace** **Continuous -2001** • Cont. Icon Blinking = true • Display Color = RED • Blink-off Color = GRAY • Alarm Aux Color = RED **Tank Icon Test-201** • Icon Blinking = true • Display Color = RED • Blink-off Color = GRAY **Latest Alarm Message** • Display Color = RED	
6.	Enter a **25** in Milli-amp type-in box on the **Continuous Functional Test Workspace**	Beep Beep = true ***Most Recent Alarm*** • Message Status = Reading Out Of Range • Display Color = WHITE • Text Color = BLACK **Discrete Functional Test Workspace** **Discrete – 2001** • Discrete Icon Blinking = true • Display Color = YELLOW • Blink-off Color = GRAY • Alarm Aux Color = YELLOW **Tank Icon Test-201** • Icon Blinking = true • Display Color = YELLOW • Blink-off Color = WHITE	

Step	Perform	Expected Result	Initial
		Latest Alarm Message • Display Color = YELLOW --- **Continuous Functional Test Workspace** **Continuous – 2001** • Cont. Icon Blinking = true • Display Color = WHITE • Blink-off Color = RED • Alarm Aux Color = RED **Tank Icon Test-201** • Icon Blinking = true • Display Color = YELLOW • Blink-off Color = WHITE **Latest Alarm Message** • Display Color = WHITE	
7.	Enter **3** in Dip-switch type-in box on the **Discrete Functional Test Workspace.**	Beep Beep = true --- **MOST RECENT ALARM** • Message Status = Reading Out Of Range • Display Color = WHITE • Text Color = BLACK --- **CURRENT ALARM SCREEN** • Message Status = Discrete 200001 Resets • Display Color = GREEN • Text Color = BLACK --- **Discrete Functional Test Workspace** **Discrete – 2001** • Discrete Icon Blinking = true	

Step	Perform	Expected Result	Initial
		• Display Color = GREEN • Blink-off Color = GRAY • Alarm Aux Color = TRANSPARENT **Tank Icon Test-201** • Icon Blinking = true • Display Color = WHITE • Blink-off Color = RED **Latest Alarm Message** • Display Color = WHITE **Continuous Functional Test Workspace** **Continuous – 2001** • Cont. Icon Blinking = true • Display Color = WHITE • Blink-off Color = RED • Alarm Aux Color = RED **Tank Icon Test-201** • Icon Blinking = true • Display Color = WHITE • Blink-off Color = RED **Latest Alarm Message** • Display Color = WHITE	
8.	Acknowledge alarm messages and hide the Point Processing Functional Test workspaces.	Verify the following: beep is silenced Point Processing Functional Test workspaces are hidden.	

6.6 LOGGING

6.6.1 Current

The data files in this section are created upon system startup and then around midnight are closed and moved to the history directory and another file with the current date is created.

6.6.1.1 Alarm Logging

Step	Perform	Expected Result	Initial
1.	Examine the almhst_YYYY_MM_DD_HHmm.dat. Where YYYY = the year MM = the month DD = the day HH = the hour mm = the minute *To examine the files it may be necessary to stop G2®. The directory is located at f:\BackedUp\TMACSData\Current.*	Verify the following: • High/low alarm conditions and resets recorded • Format match the description given in the LMSI External Letter, RGG-SDI-99-001, *TMACS Data File Formats, Release 11.0.*	
2.	Examine the equip_fail_YYYY_MM_DD_HHmm.dat. Where YYYY = the year MM = the month DD = the day HH = the hour mm = the minute *To examine the files it may be necessary to stop G2®. The directory is located at f:\BackedUp\TMACSData\Current.*	Verify the following • Loss of communication messages are recorded • Format match the description given in the LMSI External Letter, RGG-SDI-99-001, *TMACS Data File Formats, Release 11.0.*	

6.6.1.2 Discrete Sensor Data Logging

Step	Perform	Expected Result	Initial
1.	Examine the discrete_sensor_history_YYYY_MMDD.ascii. Where YYYY – is the year created MM – is the month created DD – is the day created *To examine the file it may be necessary to stop G2®. The directory is located at f:\BackedUp\TMACSData\Current.*	Verify the following: • Reading messages are being recorded properly. • Format match the description given in the LMSI External Letter, RGG-SDI-99-001, *TMACS Data File Formats, Release 11.0.*	

6.6.1.3 Continuous Sensor Data Logging

Continuous sensor history is recorded in the continuous_sensor_history_YYYY_MMDD.ascii file where

YYYY – is the year that the file was created.
MM – is the month that the file was created.
DD – is the day that the file was created.

