WBN2Public Resource

From: Boyd, Desiree L [dlboyd@tva.gov]
Sent: Wednesday, July 13, 2011 1:28 PM
To: Epperson, Dan; Poole, Justin; Raghavan, Rags; Milano, Patrick; Campbell, Stephen
Cc: Crouch, William D; Hamill, Carol L; Boyd, Desiree L
Subject: TVA letter to NRC_07-13-11_2-PTI-261-01 transmittal to NRC
Attachments: 07-13-11_2-PTI-261-01 transmittal to NRC_Final.pdf

Please see attached TVA letter that was sent to the NRC today.

Thank You,

~*~*~*~*~*~*~*~*~*~*~*~

Désireé L. Boyd
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Sun Technical Services
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Hearing Identifier: Watts_Bar_2_Operating_LA_Public
Email Number: 453

Mail Envelope Properties (7AB41F650F76BD44B5BCAB7C0CCABFAF20CEB7E3)

Subject: TVA letter to NRC_07-13-11_2-PTI-261-01 transmittal to NRC
Sent Date: 7/13/2011 1:27:37 PM
Received Date: 7/13/2011 1:28:39 PM
From: Boyd, Desiree L

Created By: dlboyd@tva.gov

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Post Office: TVANUCXVS2.main.tva.gov

Files	**Size**	**Date & Time**
MESSAGE	307	7/13/2011 1:28:39 PM
07-13-11_2-PTI-261-01 transmittal to NRC_Final.pdf	435758	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

July 13, 2011

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

Subject: Watts Bar Nuclear Plant (WBN) Unit 2 - Submittal of Pre-op Test Instruction

The following approved WBN Unit 2 Pre-op Test Instruction (PTI) is enclosed:

PTI NUMBER	Rev.	TITLE
2-PTI-261-01	0	Integrated Computer System Functional Test

If you have any questions, please contact Pete Olson at (423) 365-3294.

Respectfully,

David Stinson
Watts Bar Unit 2 Vice President

Enclosure
cc (Enclosure):

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WATTS BAR NUCLEAR PLANT

UNIT 2 STARTUP

TITLE: INTEGRATED COMPUTER SYSTEM FUNCTIONAL TEST

Instruction No: 2-PTI-261-01

Revision No: 0000

PREPARED BY: E A PRATER _____ DATE 8/23/10

PRINT NAME/ SIGNATURE

REVIEWED BY: A B LOWE _____ DATE 8/23/10

PRINT NAME/ SIGNATURE

INSTRUCTION APPROVAL

JTG MEETING NO: 2-11-012

JTG CHAIRMAN: _____ DATE 6/30/11

APPROVED BY: _____ DATE 6/30/11

PREOPERATIONAL STARTUP MANAGER

TEST RESULTS APPROVAL

JTG MEETING NO: _____

JTG CHAIRMAN: _____ DATE _____

APPROVED BY: _____ DATE _____

PREOPERATIONAL STARTUP MANAGER

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0000	6/30/11	ALL	Initial Issue

Table of Contents

Table of Contents (continued)

1.0 INTRODUCTION

1.1 Test Objectives

A. This Preoperational Test Instruction (PTI) will demonstrate the proper functionality and performance of the Integrated Computer System (ICS).

1. Demonstrate the ICS has been internally wired properly and that the internal CPU, Inputs and Outputs (I/O) and analog converters function as designed.

2. Demonstrate the functionality of the ICS conversion, printout or visual display, of process parameters.

3. Demonstrate the ICS software functions are processed accurately by the hardware.

1.2 Scope

NOTES

1) Field inputs to ICS will be simulated from the ICS terminal blocks.
2) Field calibration and functional tests of the field components that inputs to the ICS will be tested through the input system's component tests, PTI's and/or ATI's.
3) Accurate processing and display of analog and digital inputs using the ICS will be tested through the input system's component tests, PTI's and/or ATI's.
4) Field points that are received through data links will be tested through the input system's component tests, PTI's and/or ATI's.
5) If necessary, work order (WO) 111281636 will test any ICS field point(s) or ICS interface(s) that was not previously tested, by other system's component test(s), PTI's and/or ATI's.
6) All tests will be performed by WBN Unit 2 Preoperational Startup Engineering (PSE) and Computer Engineering Group (CEG) personnel.

A. The overall scope of this PTI is to demonstrate the following:

1. Software functions are processed accurately by the hardware.

2. Control processing and peripheral hardware functions as designed.

3. The ICS will appropriately process input signals.

1.2 Scope (continued)

B. This PTI includes:

1. Redundant Component Test: Redundant Component Test demonstrates the reliability of the ICS.

2. Plant Engineering Data System (PEDS) Interface Test: PEDS Interface Test demonstrates the proper functionality of the external data link to the ICS.

3. Human Machine Interface (HMI) Devices and Printers Test: HMI and Printers Test demonstrate that all applicable ICS HMI devices and printers are installed and functioning as designed.

4. ICS Security Test: ICS Security Test demonstrates the ICS security features. This test demonstrates only authorized users, at authorized locations, can make system changes.

5. ICS Input / Output Test (ICSIOPT): ICSIOPT demonstrate the proper functionality of the data acquisition hardware; including the prefabricated adapter cables and that the ICS properly identifies, processes and displays them.

6. Digital Outputs to Ronan Test: Digital Outputs to Ronan Test demonstrate the functionality of the Ronan Annunciator windows driven by the ICS digital outputs.

2.0 REFERENCES

2.1 Performance References

A. SMP-9.0, CONDUCT OF TEST, Rev 0

2.2 Developmental References

A. SMP-4.0, SYSTEM TURNOVER, Rev 2

B. SMP-8.0, ADMINISTRATION OF PREOPERATIONAL TEST INSTRUCTIONS, Rev 4

C. Final Safety Analysis Report (FSAR)

1. FSAR-Amendment 99

a. Chapter 14, Table 14.2-1, Sheet 54 of 89

D. 2-TSD-261-1, Rev 1

E. EDCR 52322, Rev A

F. Drawings

1. Electrical

a. 2-45W2697, Series (Series is currently Rev 0), ICS Connection, Layout, Wiring and Power Diagrams

b. 2-47A615-0, Rev 1, Integrated Computer System Series Analog Termination & I/O List

