5
JAN 03 1995

ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT 609702

2. To: (Receiving Organization) Engineering Control Management	3. From: (Originating Organization) Electrical Utilities Engineering	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: U/EU/EUE (54510)	6. Cog. Engr.: AW AKERSON	7. Purchase Order No.: N/A
8. Originator Remarks: This supporting document is a test procedure that provides the steps necessary to verify correct functional operation of controls, annunciators, alarms, protective relays and related systems impacted by CENRTC #2F3E0A, Microwave Transfer Trip Project, modification work performed under work package 6B-93-00038/M (CENRTC 2F3E0A MWTT OCB A-372 PACKAGE).		9. Equip./Component No.: N/A
11. Receiver Remarks: RECEIVED JAN 24 1995 OSTI		10. System/Bldg./Facility: N/A
		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-LL-ATP-021		0	CENRTC PROJECT #2F3E0A, OCB A-372, ACCEPTANCE TEST PROCEDURE	N/A	2	1	6

16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment	4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

(G)	(H)	17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)								(G)	(H)
Reason	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
2	1	Cog.Eng. A.W. Akerson		12/29/94	S2-12	D. McCulloch			S3-55	3	
2	1	Cog. Mgr. J.M. Hache		1/3/95	S2-12	M. Miller			S2-12	3	
		QA				C.W. Johnson			S3-55	3	
		Safety				J.E. Fairchild			S2-15	3	
		Env.				Central Files (2)			12-84		
						U.S.T.I (2)			12-87		

18. Signature of EDT Originator <i>[Signature]</i> 12/29/94	19. Authorized Representative Date for Receiving Organization <i>[Signature]</i> 1-3-95	20. Cognizant Manager Date <i>[Signature]</i> 1-3-95	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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BD-7400-172-2 (04/94) GEF097

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BD-7400-172-1

INSTRUCTIONS FOR COMPLETION OF THE ENGINEERING DATA TRANSMITTAL

(USE BLACK INK OR TYPE)

<u>BLOCK</u>	<u>TITLE</u>	
(1)*	EDT	● Pre-assigned EDT number.
(2)	To: (Receiving Organization)	● Enter the individual's name, title of the organization, or entity (e.g., Distribution) that the EDT is being transmitted to.
(3)	From: (Originating Organization)	● Enter the title of the organization originating and transmitting the EDT.
(4)	Related EDT No.	● Enter EDT numbers which relate to the data being transmitted.
(5)*	Proj./Prog./Dept./Div.	● Enter the Project/Program/Department/Division title or Project/Program acronym or Project Number, Work Order Number or Organization Code.
(6)*	Cognizant Engineer	● Enter the name of the individual identified as being responsible for coordinating disposition of the EDT.
(7)	Purchase Order No.	● Enter related Purchase Order (P.O.) Number, if available.
(8)*	Originator Remarks	● Enter special or additional comments concerning transmittal, or "Key" retrieval words may be entered.
(9)	Equipment/Component No.	● Enter equipment/component number of affected item, if appropriate.
(10)	System/Bldg./Facility	● Enter applicable system, building or facility number, if appropriate.
(11)	Receiver Remarks	● Enter special or additional comments concerning transmittal.
(12)	Major Assm. Dwg. No.	● Enter applicable drawing number of major assembly, if appropriate.
(13)	Permit/Permit Application No.	● Enter applicable permit or permit application number, if appropriate.
(14)	Required Response Date	● Enter the date a response is required from individuals identified in Block 17 (Signature/Distribution).
(15)*	Data Transmitted	
	(A)* Item Number	● Enter sequential number, beginning with 1, of the information listed on EDT.
	(B)* Document/Drawing No.	● Enter the unique identification number assigned to the document or drawing being transmitted.
	(C)* Sheet No.	● Enter the sheet number of the information being transmitted. If no sheet number, leave blank.
	(D)* Rev. No.	● Enter the revision number of the information being transmitted. If no revision number, leave blank.
	(E) Title or Description of Data Transmitted	● Enter the title of the document or drawing or a brief description of the subject if no title is identified.
	(F)* Approval Designator	● Enter the appropriate Approval Designator (Block 15). Also, indicate the appropriate approvals for each item listed, i.e., SQ, ESQ, etc.
	(G) Reason for Transmittal	● Enter the appropriate code to identify the purpose of the data transmittal (see Block 16).
	(H) Originator Disposition	● Enter the appropriate disposition code (see Block 16).
	(I) Receiver Disposition	● Enter the appropriate disposition code (see Block 16).
(16)	Key	● Number codes used in completion of Blocks 15 (G), (H), and (I), and 17 (G), (H) (Signature/Distribution).
(17)	Signature/Distribution	
	(G) Reason	● Enter the code of the reason for transmittal (Block 16).
	(H) Disposition	● Enter the code for the disposition (Block 16).
	(J) Name	● Enter the signature of the individual completing the Disposition 17 (H) and the Transmittal.
	(K)* Signature	● Obtain appropriate signature(s).
	(L)* Date	● Enter date signature is obtained.
	(M)* MSIN	● Enter MSIN. Note: If Distribution Sheet is used, show entire distribution (including that indicated on Page 1 of the EDT) on the Distribution Sheet.
(18)	Signature of EDT Originator	● Enter the signature and date of the individual originating the EDT (entered prior to transmittal to Receiving Organization). If the EDT originator is the cognizant engineer, sign both Blocks 17 and 18.
(19)	Authorized Representative for Receiving Organization	● Enter the signature and date of the individual identified by the Receiving Organization as authorized to approve disposition of the EDT and acceptance of the data-transmitted, as applicable.
(20)*	Cognizant Manager	● Enter the signature and date of the cognizant manager. (This signature is authorization for release.)
(21)*	DOE Approval	● Enter DOE approval (if required) by signature or control number that tracks the approval to a signature, and indicate DOE action.