To examine the file it may be necessary to stop G2®. The directory is:

- f:\BackedUp\TMACSData\Current.

Step	Perform	Expected Result	Initial
1.	Examine the continuous_sensor_history _YYYY_MMDD.ascii. Where YYYY – is the year created MM – is the month created DD – is the day created *To examine the file it may be necessary to stop G2®. The directory is located at f:\BackedUp\TMACSData\Current.*	Verify the following: • Reading messages are being recorded properly. • Format match the description given in the LMSI External Letter, RGG-SDI-99-001, *TMACS Data File Formats, Release 11.0.*	

6.6.2 Nightly File Creations

Eight files are created nightly by TMACS (*rdbms files are created around 4:00 AM, all others created around 12:00 AM)*

Step	Perform	Verify	Initial
1.	Let the system run over night. (*Note: Test Director may opt to change the system clock to simulate overnight. This requires time periods around midnight and 4 AM)* Check the location f:\BackedUp\TMACSData\ History to determine if the files have been created.	Verify that the following flat files are created: • almhst_yyyy_mmdd_mmss.dat • continuous_sensor_history yyyy_mmdd.ascii • discrete_sensor_history_yyyy_mmdd.ascii • equip_fail_yyyy_mmdd_mmss.dat • perf_data_yyyy_mmdd.dat • test_tank_history_yyyy_mmdd.ascii • dst_data_yyyy_mmdd_mmss.rdbms • sst_data_yyyy_mmdd_mmss.rdbms where: yyyy = the year mm = the month dd = the day hh = the hour mm = the minute Verify that the fields in the files match the description given in the LMSI External Letter, RGG-SDI-99-001, *TMACS Data File Formats, Release 11.0.*	

6.7 PERFORMACE

6.7.1 CPU Use Vs Number of Continuous Points/Sec Performance Test

Step	Perform	Expected Result	Initial
1.	On the Point Processing Performance Test workspace click on the "**CPU Use Versus Number of Continuous Points/Sec**" button.	Verify the correct workspace is shown.	
2.	Click on the "Start Performance Test" button. After the **Test Running** box turns to FALSE examine the results. (*The test will take about **20 minutes** to run*)	Verify the test runs and that the %CPU/pt/sec values are less than 0.94 for all values of points/second.	
3.	Click on the "Print" button.	Verify that the workspace prints. Attach the printout to this test procedure.	
4.	Hide the Performance Test workspace(s)	Verify the workspace(s) is hidden.	

6.7.2 CPU Use Vs Number of Discrete Points/Sec Performance Test

Step	Perform	Expected Result	Initial
1.	On the Point Processing Performance Test workspace click on the "**CPU Use Versus Number of Discrete Points/Sec**" button.	Verify the correct Performance Test workspace is shown.	
2.	Click on the "Start Performance Test" button. After the **Test Running** box turns to FALSE examine the results. (*The test will take about **20 minutes** to run*)	Verify that the test runs and that the %CPU/pt/sec values are less than 0.82 for all values of points/second.	
3.	Click on the "Print" button.	Verify that the workspace prints. Attach the printout to this test procedure.	
4.	Hide the Performance Test workspace(s)	Verify the workspace(s) is hidden.	

6.7.3 CPU Use Vs Pt-Processing Function for Continuous Points Performance Test

Step	Perform	Expected Result	Initial
1.	On the Point Processing Performance Test workspace click on the Click on the "**CPU Use Versus Point-Processing Function for Continuous Points**" button.	Verify the correct Performance Test workspace is shown.	
2.	Click on the "Start Performance Test" button. After the **Test Running** box turns to FALSE examine the results. (*The test will take about **20 minutes** to run*)	Verify that the test runs and that for each Point Processing Breakdown that the following criteria are met. Update Pt. the %CPU per points/sec < 0.23 Delta Check the %CPU per points/sec < 0.15 Alarm Check the %CPU per points/sec < 0.07 ROC Check the %CPU per points/sec < 0.12 Log to Disk the %CPU per points/sec < 0.57	
3.	Click on the "Print" button.	Verify that the workspace prints. Attach the printout to this test procedure.	
4.	Hide the Performance Test workspace	Verify the workspace is hidden.	