c. 2-45W600-55-2, Rev 0, Wiring Diagram Annunciator System Key Diagram Panel 1A

d. 2-45W600-55-6, Rev 0, Wiring Diagram Annunciator System Key Diagram Panel 3A

e. 2-45W600-55-10, Rev 0, Wiring Diagram Annunciator System Key Diagram Panel 4B

f. 2-45W600-55-13, Rev 0, Wiring Diagram Annunciator System Key Diagram Panel 5A

2.2 Developmental References (continued)

g. 2-45W600-55-14, Rev 0, Wiring Diagram Annunciator System Key Diagram Panel 5B

h. 2-45W600-55-20, Rev 1, Wiring Diagram Annunciator System Key Diagram Panel 6D

i. 2-45B655-1A, Rev 0, Main Control Room Annunciator Inputs Window Box XA-55-1A

j. 2-45B655-3A, Rev 0, Main Control Room Annunciator Inputs Window Box XA-55-3A

k. 2-45B655-4B, Rev 0, Main Control Room Annunciator Inputs Window Box XA-55-4B

l. 2-45B655-5A, Rev 0, Main Control Room Annunciator Inputs Window Box XA-55-5A

m. 2-45B655-5B, Rev 0, Main Control Room Annunciator Inputs Window Box XA-55-5B

n. 2-45B655-6D, Rev 1, Main Control Room Annunciator Inputs Window Box XA-55-6D

o. 2-45B655-E1A, Rev 0, Electrical Annunciator Window Box XA-55-1A Engraving

p. 2-45B655-E3A, Rev 0, Electrical Annunciator Window Box XA-55-3A Engraving

q. 2-45B655-E4B, Rev 0, Electrical Annunciator Window Box XA-55-4B Engraving

r. 2-45B655-E5A, Rev 0, Electrical Annunciator Window Box XA-55-5A Engraving

s. 2-45B655-E5B, Rev 0, Electrical Annunciator Window Box XA-55-5B Engraving

t. 2-45B655-E6D, Rev 1, Electrical Annunciator Window Box XA-55-6D Engraving

3.0 PRECAUTIONS AND LIMITIATIONS

A. Standard precautions shall be followed for working around energized electrical equipment in accordance with TVA Safety Manual Procedure 1021.

B. Steps may be repeated if all components cannot be tested in a step. However, if the test has been exited, prerequisite steps must be re-verified and a Chronological Test Log (CTL) entry made.

C. Discrepancies between component ID tags and the description in a procedure/instruction if the UNIDs match, exclusive of place keeping zeros and train designators (e.g.; 2-HS-31-468 vs. 2-HS-031-0468) and the noun description is sufficient to identify the component. This condition does not require a TDN in accordance SMP-14.0. If the component label needs to be changed, a Tag Request Form (TR Card) should be processed in accordance with TI-12.14. Make an entry in the CTL and continue testing.

D. All wires removed/lifted from a terminal shall be identified and taped or covered with an insulator to prevent personnel or equipment hazard and possible spurious initiations. The wires should be grouped together and labeled with the work implementing document number that required them to be lifted if left unattended.

E. All open problems are to be tracked by a corrective action document and entered on the appropriate system punchlist.

F. Problems identified during the test shall be annotated on the Chronological Test Log (CTL) from SMP-9.0 including a description of the problem, the procedure step when/where the problem was identified, corrective action steps taken to resolve the problem, and the number of the corrective action document, if one was required.

G. All Radiation Protection (RP) requirements shall be observed when working in or near contaminated areas.

H. Equipment hookup and removal steps may be performed out of sequence at the discretion of the Test Director (TD).

I. Ensure there are no adverse effects to the operation of Unit 1 structures, systems, or components.

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4.0 PREREQUISTE ACTIONS

NOTE

Prerequisite steps may be performed in any order unless otherwise stated and should be completed as close in time as practicable to the start of the instruction subsection to which they apply.

4.1 Preliminary Actions

[1] **VERIFY** the test/performance copy of this Preoperational Test Instruction (PTI) is the current revision including any change notices and as needed, each test person assisting in this test has the current revision including any change notices. _____

[2] **OBTAIN** copies of the applicable forms from the latest revision of SMP-9.0, **AND**

ATTACH to this PTI for use during the performance of this PTI. _____

[3] **ENSURE** changes to the references listed on Appendix A, have been reviewed, and determined NOT to adversely affect the test performance. _____

[4] **VERIFY** current revisions and change paper for referenced drawings has been reviewed and determined NOT to adversely affect the test performance, **AND**

ATTACH documentation of current drawing revision numbers change paper, that were reviewed, to data package. _____

[5] **EVALUATE** open items in Watts Bar Integrated Task Equipment List (WITEL), **AND**

ENSURE that they will NOT adversely affect the test performance. _____

[6] **ENSURE** the Factory Acceptance Test, required Component Testing, including the Site Acceptance Test, has been completed prior to start of test. _____

Data Package: Page ____ of ____ **Date _____**

4.1 Preliminary Actions (continued)

[7] **ENSURE** outstanding Design Change Notices (DCN's), Engineering Document Construction Release (EDCR's) or Temporary Alterations (TA's) do NOT adversely impact testing, **AND**

ATTACH documentation of DCN's, EDCR's and TA's that were reviewed to the data package. _____

[8] **ENSURE** a review of outstanding Clearances has been coordinated with Operations for impact to the test performance, **THEN**

RECORD in Appendix B, Temporary Condition Log, if required. _____

[9] **VERIFY** Measuring and Test Equipment (M&TE) calibration due dates will support the completion of this test performance. _____

NOTE

Any Annunciator points associated with 2-MUX-55-12 and 2-MUX-55-13 only have master switches at the bottom of each terminal strip.

[10] **ENSURE** System 55, Annunciator and Sequential Events Recording System applicable TBK switches are ON, the applicable Master Switches are ON, and window software input(s) are ENABLED for the following Annunciator windows.

A. 2-XA-55-4B/83-D (Subsection 6.4) _____

B. 2-XA-55-5B/100-A (Subsection 6.4) _____

C. 2-XA-55-6D/136-F (Subsection 6.4) _____

D. 2-XA-55-5A/91-C (Subsection 6.4) _____

E. 2-XA-55-1A/1-C (Subsection 6.4) _____

F. 2-XA-55-3A/46-C (Subsection 6.4) _____

G. 2-XA-55-1A/4-A (Subsection 6.4) _____

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4.1 Preliminary Actions (continued)

[11] **ENSURE** components contained within the boundaries of this test are under the jurisdictional control of Preoperational Startup Engineering (PSE) and/or Plant Operations. _____

[12] **PERFORM** a pretest walkdown on equipment to be tested to ensure no conditions exist that will impact test performance. _____

[13] **CONDUCT** a pretest briefing with Test and Operations personnel in accordance with SMP-9.0. _____

[14] **ENSURE** that communications are available for areas where testing is to be conducted. _____

[15] **DOCUMENT** the applicable software version that supports the performance of this Preoperational Test Instruction, in the table below.