*Asterisk denote the required minimum items check by Configuration Documentation prior to release; these are the minimum release requirements.

RELEASE AUTHORIZATION

Document Number: WHC-SD-LL-ATP-021, REV 0

Document Title: CENRTC PROJECT #2F3EOA, OCB A-372, ACCEPTANCE TEST PROCEDURE

Release Date: 1/3/95

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

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz

January 3, 1995

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SUPPORTING DOCUMENT		1. Total Pages 61
2. Title CENRTC PROJECT #2F3E0A, OCB A-372, ACCEPTANCE TEST PROCEDURE	3. Number WHC-SD-LL-ATP-021	4. Rev No. 0
5. Key Words CENRTC 2F3E0A <i>KimB 1/3/95</i>	6. Author Name: AW AKERSON <i>AW Akerson</i> Signature Organization/Charge Code 54510/M0105	
7. Abstract <p>This test procedure provides the steps necessary to verify correct functional operation of controls, annunciators, alarms, protective relays and related systems impacted by CENRTC #2F3E0A, Microwave Transfer Trip Project, modification work performed under work package 6B-93-00038/M (CENRTC 2F3E0A MWTT OCB A-372 PACKAGE).</p>		
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9. Impact Level N/A		

WHC-SD-LL-ATP-021
Revision 0

CENRTC PROJECT #2F3E0A
OCB A-372
ACCEPTANCE TEST PROCEDURE

Prepared By:
A. W. Akerson, P.E.

1.0 PURPOSE

This test procedure provides the steps necessary to verify correct functional operation of controls, annunciators, alarms, protective relays and related systems impacted by CENRTC #2F3E0A, Microwave Transfer Trip Project, modification work performed under work package 6B-93-00038/M (CENRTC 2F3E0A MWTT OCB A-372 PACKAGE).

2.0 SCOPE

This acceptance test procedure shall only be used in conjunction with work package 6B-93-00038/M.

3.0 REFERENCES

- 3.1 Marked-up blue lines from work package 6B-93-00038/M.
- 3.2 Copy of ECN 604869 and the latest revision of the substation A7 one-line, three-lines, control and interconnection drawings.
- 3.3 RFL Dowtey Model 6750 ITTS Instruction Manual.

4.0 ACCEPTANCE TEST PROCEDURE

- 4.1 A Lead Meter/Relay Technician shall be appointed by the Substation/Relay Manager prior to this work commencing. **The Lead Meter/Relay Technician shall be responsible for initialing each step of Sections 5 through 9 as it is successfully completed, regardless of additional signature or initialing requirements indicated in a particular step.**
- 4.2 It is the responsibility of the **Lead Meter/Relay Technician** to report any discrepancies or problems associated with the following steps to the EUE System Protection Engineer and record same in Section 10.0.
- 4.3 The EUE System Protection Engineer shall be present for all testing.
- 4.4 This procedure separates five tests into separate sections.
 - Section 5.0 - Energization of A-372 Duplex Panel and Circuits.
 - Section 6.0 - SCADA tests.
 - Section 7.0 - A-372 local trip tests.
 - Section 8.0 - Local RFL 6750 function tests and start-up.
 - Section 9.0 - Initialize the A7/Midway μ Wave Radio Link
 - Section 10.0 - 372/Midway μ Wave trip tests