6.7.4 CPU Use Vs Point-Processing Function for Discrete Points Performance Test

Step	Perform	Expected Result	Initial
1.	On the Point Processing Performance Test workspace click on the Click on the "**CPU Use Versus Point-Processing Function for Discrete Points**" button.	Verify the correct Performance Test workspace is shown.	
2.	Click on the "Start Performance Test" button. After the **Test Running** box turns to FALSE examine the results. (*The test will take about **20 minutes** to run*)	Verify that the test runs and that for each Point Processing Breakdown that the following criteria are met. for Update Pt. the %CPU per points/sec < 0.28 for Alarm Check the %CPU per points/sec < 0.07 for Log to Disk the %CPU per points/sec < 0.57	
3.	Click on the "Print" button.	Verify that the workspace prints. Attach the printout to this test procedure.	
4.	Hide the Performance Test workspace	Verify the workspace is hidden.	

6.8 SERVICE REQUESTS

6.8.1 SR 80 – Temperature values hard to read

Step	Perform	Expected Result	Initial
1.	Select a tank at random and call up it's workspace.	Verify that the temperature values are readable.	

6.8.2 SR 82 – Tank icons hard to read

Step	Perform	Expected Result	Initial
1.	View the Hanford Tank Farm Facilities workspace.	Verify that the tank numbers are readable.	

6.8.3 SR 99 – C-106 Sensor Configuration Changes

Step	Perform	Expected Result	Initial
1.	Call up the workspace for Tank C-106.	Verify that the pressure sensor is associated with Riser 1.	

6.8.4 SR 104 – Make TMACS colors readable

Step	Perform	Expected Result	Initial
1.	Select the Display Current Alarm button on the main screen.	Verify that the Current Alarms screen is displayed and that the wording for the alarms is readable. (*May have to generated some alarms.*)	

6.8.5 SR 114 – Convert TX Farm Trend Graphs To Trend Charts

Step	Perform	Verify	Initial
1.	Run an inspect command to display the class for the Trends in the TX farm.	Verify that the trends are identified as charts.	
2.	Display a few individual sensor trends at random from the TX farm.	Verify that the trends are properly displayed and that the data displayed is appropriate for the sensor chosen.	
3.	Display a few selectable sensor trends at random from the TX farm.	Verify that the trends are properly displayed and that the data displayed is appropriate for the sensors chosen.	

6.8.6 SR 129 – Upgrade All Selectable Trend Graphs To Trend Charts

Step	Perform	Verify	Initial
1.	Run an inspect command to display workspaces with trend graphs.	Verify that none are found.	
2.	Display a few individual sensor trends at random	Verify that the trends are properly displayed and that the data displayed is appropriate for the sensor chosen.	
3.	Display a few selectable sensor trends at random.	Verify that the trends are properly displayed and that the data displayed is appropriate for the sensors chosen.	

6.8.7 SR 458 – Change the time that the nightly flat files are created

Step	Perform	Verify	Initial
1.	Let the system run over night. (*Note: Test Director may opt to change the system clock to simulate overnight. This requires time periods around midnight and 4 AM)* Check the location	Verify that the following flat files are created: almhst_yyyy_mmdd_mmss.dat continuous_sensor_history yyyy_mmdd.ascii discrete_sensor_history_yyyy_mmdd.ascii equip_fail_yyyy_mmdd_mmss.dat perf_data_yyyy_mmdd.dat test_tank_history_yyyy_mmdd.ascii dst_data_yyyy_mmdd_mmss.rdbms sst_data_yyyy_mmdd_mmss.rdbms	

	f:\BackedUp\TMACSData\ History to determine if the files have been created.	where: yyyy = the year mm = the month dd = the day hh = the hour mm = the minute	

6.8.8 SR 471 – Sensor Trends display sensor identifier as tag list identifier

Step	Perform	Verify	Initial
1.	Select at random several individual sensor trends.	Verify that the sensor tag name is displayed and that it matches the tag list.	