VERSION	INITIALS

Data Package: Page ____ of ____ **Date _____**

4.2 Special Tools, Measuring and Test Equipment, Parts, and Supplies

[1] **ENSURE** the following M&TE or equivalent is available and within their calibration due dates, **THEN**

RECORD the M&TE data on SMP-9.0, Measuring and Test equipment (M&TE) Log. _____

- Voltmeter
- DC Voltage Source
- Biddle Temperature Injection °F.
- RTD 100 10–999Ω ± 0.062% of set.
- Digital Thermometer, 0-600°F.
- Voltage Tester, 0–48Vdc.
- Function Generator

[2] **ENSURE** the following equipment is available. _____

- Jumpers

Data Package: Page ____ of ____ **Date _____**

4.3 Field Preparations

[1] Field requirements for Subsection 6.1.1:

A. **VERIFY** the physical installation of all ICS equipment and interconnecting cables, applicable to the components tested in this subsection. _____

[2] Field requirements for Subsection 6.1.2:

A. **VERIFY** the physical installation of all external interface communication cables and networking equipment, applicable to the components tested in this subsection. At least one ICS HMI device MUST be installed. _____

[3] Field requirements for Subsection 6.1.3:

A. **VERIFY** the physical installation of all associated networking equipment, interconnecting cables and HMI equipment, applicable to the components tested in this subsection. _____

[4] Field requirements for Subsection 6.1.4:

A. **VERIFY** the physical installation of all ICS equipment and interconnecting cables, applicable to the components tested in this subsection. _____

[5] Field requirements for Subsection 6.2:

A. **VERIFY** the physical installation of data acquisition equipment, networking equipment, and interconnecting cables, applicable to the components tested in this subsection. At least one ICS HMI device must be installed. _____

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4.3 Field Preparations (continued)

[6] Field requirements for Subsection 6.3:

A. **VERIFY** the physical installation of all ICS equipment and interconnecting cables and System 55, Ronan Annunciator equipment, applicable to the components tested in this subsection, are available. _____

NOTE

2-XA-55-6D is located on 2-M-6 in the U2 Main Control Room (MCR). The alarm events display can be viewed at 2-M-21, CAB I, A (front side), Main Control Room (MCR), EL 755.

B. **VERIFY** the following:

RONAN LAMPBOX	RONAN WINDOW	WINDOW ENGRAVING	ALARM EVENTS DISPLAY MONITOR MESSAGE	INITIALS	CV
2-XA-55-6D	136F	PLANT COMPUTER TROUBLE	PLANT COMPUTER TROUBLE	_____	_____

Data Package: Page ____ of ____ **Date _____**

4.4 Approvals and Notifications

[1] **OBTAIN** permission of the Preoperational Startup Manager to start the test.

_____ _____

Preoperational Startup Manager Signature Date

[2] **OBTAIN** the Unit 2 Supervisor's (US/SRO) or Shift Manager's (SM) authorization.

_____ _____

U2 US/SRO/SM Signature Date

5.0 ACCEPTANCE CRITERIA

A. The overall acceptance criteria is DEFINED by the following:

1. The ICS has been internally wired properly and the internal CPU, peripheral devices, Input / Output (I/O) and analog converters function properly.

2. The calibration and function of the elements of the ICS, results in accurate processing and display of analog and digital input signals using the ICS.

3. Installed application programs perform as designed.

B. The overall acceptance criteria is DEMONSTRATED by the following:

1. Satisfactory completion of the following test:

a. Redundant Component test: Acceptable satisfactory completion of the Redundant Component test will be documented in Subsection steps 6.1.1[5], 6.1.1[10], 6.1.1[19], 6.1.1[30].

b. PEDS Interface Test: Acceptable satisfactory completion of PEDS Interface Test will be documented in Subsection step 6.1.2[2]H.

c. HMI Devices and Printers Test: Acceptable satisfactory completion of HMI Devices and Printers Test will be documented in Subsection step 6.1.3[3].

d. ICS Security Test: Acceptable satisfactory completion of ICS Security Test will be documented in Subsection steps 6.1.4[2]A, 6.1.4[2]C.

e. ICS Input / Output Test (ICSIOPT): Acceptable satisfactory completion of the ICSIOPT will be documented in Subsection steps 6.2.1[4], 6.2.2[3], 6.2.3[3].

f. Digital Outputs to Ronan Test: Acceptable satisfactory completion of the Digital Outputs to Ronan Test will be documented in Subsection steps 6.3[3], 6.3[5], 6.3[6].

Data Package: Page ____ of ____ **Date _____**

6.0 PERFORMANCE

6.1 ICS Functional Test

NOTES

1) Each subsection tests specific components and features of the ICS and may be performed in any order as deemed appropriate by the responsible TD.
2) Redundant Component Test demonstrates the reliability of the ICS to limited faults, such as redundant hardware items. This test include the following:

   Loss of Data Acquisition Switch A and B.

   Loss of ICS A and B.
3) PEDS Interface Test demonstrates the proper functionality of the PEDS data link to the ICS.
4) HMI Devices and Printers Test demonstrate that all applicable ICS HMI devices and printers are installed and functional.
5) ICS Security Test demonstrates the ICS security features. This test will demonstrate, only authorized users, at authorized locations, can make system changes.

6.1.1 Redundant Components

NOTE

The purpose of this test is to verify proper functionality of the ICS after the failure of a redundant component.

[1] **VERIFY** step 4.3[1] is COMPLETE. _____

NOTE

The following steps will simulate the loss of 2-XS-261-R153B, Data Acquisition Switch A, Computer Room [C3/708].

[2] **ACTIVATE**, on an SDS (Satellite Display System), a Group Display containing field inputs (i.e., Analog Inputs (AI's) or Digital Inputs (DI's)). _____

[3] **VERIFY** the qualities of the points are NOT INVL. _____

Data Package: Page ____ of ____ **Date _____**

6.1.1 Redundant Components (continued)

[4] **REMOVE** power cord, from the rear of 2-XS-261-R153B. _____
_____
CV

[5] **VERIFY** the qualities of the points are NOT INVL. (**Acc Crit**) _____

[6] **INSTALL** power cord, at rear of 2-XS-261-R153B. _____
_____
CV

NOTE

The following steps will simulate the loss of 2-XS-261-R154B, Data Acquisition Switch B, Computer Room [C3/708].