5.0 ENERGIZATION OF A-372 DUPLEX PANEL AND CIRCUITS

5.1 Equipment Configuration

5.1.1 Verify the following test switches are in the open position.

Panel 1F	
Device Number	Description
3G	SEL SET #1 TRIP AND MONITOR CONTACTS
4G	SEL SET #1 AC VOLTAGE INPUT
5G	SEL SET #1 CURRENT AND POLARIZATION INPUT
6G	SEL SET #2 TRIP AND MONITOR CONTACTS
7G	SEL SET #2 AC VOLTAGE INPUT
8G	SEL SET #2 CURRENT AND POLARIZATION INPUT

Panel 1R		
Device	Test Switch	Description
4M	POLE 1-2	OCB A-372 TRIP VIA 86-T1
4M	POLE 3-4-5-6	OCB A-372 CLOSE BLOCK VIA 86-T1
6M	POLE 7-8	OCB A-372 TRIP VIA 86-TB1
6M	POLE 9-10-11-12	OCB A-372 CLOSE BLOCK VIA 86-TB1

5.1.2 Verify the following SCADA switches are in the open position.

Panel 2F, Mini-Control Panel	
Device Number	Description
A-372 SCS	A-372 SCADA CUT-OFF SWITCH
A-372 RCS	A-372 RECLOSING CUT-OFF SWITCH
A-372 HOTLINE	A-372 HOT LINE BYPASS SWITCH

5.1.3 Verify the following 125 Vdc breakers are in the open position.

Panel or Rack	Device Number	Description
Panel 1R	2G	A-372 TRIP BUS BFR
	3G	A-372 TRIP BUS RELAY SET #1
	4G	A-372 TRIP BUS RELAY SET #2
	5G	A-372 CLOSE BUS
	6G	A-372 TRIP BUS
	7G	TRIP BUS 86-TB1
	8G	TRIP BUS 86-T1
Rack C1	1E	A-372 RFL
	2E	A-376 RFL
Panel 2F	3F	ANNUNCIATOR BUS
	4F	A-372 LOCAL CONTROL

5.1.4 Verify the following 115 Vac breakers are in the open position.

Panel or Rack	Device Number	Description
Panel 2R	9H	A-372 RECLOSER MOTOR
Panel 1F	LA1	A-372 RELAY POT #2 RELAY SET #1
	LA2	A-372 RELAY POT #1 RELAY SET #2
Bus #1 PT Cabinet	RLY POT #1	RELAY POTENTIAL #1 BREAKER
	RLY POT #1A	RELAY POTENTIAL #1A BREAKER

5.1.5 Verify the devices are switched to the OFF position.

Panel or Rack	Device Number	Description
Rack C1	C	A-372 RFL 6750
	D	A-376 RFL 6750
Panel 1F	3C	A-372 SEL 121-G-5 SET #1 RELAY
	4C	A-372 SEL 121-G-5 SET #2 RELAY
	5C	A7 SEL PRU

- 5.1.6 Verify the manual test switch on the RFL 6750 relays on Rack C1 are switched to the OFF position.

5.2 Energize A372 Control Circuits

- 5.2.1 Energize the A7 annunciator bus by closing device 3F, located on Panel 2F. Acknowledge and reset alarms. Verify the following annunciators remain illuminated and that the Dispatcher indicates the following SCADA Indication Points (additional SCADA points are listed on the following page).

ANNUNCIATOR WINDOW & SCADA

Annunciator Window	SCADA	
	Point	Status
W25 - A-372 ITTS EQUIPMENT FAILURE	21 - A-372 ITTS EQUIPMENT FAILURE	ALARM
W26 - 230 KV TRIP BUS FAILURE	N/A	N/A
W27 - A-376 ITTS EQUIPMENT FAILURE	22 - A-376 ITTS EQUIPMENT FAILURE	ALARM
W28 - 230 KV CLOSE FAILURE	N/A	N/A
W29 - ITTS LOW TRANSMIT LEVEL	49 - ITTS LOW TRANSMIT LEVEL	ALARM
W8 - A-372 SEL RELAY FAILURE	13 - SEL RELAY TROUBLE	ALARM
W10 - SEL PRTU TROUBLE	N/A	N/A
W30 - 230 RELAY POT FAILURE	09 - A-372 PCB RELAY TROUBLE	ALARM
W32 - BUS 1 PT ACB TRIP ALARM		