6.8.9 SR 660 – Convert TMACS from UNIX™ to WindowsNT™

Running the test procedures in the previous sections completes this service request.

6.8.10 SR 704 – Redirection of I/O Drivers from Production to Development

Step	Perform	Verify	Initial
1.	Use the inspect command to display the GSI™ connection configuration attribute of the GSI_Interface objects for both development and production. (*Except for the ODBC interface which is limited to TMACSPROD due to licensing restrictions.*)	Verify that the tcp-ip-host is identified as "local host".	

6.8.11 SR 748 – Enraf® Drivers polls with incorrect message

Step	Perform	Verify	Initial
1.	While the Enraf® bridge and G2® are running, connect the serial analyzer and the ENRAF® emulator to the appropriate serial port. Enable and disable the gsi_interface associated with the ENRAF®. Note: *If using a enraf® connected to a code-operated switch then the transmitted message will be preceded with the arming character (<SOH>, hex or decimal 01) followed by line number which is an ASCII 0-7*	Verify that the serial analyzer is displaying the proper Embedded Host Command to the Enraf® CIU. The B-record command format from TMACS to the CIU is: <STX>[CIU][Gauge][Instrument][Record]<ETX>[BCC] The fields are defined as follows: <STX> - Start Text Character, hex or dec 02 [CIU] - CIU Address, ASCII digits 0-9 [Gauge] - Gauge Address. ASCII digits 00 -99 [Instrument] – Type of Instrument, "B" for type 954 gauge [Record] – Type of Record, "B" for value and alarm status <ETX> - End of Text Character, hex or dec 03 [BCC] – Block Check Character	
		Verify that the serial analyzer is displaying the command response: <STX>[CIU][Gauge][Record][Instr][AS][LS][Level]<ETX>[BCC] where the first 5 fields and last 2 fields are the same as in the Host command format. The other fields are defined as: [AS] - Alarm Status (can be "B", "C", "F", "H", "L" or "-"). [LS] - Level Status (can be "B", "C", "D", "F", "L", "R", "T", "W" or "-"). [Level] - Level Value in 1/100th of an inch in the form of NNNNNN (6 decimal digits with implied decimal point after the fourth digit).	

6.8.12 SR 749 – TMACS Alarm Printer gsi_interface configuration

Step	Perform	Verify	Initial
1.	Display the table for the TMACS Alarm Printer gsi_interface.	Verify that the gsi™ connection configuration attribute identifies the TCP-IP Host as local host and the Port Number as 22300.	

6.8.13 SR 757 – Enraf® does not handle "FFFFFF" error message correctly.

Presently the ENRAF® emulator does not support the creation of the "FFFFFF". This feature will not be tested.

6.8.14 SR 762 – U-108 Enraf® conversion formula

Step	Perform	Verify	Initial
1.	Display the conversion formula for the U-108 Enraf® level gauge.	Verify that the offset value in the formula is 154	

6.8.15 SR 763 – Fix Reference Junction Formulas

Step	Perform	Verify	Initial
1.	Run an inspect command that displays the reference junctions that have a function definition not equal to temp_convert. *Temp convert is set to the following:* *Displayed Value = 0.18 * x + 32.0.* *Where x is the raw value from the acromag™*	Verify nothing is displayed	

6.8.16 SR 769 – Sensor Detail Button on Individual Sensor Trends

Running the test procedures in the section 6.3.1, "Operation of Sensor Trends" completes this service request.

6.8.17 SR 770 – Make TMACS Surface Level function definitions uniform

Step	Perform	Verify	Initial
1.	Run an inspect command to display the TMACS Surface Level function definitions.	Verify the definitions are correct and consistent.	

6.8.18 SR 771 – Add Discrete Update Button to TMACS displays containing Discrete I/O points

Step	Perform	Verify	Initial
1.	Using the inspect command generate a list of tanks that have discrete io points. [**i.e** show on a workspace every kb-workspace W1 such that there exists a tank TNK upon W1 and there exists a subworkspace W2 of TNK such that (there exists a discrete-io-point PT1 upon W2)] Select a few tanks at random from this list.	Verify that the Discrete Update button is present.	
2.	Press the update button. (*Make sure that the emulator is connected and communication as the device being examined.*)	Verify the discrete status icons momentarily turn white (lost communication) then return to the original status color. Verify the current alarms screen displays a white lost communication message followed by a white established communication message for the io-station that the discrete io-point is associated with.	