[7] **ACTIVATE** a Group Display containing field inputs (i.e., AI's or DI's), on an SDS. _____

[8] **VERIFY** the qualities of the points are NOT INVL. _____

[9] **REMOVE** power cord, from the rear of 2-XS-261-R154B. _____
_____
CV

[10] **VERIFY** the qualities of the points are NOT INVL. (**Acc Crit**) _____

[11] **INSTALL** power cord, at rear of 2-XS-261-R154B. _____
_____
CV

NOTES

1) The following steps will simulate the loss of ICS A.
2) Only the SDS's in the Computer Room (C3/708), when performing the following steps.
3) The computer indicator at bottom of a SDS shows which ICS computer is primary.

[12] **ENSURE** the ICS is functioning in primary with backup mode and ICS A is the primary processor. _____

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6.1.1 Redundant Components (continued)

[13] **RECORD** the primary processor.

Primary Processor: _____ _____

[14] **PRINT** the current ICS display, **THEN**

ATTACH it to this PTI. _____

[15] **ENTER** FAIL to cause a system failover, on an SDS. _____

[16] **SELECT** OK to activate the failover. _____

NOTE

Allow approximately one minute for SDS to become functional, after a failover.

[17] **VERIFY** that the failover occurs; **THEN**

VERIFY the SDS window is functional again. _____

[18] **PRINT** the same ICS display from step 6.1.1[14], **THEN**

ATTACH the printout to this PTI. _____

[19] **VERIFY**, by comparing printouts from steps 6.1.1[14] and 6.1.1[18], the SDS windows are displaying the same information. (**Acc Crit**) _____

[20] **VERIFY** the CPU indicator at the bottom of the SDS screen indicates the opposite CPU as recorded in step 6.1.1[13]. _____

[21] **VERIFY** that the system status is now primary with no backup. _____

NOTE

Allow 2-5 minutes.

[22] **VERIFY** that the system status is now primary with backup. _____

Data Package: Page ____ of ____ **Date _____**

6.1.1 Redundant Components (continued)

NOTES

1) The following steps will simulate the loss of ICS B.
2) Only the SDS's in the Computer Room (C3/708), when performing the following steps.
3) The computer indicator at bottom of a SDS shows which ICS computer is primary.

[23] **ENSURE** the ICS system is functioning in primary with backup mode and ICS B is the primary processor. _____

[24] **RECORD** the primary processor.

Primary Processor: _____ _____

[25] **PRINT** the current ICS display, **THEN**

ATTACH it to this PTI. _____

[26] **ENTER** FAIL to cause a system failover, on an SDS. _____

[27] **SELECT** OK to activate the failover. _____

NOTE

Allow approximately one minute for SDS to become functional, after a failover.

[28] **VERIFY** the failover occurs; **THEN**

VERIFY the SDS window is functional again. _____

[29] **PRINT** the same ICS display from step 6.1.1[25], **THEN**

ATTACH the printout to this PTI. _____

[30] **VERIFY,** by comparing printouts from steps 6.1.1[25] and 6.1.1[29], the SDS windows are displaying the same information as before the failover. (**Acc Crit**) _____

[31] **VERIFY** that the CPU indicator at the bottom of the SDS screen indicates the opposite CPU as recorded in step 6.1.1[24]. _____

[32] **VERIFY** that the system status is now primary with no backup. _____

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6.1.1 Redundant Components (continued)

NOTE
Allow 2-5 minutes.

[33] **VERIFY** that the system status is now primary with backup. _____

Data Package: Page ____ of ____ **Date _____**

6.1.2 Plant Engineering Data System (PEDS) Interface

[1] **VERIFY** step 4.3[2] is COMPLETE. _____

NOTE

Computer Room [C3/708] SDS's can be used to perform the following steps.

[2] **PERFORM** the following steps, to test the PEDS data link to the ICS:

A. **ENTER**, @COMM:KILLPMS, at a VMS prompt "$", on the PEDS VT terminal. (This will stop the currently executing PEDS client tasks.) _____

NOTE

Allow approximately 5 minutes for the system to initialize.

B. **ENTER** PMS, at a PEDS VT terminal. (This will initialize the PEDS data link with the ICS). _____

C. **VERIFY** ICS PEDLINK communication status flag PEDSLINK on ICS indicates UP. _____

D. **REVIEW** a sample of ICS point values on the PEDS, **THEN**

CONFIRM the sample points are being transferred. _____

E. **DISCONNECT** cable E1523, from 2-CPU-261-R152C, PEDS computer, Computer Room [C3/708]. _____

_____
CV

NOTE

Allow approximately 10 seconds, for status flag indication to update.

F. **VERIFY** ICS PEDSLINK communication status flag indicates DOWN, and ICS points on PEDS system indicates unreliable data. _____

Data Package: Page ____ of ____ **Date _____**

6.1.2 Plant Engineering Data System (PEDS) Interface (continued)

G. **CONNECT** cable E1523 to 2-CPU-261-R152C, PEDS computer, Computer Room [C3/708]. _____

_____
CV

NOTE

Allow approximately 10 seconds, for status flag indication to update.

H. **VERIFY** ICS PEDSLINK communication status flag indicates UP, and that a sample of the ICS points, on the PEDS system indicates the same quality as that of the associated point on the ICS. (**Acc Crit**) _____

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6.1.3 HMI Devices and Printers

[1] **VERIFY** step 4.3[3] is COMPLETE. _____

NOTES

1) The purpose of the following test is to verify that HMI devices and printers are installed and functional.
2) A HMI and printer can be determined functional by going through several functions available under the ICS menus. Log, reports, print and graphics are some examples.

[2] **PERFORM** the following steps to test the HMI devices:

A. Use the following table as a guide,

VERIFY all ICS HMI devices are functional by activating several ICS functions on each HMI:

HMI UNID	HMI LOCATION	INITIALS
2-MON-261-3A	2-M-19A (MCR BARGE)	
2-MON-261-3B	2-M-19A (MCR BARGE)	
2-MON-261-4A	2-M-16 (MCR BARGE)	
2-MON-261-4B	2-M-16 (MCR BARGE)	
2-MON-261-8A	2-M-19B (MCR BARGE)	
2-MON-261-8B	2-M-19B (MCR BARGE)	
2-MON-261-9	MCR EL 755	
2-MON-261-10	Computer Room [C3/708]	
2-MON-261-15	2-M-14 (MCR BARGE)	
2-MON-261-153	Computer Room [C3/708]	
2-MON-261-154	Computer Room [C3/708]	

Data Package: Page ____ of ____ **Date _____**

6.1.3 HMI Devices and Printers (continued)

B. Use the following table as a guide,

VERIFY all printers can function in their final configuration:

PRINTER UNID	PRINTER LOCATION	INITIALS
2-PLOT-261-10	Computer Room [C3/708]	
2-PLOT-261-16	MCR EL 755	

[3] **VERIFY** all HMI Devices and Printers, listed steps 6.1.3[2]A, 6.1.3[2]B, are functional. (**Acc Crit**) _____

Data Package: Page ____ of ____ **Date _____**

6.1.4 ICS Security

[1] **VERIFY** step 4.3[4] is COMPLETE. _____

NOTE

The following test will evaluate the ICS security features. This test will demonstrate, only authorized users, at authorized locations, can make system changes.