SCADA

Point	Status	Point	Status
19 - LINE A2-7 HOT LINE	DEADLINE	55 - DTT RECEIVED A-376	NORMAL
43 - ANNUNCIATOR DROP	ALARM THEN NORMAL*	56 - BANK 1 HIGH OIL TEMP.	NORMAL
51 - 230 KV TRIP BUS FAILURE	ALARM	57 - BANK 1 LOW OIL LEVEL	NORMAL
52 - DTT SENT A-372	NORMAL	58 - BANK 2 HIGH OIL TEMP.	NORMAL
53 - DTT RECEIVED A-372	NORMAL	59 - BANK 2 LOW OIL LEVEL	NORMAL
54 - DTT SENT A-376	NORMAL		

- * WHEN THE ANNUNCIATOR SYSTEM IS ACKNOWLEDGED AND RESET, SCADA INDICATION POINT 43 (ANNUNCIATOR DROP) SHOULD TRANSITION FROM THE ALARM STATUS TO THE NORMAL STATUS.

- 5.2.2 Close the following 125 Vdc breakers and verify, where noted, that the associated annunciator clears after the alarm has been acknowledged and reset and that the Dispatcher indicates the same for the respective SCADA Indication Points.

Rack or Panel	Device Number	Description	Annunciator Window	SCADA	
				Point	Status
1F	2G	A-372 TRIP BUS BFR	N/A	N/A	N/A
1F	3G	A-372 TRIP BUS RELAY SET #1	N/A	N/A	N/A
1F	4G	A-372 TRIP BUS RELAY SET #2	N/A	N/A	N/A
1F	5G	A-372 CLOSE BUS	W28 - 230 KV CLOSE FAILURE	05 - A-372 PCB STATUS	OPEN
				06 - A-372 SCS STATUS	OPEN
				07 - A-372 RECLOSING STATUS	OPEN
1F	6G	A-372 TRIP BUS	W26 - 230 KV TRIP BUS FAILURE	51 - 230 KV TRIP BUS FAILURE	N/A
1F	7G	TRIP BUS 86-TB1	N/A	N/A	N/A
1F	8G	TRIP BUS 86-T1	N/A	N/A	N/A

- 5.2.3 Close the following 115 Vac breakers and verify, where noted, that the associated annunciator clears after the alarm has been acknowledged and reset and that the Dispatcher indicates the same for the respective SCADA Indication Points.

Panel or Rack	Device Number	Description	Annunciator Window	SCADA	
				Point	Status
2R	9H	A-372 RECLOSER MOTOR	N/A	N/A	N/A
1F	LA1	A-372 RELAY POT #2 RELAY SET #1			
	LA2	A-372 RELAY POT #1 RELAY SET #2	W30 - 230KV RELAY POT FAILURE	N/A	N/A
BUS #1 PT CABINET	RLY POT #1	RELAY POTENTIAL #1 BREAKER			
	RLY POT #1A	RELAY POTENTIAL #1A BREAKER	W32 - BUS 1 PT ACB TRIP ALARM	09 - A-372 PCB RELAY TROUBLE	NORMAL

- _____ 5.2.4 Switch the following devices to the **ON** position and verify, where noted, that the associated annunciator clears after the alarm has been acknowledged and reset and that the Dispatcher indicates the same for the respective SCADA Indication Points.

Panel or Rack	Device Number	Description	Annunciator Window	SCADA	
				Point	Status
1F	3C	A-372 SEL 121G-5 SET #1 RELAY			
	4C	A-372 SEL 121G-5 SET #2 RELAY	W8 - A372 SEL RELAY FAILURE	13 - SEL RELAY TROUBLE	NORMAL
	5C	A7 SEL PRTU	W10 - SEL PRTU TROUBLE	N/A	N/A

5.3 Local OCB A-372 Operation and Alarm Verification

- _____ 5.3.1 Place a temporary jumper between terminal **3** and **10** of Device **5D** (A-372 Sync Check Relay) on Panel **1R**.
- _____ 5.3.2 From the mini-control panel (Panel 2F) **CLOSE**, then **OPEN** the **SCADA cut-off switch (SCS)** for OCB **A372**.
- _____ 5.3.3 Verify with the Dispatcher that SCADA has indicated that the **A-372 SCS** switch is **CLOSED**, then **OPENED** (verifies SCADA Indication Point 06 - A-372 SCS Status).
- _____ 5.3.4 From the mini-control panel (Panel 2F) **CLOSE**, then **OPEN** OCB **A-372**.
- _____ 5.3.5 Verify the breaker closes and opens on command.
- _____ 5.3.6 Verify with the Dispatcher that SCADA has indicated the close and open operations (verifies SCADA Indication Point 05 - A-372 PCB Status).
- _____ 5.3.7 Verify the A-372 indication lamps (green and red) have indicated the proper status during the open and closing cycles.