6.8.19 SR 772 – Correct TMACS Data History Recovery

Step	Perform	Verify	Initial
1.	Display the trends for the same sensors that were selected from production system prior to running this test. (See Prerequisites)	Verify the trends are comparable	

6.8.20 SR 775 – Fix Abort Problem When Discrete Values Are Outside Instrument Limits

Step	Perform	Verify	Initial
1.	Using the Acromag™ emulator generate an out of range value for a discrete io-point. Display the system logbook.	Verify the system log does not display an abort message for the procedure named "log-discrete-io-point-to-disk".	

6.8.21 SR 782 – File Read Status On TMACS Startup

Running the test procedures in the section 6.1.1 "Startup" completes this service request.

6.8.22 SR 783 – Correct Scaling problem with Individual Sensor Trends

Step	Perform	Verify	Initial
1.	Select a sensor at random. Generate history data for that sensor that is lower than the low alarm limit. (With in 5 times the alarm limit span) Display the individual sensor trend for the sensor selected.	Verify that the both the data and the alarm limits are displayed on the individual trend chart.	

Step	Perform	Verify	Initial
2.	Select a sensor at random. Generate history data for that sensor that is greater than the high alarm limit. (Within 5 times the alarm limit span) Display the individual sensor trend for the sensor selected.	Verify that the both the data and the alarm limits are displayed on the individual trend chart.	

6.8.23 SR 784 – Modify TMACS continuous point processing to assure at least one reading a day

Step	Perform	Verify	Initial
1.	Have Test Director start the continuous sensor emulator (i.e. Acromag™ emulator). (*Note: Acromag™ emulator does not support code-operated-switch*) Let the system run over night. (*Note: Test Director may opt to change the system clock to simulate overnight.)*	Verify that the current continuous sensor history file contains at least one reading for each of the sensors emulated by the connected emulator.	

6.8.24 SR 791 – Label Trend Charts that include 2 risers

Step	Perform	Verify	Initial
1.	Inspection of the system has determined that only two tanks did not have the riser labels. The tanks are as follows: BY110 C106 Display the user selectable (multiple) trend charts for the listed tanks.	Verify the riser labels are present and correct.	

6.8.25 SR 823 – Modify User Trend charts to support persistence.

Step	Perform	Verify	Initial
1.	Click any enabled Tank Icon in the Hanford Tank Farm Facilities. *(The icon will not be gray.)* Click on a USER SELECTABLE TRENDS button. *(located at the bottom of the Tank Status workspace.)*	Verify that the USER SELECTABLE TRENDS workspace appears.	
2.	Click any "SELECT TIME INTERVAL" option.	Note the time interval here _____ Verify the following: • A black dot appears in the circle of the time interval selected. • The Sensor Reading Description is modified according to the SELECT TIME INTERVAL chosen. (*Note: Trend graph is not updated automatically*)	
3.	Click on the UPDATE GRAPH button	Verify the Graph/Chart is updated and has the following: • The current value for each sensor on the trend graph approximates the current value on the digital display. • The values line matches the symbol for each sensor. • Trend graph label *(below the x-axis of the graph)* reads: "TANK **xx-yyy** SELECTED SENSORS INDICATED BY X" Where "**xx-yyy**" represents the name of the tank. The time scale of the horizontal time axis is based on the SELECT TIME INTERVAL chosen.	
4.	Click on the HIDE WINDOW.	Verify that the workspace is hidden.	
5.	Redisplay the same USER SELECTABLE TREND.	Verify the USER SELECTABLE TRENDS workspace is displayed and	

Step	Perform	Verify	Initial
		the following: • A black dot appears in the circle of the time interval selected as noted previously. • The Sensor Reading Description is according to the SELECT TIME INTERVAL. • The current value for each sensor on the trend graph approximates the current value on the digital display. • The values line matches the symbol for each sensor. • Trend graph label *(below the x-axis of the graph)* reads: "TANK **xx-yyy** SELECTED SENSORS INDICATED BY X" Where "**xx-yyy**" represents the name of the tank. • The time scale of the horizontal time axis is based on the SELECT TIME INTERVAL.	