[2] **PERFORM** the following steps to test the HMI devices:

NOTE

2-MON-261-3A, 2-MON-261-3B, 2-MON-261-4A, 2-MON-261-4B, 2-MON-261-8A, 2-MON-261-8B and 2-MON-261-15 are located in the Horseshoe area of the U2 MCR C12/755.

A. **VERIFY** that only the SDS terminals in the Horseshoe area of the main control room (MCR-BOP, MCR-NSSS) have access to the following functions: Substitute Value, Temporary Alarm Limits, Alarm Acknowledge, and NSSS Message Acknowledge. (**Acc Crit**) _____

NOTE

2-MON-261-10, 2-MON-261-153 and 2-MON-261-154 are located in the Computer Room, [C3/708].

B. **VERIFY** that the Computer Room SDS terminals have access to the ICS administration functions only if the user is logged in as a “super user”. _____

C. **VERIFY** that all other SDS terminals cannot access the ICS system administration functions. (**Acc Crit**) _____

Data Package: Page ____ of ____ **Date _____**

6.2 ICS Input / Output Point Test (ICSIOPT)

NOTES

1) This test will simulate the input or output, at the ICS terminal strips. The purpose of this test is to demonstrate proper functionality of the data acquisition hardware, including the prefabricated adapter cables and that the ICS properly identifies, processes and displays them. A sample of inputs and outputs (analog, digital, sequence of events and pulse) are tested.
2) Subsections within this section can be performed in any order at the discretion of the Test Director.

6.2.1 Analog and Digital Inputs

[1] **VERIFY** step 4.3[5] is COMPLETE. _____

Data Package: Page ____ of ____ **Date _____**

6.2.1 Analog and Digital Inputs (continued)

NOTE

The following step avoids generating nuisance alarms in the control room during the performance of this test.

[2] **DELETE** the following Digital Output points, from processing:

COMPUTER POINT	DESCRIPTION	INITIALS	CV
Y9000C	PLANT COMPUTER GENERATED ALARMS		
Y9001C	RCP STATOR/MTR THRUST BRG TEMP HI		
Y9002C	ICS COMPUTER TROUBLE		
Y9004C	RC APPROACCHING SAT TEMP		
Y9005C	STAT COOLING WATER TEMP ANN MCR		
Y9006C	CONDENSER VACUUM LO		
Y9007C	GEN PRIMARY/SECONDAR RLY FAIL		

NOTE

Detail instructions for Analog, Digital and Sequence of Events Points are explained in Data Sheets 1, 2, and 3 respectively.

[3] **PERFORM** the Analog, Digital and Sequence of Events Input Point Verification Data Sheets. _____

[4] **VERIFY** the Analog, Digital and Sequence of Events points tested are within the values specified in the datasheets, **THEN**

ATTACH the applicable data sheets to this PTI. (**Acc Crit**) _____

Data Package: Page ____ of ____ **Date _____**

6.2.1 Analog and Digital Inputs (continued)

[5] **WHEN** step 6.2.1[4] is complete, **THEN**

RETURN the following Digital Output points to processing:

COMPUTER POINT	DESCRIPTION	INITIALS	CV
Y9000C	PLANT COMPUTER GENERATED ALARMS		
Y9001C	RCP STATOR/MTR THRUST BRG TEMP HI		
Y9002C	ICS COMPUTER TROUBLE		
Y9004C	RC APPROACCHING SAT TEMP		
Y9005C	STAT COOLING WATER TEMP ANN MCR		
Y9006C	CONDENSER VACUUM LO		
Y9007C	GEN PRIMARY/SECONDAR RLY FAIL		

Data Package: Page ____ of ____ **Date _____**

6.2.2 Pulse Points

[1] **VERIFY** step 4.3[5] is COMPLETE. _____

NOTE
Detailed instructions for Pulse Inputs are explained in Datasheet 4.

[2] **PERFORM** the Pulse Point Verification Data Sheets. _____

[3] **VERIFY** the Pulse Points tested are within the values specified in the datasheets, **THEN**

ATTACH the applicable data sheets to this PTI. (**Acc Crit**) _____

Data Package: Page ____ of ____ **Date _____**

6.2.3 Analog and Digital Outputs

[1] **VERIFY** step 4.3[5] is COMPLETE. _____

NOTE
Detailed instructions for Digital and Analog outputs are explained in Datasheets 5 and 6 respectively.

[2] **PERFORM** the Analog and Digital Outputs Verification Data Sheets. _____

[3] **VERIFY** Analog and Digital Output points tested are within the values specified in the datasheets, **THEN**

ATTACH the applicable data sheets to this PTI. (**Acc Crit**) _____

Data Package: Page ____ of ____ **Date _____**

6.3 Digital Outputs To Ronan Test

[1] **VERIFY** step 4.3[6] is COMPLETE. _____

NOTE
This test verifies the Ronan Annunciator windows driven by ICS digital outputs.

[2] **RECORD** the status of the ICS Outputs that drive RONAN alarm windows:

ICS PID	ALARM FUNCTION	RONAN LIGHTBOX	RONAN WINDOW	STATUS	CHANGES STATE	INITIALS
Y9000C	Plant Computer Generated Alarms	2-XA-55-4B	83D			
Y9001C	RCP STATOR/MTR THRUST BRG TEMP HI	2-XA-55-5B	100A			
Y9002C	ICS COMPUTER TROUBLE	2-XA-55-6D	136F			
Y9004C	RC APPROACHING SAT TEMP	2-XA-55-5A	91C			
Y9005C	STAT COOLING WATER TEMP ANN-MCR	2-XA-55-1A	1C			
Y9006C	CONDENSER VACUUM LOW	2-XA-55-3A	46C			
Y9007C	GEN PRIMARY/ SECONDAR RLY FAIL	2-XA-55-1A	4A			

Data Package: Page ____ of ____ **Date _____**

6.3 Digital Outputs To Ronan Test (continued)

NOTES

1) Detailed instructions for simulating a Digital Output are explained in Datasheet 5.
2) Entering GD 83DALARM, on a SDS station, will show the points making up 83D Ronan alarm contact output.
3) Substitute Value is a value that is inserted for a point that causes a BAD quality and that point will not process until it is restored to processing.