5.4 Return Test Switch Configuration to Normal

5.4.1 Place the following test switches in the closed position.

Panel 1F	
Device Number	Description
3G	SEL SET #1 TRIP AND MONITOR CONTACTS
4G	SEL SET #1 AC VOLTAGE INPUT
5G	SEL SET #1 CURRENT AND POLARIZATION INPUT
6G	SEL SET #2 TRIP AND MONITOR CONTACTS
7G	SEL SET #2 AC VOLTAGE INPUT
8G	SEL SET #2 CURRENT AND POLARIZATION INPUT

Panel 1R		
Device	Test Switch	Description
4M	POLE 1-2	OCB A-372 TRIP VIA 86-T1
4M	POLE 3-4-5-6	OCB A-372 CLOSE BLOCK VIA 86-T1
6M	POLE 7-8	OCB A-372 TRIP VIA 86-TB1
6M	POLE 9-10-11-12	OCB A-372 CLOSE BLOCK VIA 86-TB1

5.5 Energization of A-372 Duplex Panels and Circuits Tests Acceptance

5.5.1 The Lead Meter/Relay Technician and EUE System Protection Engineer shall sign below indicating tests have been completed successfully.

Lead Meter/Relay Technician

Date

EUE System Protection Engineer

Date

6.0 SCADA TESTS

6.1 Status of Previously Verified SCADA Indication Points Tests

6.1.1 The following is a status of the SCADA indication points that have been verified including indication points that will be verified in this section.

SCADA Point	Status	Status checked on	Status	Status checked on
05 - A-376 PCB STATUS	OPEN	5.2.2	CLOSED	5.3.6
06 - A-372 SCS STATUS	OPEN	5.2.2	CLOSED	5.3.3
07 - A-372 RECLOSING STATUS	OPEN	5.2.2	CLOSED*	6.2.3
09 - A-372 PCB RELAY TROUBLE	ALARM	5.2.1	NORMAL	5.2.3
13 - SEL RELAY TROUBLE	ALARM	5.2.1	NORMAL	5.2.4
19 - LINE A2-7 HOT LINE INDICATOR	DEADLINE	5.2.1	HOTLINE*	6.2.2
21 - A-372 ITTS EQUIPMENT FAILURE	ALARM	5.2.1	NORMAL	8.2.3
22 - A-376 ITTS EQUIPMENT FAILURE	ALARM	5.2.1	NORMAL	8.2.3
43 - ANNUNCIATOR DROP	ALARM	5.2.1	NORMAL	5.2.1
49 - ITTS LOW TRANSMIT LEVEL	ALARM	5.2.1	NORMAL	8.2.3
50 - 13.8 KV TRANSFORMER TEMPERATURE	NORMAL	5.2.1	ALARM*	6.2.5
51 - 230 KV TRIP BUS FAILURE	ALARM	5.2.1	NORMAL	5.2.2
52 - DTT SENT A-372	ALARM	5.2.1	NORMAL*	6.2.1
53 - DTT RECEIVED A-372	ALARM	5.2.1	NORMAL*	6.2.1
54 - DTT SENT A-376	ALARM	5.2.1	NORMAL*	6.2.1
55 - DTT RECEIVED A-376	ALARM	5.2.1	NORMAL*	6.2.1
56 - BANK 1 HIGH OIL TEMPERATURE	NORMAL	5.2.1	ALARM*	6.2.4
57 - BANK 1 LOW OIL LEVEL	NORMAL	5.2.1	ALARM*	6.2.4
58 - BANK 2 HIGH OIL TEMPERATURE	NORMAL	5.2.1	ALARM*	6.2.4
59 - BANK 2 LOW OIL LEVEL	NORMAL	5.2.1	ALARM*	6.2.4

* ALARM VERIFICATION WILL BE PERFORMED IN THE INDICATED STEPS.

6.2 Remaining SCADA Indication Points Tests

6.2.1 RLF 6750 SCADA Indication Points.

6.2.1.1 Simulate contact closure by placing a shorting strip between the following contacts of the RFL Relays, located on Rack C1, to activate the associated SCADA indication points. Test one SCADA indication point alarm at a time. Verify alarm with the Dispatcher, remove shorting strip, then verify with the Dispatcher that the alarm has cleared.