6.8.26 SR 828 – Re-Span SY101 ENRAF

Step	Perform	Expected Result	Initial
1.	Call up the sensor details for the ENRAF level sensor on Tank SY101. *(Sensor details is accessed through the button in the upper right hand corner on the individual sensor trend workspace.)*	Verify the sensor details for the sensor are displayed and that the Formula Expression is as follows: "SurLev-convert-100 (x) = (0.01 * x)"	
2.	Use the Formula expression and Raw Value from the sensor details button on the sensor's trend to calculate the current reading for the	Write the value here _____	

Step	Perform	Expected Result	Initial
	sensor.		
3.	Compare the Current Reading with the reading in Step 2.	Verify that the readings are the same.	
4.	Examine the trend chart for this sensor.	Verify that the value graphed approximates the value recorded in Step 2. *(Note: Three or more points are needed for auto scaling.)*	

6.9 TMACS SHUTDOWN

6.9.1 Telewindows® Session

Step	Action	Verify	Initial
1.	On the TMACS screen, type Control-Y.	Verify that the user mode selection workspace appears on the screen.	
2.	Edit the 'G2® user mode' to be "shutdown" and click on the END.	Verify that a warning message appears indicating that this function is not available. Verify the 'G2® user mode' has reverted back to "t2-user".	

6.9.2 Central Console

Step	Action	Verify	Initial
1.	On the TMACS screen, type Control-Y.	Verify that the user mode selection workspace appears on the screen.	
2.	Edit the 'G2® user mode' to be "shutdown" and click on the END.	Verify that G2® terminates.	

Step	Action	Verify	Initial
3.	As part of the shutdown process TMACS creates the following files in the directory F:\BackedUp\TMACS\Data\Current: • Continuous_Shutdown_History_ YYYY_MMDD.ascii. • Discrete_Shutdown_History_ YYYY_MMDD.ascii. Where: YYYY – is the year that the file was created. MM – is the month that the file was created. DD – is the day that the file was created.	Verify that the files were created and the format match the description given in the LMSI External Letter, RGG-SDI-99-001, *TMACS Data File Formats, Release 11.0.*	

7. EXCEPTION SHEETS

The following page is an example of the form used to describe exceptions found during the running of this Acceptance Test Procedure. If exceptions are found, copies of this sheet should be completed and included in the Acceptance Test Report.

Acceptance Test Procedure
Exception Record

Exception No.	Step No.	Date
Originator/Organization		
Description:		
Resolution:		
Resolution Date:		

Title/Organization	Signature	Date
Test Director		
Cognizant Engineer		
QA		
ESH		
Safety		

8. PARTICIPATION RECORD SHEET

The following page is an example of the form used record the participants involved in the running of this Acceptance Test Procedure. This sheet should be completed and included in the Acceptance Test Report.

Acceptance Test Procedure
Participation Record

_____ _____

TEST DIRECTOR

TEST PERFORMANCE GROUP

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

TEST WITNESS

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

9. ACCEPTANCE RECORD SHEET

The following page is the form used record the participants involved in the running of this Acceptance Test Procedure. This sheet should be completed and included in the Acceptance Test Report.

Acceptance Test Procedure
Acceptance Record

CERTIFICATION OF SATISFACTORY EXECUTION

All of the test cases for this test procedure have been tested and all exceptions for this test procedure have been resolved.

_____ _____
Test Director

_____ _____
Cognizant Engineer

_____ _____
Quality Assurance

_____ _____
Safety

_____ _____
Environmental Health

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Process Control	Date 4/23/99
Project Title/Work Order		EDT No. N/A
Tank Monitor and Control System (TMACS) Acceptance Test Procedure (ATP)		ECN No. 653555

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
D. A. Barnes	R2-11	X			
D. C. Board	S7-07	X			
S. C. Cantrell	R3-47	X			
J. A. Glasscock	R1-01	X			
M. J. Holm	R2-11	X			
N. W. Kirch	R2-11	X			
P. C. Miller	R1-51	X			
D. A. Selle	S5-03	X			
L. E. Thomas	R3-01	X			
R. P. Tucker	T4-07	X			
R. R. Wandling	R1-01	X			