[3] **CHANGE** an ICS parameter for each RONAN alarm in step 6.3[2], **THEN**

VERIFY a change of state (digital output is functional), **THEN**

RECORD the change of state in step 6.3[2]. (**Acc Crit**) _____

[4] **ENSURE**, multiple alarm point, Y9000C will re-flash when each of the alarms is activated. _____

[5] **SIMULATE** a change of state for ICS point Y9002C, **THEN**

VERIFY 2-XA-55-6D, window 136F ALARMS. (**Acc Crit**) _____

[6] **RETURN** point Y9002C to its normal state, **THEN**

VERIFY 2-XA-55-6D, window 136F RETURNS TO NORMAL. (**Acc Crit**) _____

[7] **IF** the Substitute Value function was used in steps 6.3[3], 6.3[4] or 6.3[5], **THEN**

RESTORE all ICS points to normal processing. _____

_____
CV

Data Package: Page ____ of ____ **Date _____**

7.0 POST PERFORMANCE ACTIVITY

[1] **VERIFY** that Post-test calibration of the M&TE used to record quantitative acceptance criteria has been satisfactorily performed, **AND**

RECORD the results on Measuring and Test Equipment (M&TE) Log. _____

[2] **NOTIFY** the Unit 2 US/SRO of the test completion and system alignment. _____

8.0 RECORDS

A. QA Records

Complete Test Package.

B. Non-QA Records

None

Appendix A
(Page 1 of 1)

TEST PROCEDURES/INSTRUCTIONS REFERENCE REVIEW

NOTES

1) Additional copies of this table may be made as necessary.
2) Initial and date indicates review has been completed for impact

PROCEDURE/ INSTRUCTION	REVISION/CHANGES	IMPACT Yes/No	INITIAL AND DATE. (N/A for no change)
SMP-4.0			
SMP-8.0			
FSAR-Amendment 99 Table 14.2-1; Sheet 54 of 89			
2-TSD-261-1			

Appendix B
(Page 1 of 1)

TEMPORARY CONDITION LOG

Data Package: Page ____ of ____ **Date ________**

These steps will be N/A'd if no temporary condition existed. Additional copies of this table may be made as necessary.

ITEM No.	TEMPORARY CONDITION DESCRIPTION	PERFORMED		RETURNED TO NORMAL	
		Step No.	Performed By/Date CV By/Date	Step No.	Returned By/Date CV By/Date

Data Sheet 1
(Page 1 of 3)

Analog Input Verification

1.0 Description

The data sheets, in this section, contain a table for each AI point. Each point is identified with point specific information, detailing point scaling ranges and termination information, such as chassis, card and channel.

The information for each point includes a table for a 5 point check, spanning the reasonable limit range of the point. Expected values are listed for the input voltages, with blanks for recording the observed engineering unit values.

For thermocouple cards, the special thermocouple cable will be used with a thermocouple termination module and a secondary voltage source. The secondary voltage source will be configured to inject a voltage to produce a 32 DEGF reference temperature. As each thermocouple card is tested, verify that the reference temperature on the card is reading approximately 32 [31- 33] DEGF.

2.0 Sample Instructions

2.1 Analog Input (AI) Card

[1] **RUN** utility SUDECPLCZ, on the ICS primary system.

[2] **CONNECT** a voltage source to the applicable terminals, on the termination module, for the applicable card and channel, for each test point.

NOTE

Group Display (GD) or SHOW30 may also be used, for the step below.

[3] **ACTIVATE** a group display, on a SDS using the following command on the SDS, for each test point:

HW !XXXXXX* where XXXXXX is the card hardware channel address (e.g. HW !2A0000*)

Data Sheet 1
(Page 2 of 3)

Analog Input Verification

2.1 Analog Input (AI) Card (continued)

NOTES

1) If needed, the Single Value Display (SVD) turn on code or other similar means (at the Test Director's discretion) may be utilized to observe the point value to more decimal places than the GD or Hardware (HW) turn on codes displays. This can be done on a point by point basis as needed.
2) Input voltage values are indicated in the AI datasheet, for the step below.

[4] **RECORD** the displayed values, from the SDS, in the appropriate location, on the AI data sheets.

Data Sheet 1
(Page 3 of 3)

Analog Input Verification

2.2 Sample AI Data Sheet

NOTES

1) Each analog input card will be tested.
2) Refer to 2-47A615-0 for sample point information.
3) A minimum of two points per card will be tested.

Mux 2A00 Card 00 (2A0000*) Card Type: 8707/00-003

Point ID:SPAI0001 Point Type-Subtype:AI-TYPT Channel: 00
Point Description:SPARE AI CHANNEL Address: 2A000000
Reasonable Limit Range = 0. to 10. MV
Engineering Unit Range = 32. to 416. DEGF

% Range	Voltage Input	EU Value Expected	+/-	EU Value Observed
0.	0. MV	31.99 DEGF	2.00	_____
25.	2. MV	120.52 DEGF	2.00	_____
50.	5. MV	239.48 DEGF	2.00	_____
75.	7. MV	312.64 DEGF	2.00	_____
100.	10. MV	416.01 DEGF	2.00	_____

Point ID:SPAI0002 Point Type-Subtype:AI-TYPT Channel: 01
Point Description:SPARE AI CHANNEL Address: 2A000001
Reasonable Limit Range = 0. to 10. MV
Engineering Unit Range = 32. to 416. DEGF

% Range	Voltage Input	EU Value Expected	+/-	EU Value Observed
0.	0. MV	31.99 DEGF	2.00	_____
25.	2. MV	120.52 DEGF	2.00	_____
50.	5. MV	239.48 DEGF	2.00	_____
75.	7. MV	312.64 DEGF	2.00	_____
100.	10. MV	416.01 DEGF	2.00	_____

Data Sheet 2
(Page 1 of 2)

Digital Input Verification

1.0 Description

The data sheets, in this section, contain a table for each DI card. Each point is identified with point specific information, detailing the point's set and reset messages and termination information, such as chassis, card, and channel.

2.0 Sample Instructions

2.1 Digital Input (DI) Card

NOTES
1) If a voltage source is not already connected, follow the step below.
2) 48V points already have a voltage source wired to supply sense line voltage.

[1] **CONNECT** a voltage source, as applicable, to the applicable terminals, on the termination module, for the applicable card and channel, for each test point.