Rack C1		
RFL Unit	Terminals to Short (located on RFL Unit)	SCADA Point
A-372	C2-9 and C2-10	52 - A-372 DTT SENT
	C2-31 and C2-32	54 - A-372 DTT RECEIVED
A-376	D2-9 and D2-10	53 - A-376 DTT SENT
	D2-31 and D2-32	55 - A-376 DTT RECEIVED

6.2.2 Line A2-7 Hot Line/Dead Line SCADA Indication Point

6.2.2.1 Simulate contact closure by placing a shorting strip between the following contacts of the NGV (Hot Line) Relay (Device 3D), located on Panel 1R, to activate the associated SCADA indication point. Verify alarm with the Dispatcher, remove shorting strip, then verify with the Dispatcher that the alarm has cleared.

Panel 1R		
NGV Relay	Terminals to Short (located on NGV Relay)	SCADA Point
3D	7 and 8	19 - MIDWAY LINE HOTLINE INDICATOR

6.2.3 A-372 Reclosing SCS Switch

6.2.3.1 Place the Reclosing cut-off switch (RCS) for OCB A-372 in the **CLOSED** (in the **ON** position).

6.2.3.2 Verify with the Dispatcher that SCADA has indicated that the A-372 Reclosing SCS switch indicates that it is in the closed position (**this step verifies SCADA indication point 07 - A-372 Reclosing Status Indicator**).

6.2.4 Bank 1 and 2 Alarm SCADA Indication Points.

6.2.4.1 Simulate contact closure by placing a shorting strip between the following contacts on Duplex Panel 2F to activate the associated SCADA indication points. Test one SCADA indication point alarm at a time. Verify alarm with the Dispatcher, remove shorting strip, then verify with the Dispatcher that the alarm has cleared.

Panel 2F		
Bank Alarm	Terminals to Short (Panel 2F, Terminal T)	SCADA Point
Bank 1	T-26 and T-25	56 - BANK 1 HIGH OIL TEMP.
	T-26 and T-29	54 - BANK 1 LOW OIL LEVEL
Bank 2	T-28 and T-27	53 - BANK 2 HIGH OIL TEMP.
	T-28 and T-31	55 - BANK 2 LOW OIL LEVEL

6.2.5 13.8 kV Transformer Temperature SCADA Indication Points.

6.2.5.1 Simulate contact closure by placing a shorting strip between the following contacts on Duplex Panel 2F to activate the associated SCADA indication points. Test one SCADA indication point alarm at a time. Verify alarm with the Dispatcher, remove shorting strip, then verify with the Dispatcher that the alarm has cleared.

Panel 2F		
Alarm	Terminals to Short (Panel 2F, Terminal T)	SCADA Point
13.8 kV Transformers	T-85 and T-86	50 - 13.8 KV TRANSFORMER TEMPERATURE

6.3 SCADA Control Verification

6.3.1 Verify that the following SCADA cut-off switches in the closed position. Switches located on the Mini-Control Panel.

- A372 SCS
- A372 RCS SCS

6.3.2 A-372 Open and Close Controls

6.3.2.1 Request the Dispatcher to **CLOSE**, then **OPEN** OCB **A-372** from the Dispatchers Terminal.

6.3.2.2 Verify the breaker closes and opens on command (verifies SCADA Control Point 01).

6.3.2.3 Acknowledge and Reset annunciators.

6.3.3 A-372 Reclosing Controls

6.3.3.1 Request the Dispatcher to place then remove the reclosing relay system for **A-372** into and out-of service from the Dispatchers Terminal.

6.3.3.2 Verify with the Dispatcher that SCADA has indicated that the reclosing system was placed into and out-of service (verifies SCADA Control Point 04).

6.3.3.3 Have the Dispatcher acknowledge and reset the SCADA alarm.

6.4 SCADA Indication and Control Points Tests Acceptance

6.4.1 The **Lead/Meter Relay Technician** and **EUE System Protection Engineer** shall sign below indicating tests have been completed successfully.

Lead Meter/Relay Technician

Date

EUE System Protection Engineer

Date

7.0 A-372 LOCAL TRIP TESTS

7.1 Circuit Breaker Open/Close Operations

- _____ 7.1.1 **CLOSE** and **OPEN** OCB A-372 twice from the mini-control panel and twice from the circuit breaker control box to verify it is operating correctly.
- _____ 7.1.2 Request that the dispatcher **CLOSE** and **OPEN** OCB A-372 twice via SCADA to verify correct operations occur.
- _____ 7.1.3 **CLOSE** and **OPEN** OCB A-374 twice from the mini-control panel and twice from the circuit breaker control box to verify it is operating correctly.
- _____ 7.1.4 Request the dispatcher **CLOSE** and **OPEN** OCB A-374 twice via SCADA, then verify correct operations occur.