[2] **ACTIVATE** a group display, on a SDS, to display all the points on the card, using the following command on the SDS, for each card:

SHOW30 !XXXXXX* where XXXXXX is the card hardware channel address (e.g. SHOW30 !2A2000*)

[3] **OBSERVE** the state of the point with the contacts open, on the SDS, **THEN**

VERIFY that the correct state is displayed, for an open contact, for each test DI point on the card.

[4] **SHORT** the terminals, for the point, **OR**

CONNECT a voltage source to the applicable terminals, for each test point individually, **THEN**

OBSERVE the state of the point, with the contacts shorted, on the SDS, **THEN**

VERIFY that the correct state is displayed, for closed contact, for each test DI point, on the card.

Data Sheet 2
(Page 2 of 2)

Digital Input Verification

2.2 Sample DI Data Sheet

NOTES

1) Each digital input card will be tested.
2) Refer to 2-47A615-0 for sample point information.
3) A minimum of two points per card will be tested.

Mux 2A81 Chassis 1 Card 04 (2A8104*) Card Type: 8710/00-003

Point ID	Reset Message	Set Message	Channel	Invert	OK	
SPDI0286	RESET	SET	2A810400	N	___	(48 VDC)
SPDI0287	RESET	SET	2A810401	N	___	(48 VDC)
SPDI0288	RESET	SET	2A810402	N	___	(48 VDC)
SPDI0289	RESET	SET	2A810403	N	___	(48 VDC)
XD2076	PWR OFF	PWR ON	2A810404	N	___	(48 VDC)
XD2077	NOT RUN	RUNNING	2A810405	N	___	(48 VDC)
SPDI0290	RESET	SET	2A810406	N	___	(48 VDC)
SPDI0291	RESET	SET	2A810407	N	___	(48 VDC)
XD2085	PWR OFF	PWR ON	2A810408	N	___	(48 VDC)
XD2086	STOPPED	RUNNING	2A810409	N	___	(48 VDC)
SPDI0292	RESET	SET	2A810410	N	___	(48 VDC)
SPDI0293	RESET	SET	2A810411	N	___	(48 VDC)
XD2078	PWR OFF	PWR ON	2A810412	N	___	(48 VDC)
XD2027	NOT RUN	RUNNING	2A810413	N	___	(48 VDC)
XD2079	PWR OFF	PWR ON	2A810414	N	___	(48 VDC)
XD2080	NOT RUN	RUNNING	2A810415	N	___	(48 VDC)
SPDI0294	RESET	SET	2A810416	N	___	(48 VDC)
XD2003	PULLT-L	NOT P-L	2A810417	N	___	(48 VDC)
SPDI0295	RESET	SET	2A810418	N	___	(48 VDC)
SPDI0296	RESET	SET	2A810419	N	___	(48 VDC)
HD2036	NOT A A	A AUTO	2A810420	N	___	(48 VDC)
SPDI0297	RESET	SET	2A810421	N	___	(48 VDC)
SPDI0298	RESET	SET	2A810422	N	___	(48 VDC)

Data Sheet 3
(Page 1 of 2)

Sequence of Events Input Verification

1.0 Description

The data sheets, in this section, contain a table for each DS (SOE) card. Each point is identified with point specific information, detailing the point's set and reset messages and termination information, such as chassis, card, and channel.

2.0 Sample Instructions

2.1 Sequence of Events (SOE) Card

NOTES
1) If a voltage source is not already connected, follow the step below.
2) 48V points already have a voltage source wired to supply sense line voltage.

[1] **CONNECT** a voltage source as applicable, to the applicable terminals, on the termination module, for the applicable card and channel, for each test point.

[2] **ACTIVATE** a group display, on a SDS, to display all the points on the card, using the following command, on the SDS, for each card:

SHOW30 !XXXXXX* where XXXXXX is the card hardware channel address (e.g. SHOW30 !2A2000*)

[3] **OBSERVE** the state of the point, with the contacts open, on the SDS, **THEN**

VERIFY that the correct state is displayed, for an open contact, for each test SOE point on the card.

[4] **SHORT** the terminals, for the point, **OR**

CONNECT a voltage source to the applicable terminals, for each test point individually, **THEN**

OBSERVE the state of the point, with the contacts shorted, on the SDS, **THEN**

VERIFY that the correct state is displayed, for closed contact, for each test DI point, on the card.

Data Sheet 3
(Page 2 of 2)

Sequence of Events Input

2.2 Sample SOE Data Sheet

NOTES

1) Each sequence of events card will be tested.
2) Refer to 2-47A615-0 for sample point information.
3) A minimum of two points per card will be tested.

Mux 2A22 Chassis 2 Card 00 (2A2200*) Card Type: 8710/00-003

Point ID	Reset Message	Set Message	Channel	Invert	OK	
SPDS0001	RESET	SET	2A220000	N	___	(48 VDC)
Y0038D	NT SEL	SELECT	2A220001	N	___	(48 VDC)
Y0039D	NT SEL	SELECT	2A220002	N	___	(48 VDC)
SPDS0002	RESET	SET	2A220003	N	___	(48 VDC)
Y0100D	OPEN	CLOSED	2A220004	N	___	(48 VDC)
Y0101D	OPEN	CLOSED	2A220005	N	___	(48 VDC)
SPDS0003	RESET	SET	2A220006	N	___	(48 VDC)
Y0600D	OPEN	CLOSED	2A220007	N	___	(48 VDC)
Y0601D	OPEN	CLOSED	2A220008	N	___	(48 VDC)
Y1000D	NOT TR	TRIP	2A220009	N	___	(48 VDC)
Y1001D	NOT TR	TRIP	2A220010	N	___	(48 VDC)
Y2435D	OPEN	CLOSED	2A220011	N	___	(48 VDC)
Y2436D	OPEN	CLOSED	2A220012	N	___	(48 VDC)
SPDS0004	RESET	SET	2A220013	N	___	(48 VDC)
SPDS0005	RESET	SET	2A220014	N	___	(48 VDC)
SPDS0006	RESET	SET	2A220015	N	___	(48 VDC)
Y0004D	NOT TR	TRIP	2A220016	N	___	(48 VDC)
Y0005D	NOT TR	TRIP	2A220017	N	___	(48 VDC)
Y0006D	OPEN	CLOSED	2A220018	N	___	(48 VDC)
Y0007D	OPEN	CLOSED	2A220019	N	___	(48 VDC)
Y0026D	OPEN	CLOSED	2A220020	N	___	(48 VDC)
Y0027D	OPEN	CLOSED	2A220021	N	___	(48 VDC)
Y0335D	OPEN	CLOSED	2A220022	N	___	(48 VDC)
Y0336D	NOT OP	OPEN	2A220023	N	___	(48 VDC)

Data Sheet 4
(Page 1 of 2)

Pulse Point Verification

1.0 Description

The data sheets, in this section, contain a table for each PU card. Each point is identified with point specific information, detailing termination information, such as chassis, card, and channel.