7.2 Transformer #1 Trip Testing

- _____ 7.2.1 Manually operate the 50/51-TH1 A-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below. **DO NOT RESET ANY LOCKOUTS OR CLOSE CIRCUIT BREAKERS AT THIS POINT:**

50/51-TH1 A-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-TB1		
A-372		
A-374		
C7X100		
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		
OCB A-374 OPERATION		
PCB C7X100 OPERATION		
BFR/BANK 1 BACKUP RELAY TRIP		

- _____ 7.2.2 Attempt to locally close each of the tripped circuit breakers and lock-out relays indicated in 8.2.1. **None should close.**

- _____ 7.2.3 Request the Dispatcher attempt to remotely close the tripped circuit breakers and lock-out relays indicated in 8.2.1. **None should close.**
- _____ 7.2.4 Reset the **86-TB1** and locally **CLOSE** circuit breakers **A-372**, **A-374**, and **C7X100**.
- _____ 7.2.5 Clear targets and local annunciators and verify with the Dispatcher that associated SCADA alarms have also cleared.
- _____ 7.2.6 Disable the **86-TB1** functions by **OPENING** the following test switch poles located on device **2M** and **4M** on 230 kV duplex Panel 1R:

Panel 1R - Device 2M	
Test Switch	Description
Pole 5-6	Alarm
Pole 7-8	C7X100 Trip
Pole 9-10-11-12	C7X100 Close Block

Panel 1R - Device 4M	
Test Switch	Description
Pole 1-2	OCB A-372 Trip
Pole 3-4-5-6	OCB A-372 Close Block
Pole 7-8	OCB A-374 Trip
Pole 9-10-11-12	OCB A-374 Close Block

NOTE: THE REMAINING TRIP TESTS INVOLVING THE 86-TB1 RELAY WILL NOT OPERATE CIRCUIT BREAKERS -- ONLY THE 86-TB1 LOCKOUT RELAY OPERATIONS WILL BE OBSERVED. AFTER CONFIRMING THE OPERATION, RESET THE 86-TB1 LOCKOUT RELAY.

- 7.2.7 Manually operate the 50/51-TH1 B-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

50/51-TH1 B-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-TB1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 BACKUP RELAY TRIP		

- 7.2.8 Manually operate the 50/51-TH1 C-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

50/51-TH1 C-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-TB1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 BACKUP RELAY TRIP		

- 7.2.9 Manually operate the 51-GH1 residual relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

51-GH1 RESIDUAL RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-TB1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 BACKUP RELAY TRIP		

- 7.2.10 Manually operate the **63-T1** sudden pressure relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

63-T1 SUDDEN PRESSURE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-TB1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 BACKUP RELAY TRIP		

- 7.2.11 Manually operate the **51GB-GT1** zig-zag residual relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

51GB-GT1 ZIG-ZAG RESIDUAL RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-TB1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 BACKUP RELAY TRIP		

- 7.2.12 Manually operate the **51G-GT1** zig-zag residual alarm relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

51G-GT1 ZIG-ZAG RESIDUAL ALARM RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
NONE		
LOCAL ANNUNCIATION	Verify by placing a check below	
BANK 1 13.8 KV GROUND RELAY		

- 7.2.13 Manually operate the 51GT-GT1 zig-zag A-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below. **DO NOT RESET ANY LOCKOUTS OR CLOSE CIRCUIT BREAKERS AT THIS POINT:**

51GT-GT1 A-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-T1		
A-372		
A-374		
C7X100		
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		
OCB A-374 OPERATION		
PCB C7X100 OPERATION		
BUS/BANK 1 DIFFERENTIAL TRIP		

- 7.2.14 Attempt to locally close each of the tripped circuit breakers and lock-out relays indicated in 8.6.14. **None should close.**
- 7.2.15 Request the Dispatcher attempt to remotely close the tripped circuit breakers and lock-out relays indicated in 8.6.14. **None should close.**
- 7.2.16 Reset the 86-T1 and locally close circuit breakers A-372, A-374, and C7X100.
- 7.2.17 Clear targets and local annunciators and verify SCADA alarms are also cleared.