2.0 Sample Instructions

2.1 Pulse Point (PU) Card

NOTE
GD or SHOW30 commands may also be used at the Test Director's discretion

[1] **ACTIVATE** a group display on a SDS, using the following command, on the SDS, for each test card:

HW !XXXXXX* where XXXXXX is the card hardware channel address (e.g. HW !2A2100*)

[2] **CONNECT** a function generator, configured to supply a 1 Hz signal to the input, **THEN**

VERIFY that the point is updating by approximately 1 each second, for each test point.

Data Sheet 4
(Page 2 of 2)

Pulse Point Verification

2.2 Sample Pulse Point Data Sheet

NOTES

1) Each pulse card will be tested.
2) Refer to 2-47A615-0 for sample point information.
3) A minimum of two points per card will be tested.

Mux 2A21 Chassis 1 Card 00 (2A2100*) Card Type: 8714/00-000

Point ID	Description	Channel	OK
C0001D	CTRL A STEP IN PULSE (U0049)	2A210000	___
C0002D	CTRL A STEP OUT PULSE (U0049)	2A210001	___
C0003D	CTRL B STEP IN PULSE (U0050)	2A210002	___
C0004D	CTRL B STEP OUT PULSE (U0050)	2A210003	___
C0005D	CTRL C STEP IN PULSE (U0051)	2A210004	___
C0006D	CTRL C STEP OUT PULSE (U0051)	2A210005	___
C0007D	CTRL D STEP IN PULSE (U0052)	2A210006	___
C0008D	CTRL D STEP OUT PULSE (U0052)	2A210007	___

Data Sheet 5
(Page 1 of 3)

Digital Output Verification

1.0 Description

The data sheets, in this section, contain a table for each Digital Output (DO) card. Each point is identified with point specific information, detailing the point's set and reset messages and termination information, such as chassis, card, and channel.

2.0 Sample Instructions

2.1 Digital Output (DO) Card

NOTE

GD or SHOW30 commands may also be used, at the Test Director's discretion, for the steps below.

[1] **STOP** the DAOUTZ program, on the ICS primary system.

[2] **ACTIVATE** a group display, on a SDS, for each test point, using the following command on the SDS:

HW !XXXXXX* where XXXXXX is the card hardware channel address (e.g. HW !1D0001*)

[3] **INPUT** the SUSETOUTZ utility, to load a value of 0 to the output point, **THEN**

VERIFY the value changes, on the SDS, for each test point.

NOTES

1) The 8715/00 relay output cards also have LED's along the front edge that indicate the channel states. Those can also be used to observe the output, change of state.
2) 0 V is present at the output terminals or contacts are open for relay output cards.

[4] **OBSERVE** the state of the point, with the output set to 0, using a voltmeter, **THEN**

VERIFY, at the terminals, the output is in the OPEN condition.

Data Sheet 5
(Page 2 of 3)

Digital Output Verification

Data Package: Page ____ of ____ **Date _____**

2.1 Digital Output (DO) Card (continued)

[5] **USE** the SUSETOUTZ utility to load a value of 1, to the output point, **THEN**

VERIFY the value changes, on the SDS.

[6] **OBSERVE** the state of the point, with the output set to 1, **THEN**

VERIFY, at the terminals, for the test point, that the output is in the CLOSED condition, for each DO point on the card, under test. (i.e. voltage is present on the output terminals or contacts are closed for relay output cards).

[7] **USE** the SUSETOUTZ utility, to reload a value of 0 to the output point, for each test point, **THEN**

VERIFY the value changes, on the SDS.

[8] **USE** a voltmeter, **THEN**

OBSERVE the state of the point, with the output set to 0, for each DO point, on the card being tested, **THEN**

VERIFY, at the terminals, the test point output is in the OPEN condition (i.e. 0 V is present at the output terminals or contacts are open for relay output cards).

Data Sheet 5
(Page 3 of 3)

Digital Output Verification

2.2 Sample Digital Output Data Sheet

NOTES

1) Each digital output card will be tested.
2) Refer to 2-47A615-0 for sample point information.
3) A minimum of two points per card will be tested.

Mux 2A21 Chassis 1 Card 06 (2A2106*) Card Type: 8715/00-001

Point ID	Reset Message	Set Message	Channel	OK
Y9000C	NORMAL	ALARM	2A210600	___
Y9001C	NORMAL	ALARM	2A210601	___
Y9004C	NORMAL	ALARM	2A210602	___
Y9005C	NORMAL	ALARM	2A210603	___
Y9006C	NORMAL	LOW	2A210604	___

Data Sheet 6
(Page 1 of 2)

Analog Output Verification

1.0 Description

The data sheets, in this section, contain a table for each AO point. Each point is identified with point specific information, detailing termination information, such as chassis, card, and channel.

2.0 Sample Instructions

2.1 Analog Output (AO) Card

NOTE

GD or SHOW30 commands may also be used, at the performer's discretion, for the steps below.

[1] **STOP** the DASTRIPZ program, on the ICS primary system.

[2] **ACTIVATE** a group display on a SDS, for each test point, using the following command, on the SDS:

HW !XXXXXX* where XXXXXX is the card hardware channel address (e.g. HW !2A2103*)

[3] **USE** the SUSETOUT2Z utility to set the point value to the values listed in the table of injected counts, for each point.

[4] **RECORD** the output voltage, using a voltmeter, for each injected signal, for each AO test point, on the card.

[5] **VERIFY** the voltage is within the listed tolerances of the expected output voltage, for the count value.

Data Sheet 6
(Page 2 of 2)

Analog Output

2.2 Sample Analog Output Data Sheet

NOTES

1) Each analog output card will be tested.
2) Refer to 2-47A615-0 for sample point information.
3) A minimum of two points per card will be tested.

Mux 2A21 Chassis 1 Card 03 (2A2103*) Card Type: 8704/00-000

Point ID:AN000A Point Type-Subtype:AO-AOUT Channel: 2A210300
Point Description:COMPUTER TREND 1 (RED) Address: 2A210300

Counts Injected	Output Voltage Expected	+/-	Output Voltage Measured
0	0.00 V	.02 V	_____
16383	2.50 V	.02 V	_____
32767	5.00 V	.02 V	_____
49151	7.50 V	.02 V	_____
65535	10.00 V	.02 V	_____