- 7.2.18 Disable the 86-T1 functions by **OPENING** the following test switch poles located on device 6M on 230 kV duplex Panel 1R:

Panel 1R - Device 6M	
Test Switch	Description
Pole 5-6	Alarm
Pole 7-8	OCB A-372 Trip
Pole 9-10-11-12	OCB A-372 Close Block
Pole 13-14	OCB A-374 Trip
Pole 15-16-17-18	OCB A-374 Close Block
Pole 19-20	C7X100 Trip
Pole 21-22-23-24	C7X100 Close Block

NOTE: THE REMAINING TRIP TESTS INVOLVING THE 86-T1 RELAY WILL NOT OPERATE CIRCUIT BREAKERS -- ONLY THE 86-T1 LOCKOUT RELAY OPERATIONS WILL BE OBSERVED. AFTER CONFIRMING THE OPERATION, RESET THE 86-T1 LOCKOUT RELAY.

- 7.2.19 Manually operate the 51GT-GT1 zig-zag B-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

51GT-GT1 B-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-T1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 DIFFERENTIAL TRIP		

- _____ 7.2.20 Manually operate the **51GT-GT1** zig-zag C-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

51GT-GT1 C-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-T1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 DIFFERENTIAL TRIP		

- _____ 7.2.21 Manually operate the **87K1-T1** A-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

87K1-T1 A-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-T1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 DIFFERENTIAL TRIP		

- 7.2.22 Manually operate the 87K1-T1 B-phase relay – verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

87K1-T1 B-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-T1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 DIFFERENTIAL TRIP		

- 7.2.23 Manually operate the 87K1-T1 C-phase relay – verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

87K1-T1 C-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-T1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 DIFFERENTIAL TRIP		

7.3 230 kV Bus #1 Trip Testing

- 7.3.1 Manually operate the **87B1-TH1** A-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

87B1-TH1 A-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-T1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 DIFFERENTIAL TRIP		

- 7.3.2 Manually operate the **87B1-TH1** B-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

87B1-TH1 B-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-T1		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 DIFFERENTIAL TRIP		

- 7.3.3 Manually operate the **87B1-TH1** C-phase relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

87B1-TH1 C-PHASE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
86-T1.		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 DIFFERENTIAL TRIP		

7.4 230 kV A-372 Breaker Failure Relay Trip Testing

- 7.4.1 Disable the following BFR-72 trip functions by **OPENING** the test switch pole located on device 6M on 230 kV duplex panel 1R:

Panel 1R - Device 6M	
Test Switch	Description
Pole 5-6	Direct Transfer Trip (μ W) to Midway

- 7.4.2 Manually operate the **62BFR-72** breaker failure relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

62BFR-72 BREAKER FAILURE RELAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
62BFR-72		
LOCAL ANNUNCIATION	Verify by placing a check below	
BFR/BANK 1 DIFFERENTIAL TRIP		

7.5 230 kV A-372 JBCG Line Relaying Trip Testing

NOTE: OCB A-372 WILL OPEN AFTER EACH STEP IN THIS SECTION. CLOSE OCB A-372 AND RESET ANY ANNUNCIATORS AFTER THE COMPLETION OF EACH STEP.

- 7.5.1 Manually operate the directional time overcurrent element on the **67GB-72** directional ground overcurrent relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

67GB-72 DIRECTIONAL GROUND OVERCURRENT RELAY (DIRECTIONAL TIME OVERCURRENT ELEMENT)		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
A-372		
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		

- 7.5.2 Manually operate the directional instantaneous overcurrent element on the **67GB-72** directional ground overcurrent relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

67GB-72 DIRECTIONAL GROUND OVERCURRENT RELAY (DIRECTIONAL INSTANTANEOUS OVERCURRENT ELEMENT)		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
A-372		
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		

- 7.5.3 Manually operate the nondirectional instantaneous overcurrent element on the 67GB-72 directional ground overcurrent relay -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

67GB-72 DIRECTIONAL GROUND OVERCURRENT RELAY (NONDIRECTIONAL INSTANTANEOUS OVERCURRENT ELEMENT)		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
A-372		
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		

7.6 Establish SEL PRTU Communications

- 7.6.1 Establish and verify communications with the SEL PRTU Relay utilizing a personal computer (PC).

7.7 230 kV A-372 SEL 121G-5 Line Relaying Trip Testing

NOTE: OCB A-372 WILL OPEN AFTER EACH STEP IN THIS SECTION. CLOSE OCB A-372 AND RESET ANY ANNUNCIATORS AFTER THE COMPLETION OF EACH STEP.

- 7.7.1 Disable the SEL Set #1 Direct and Permissive Transfer Trip (μW) functions by **OPENING** the following test switch poles located on device 3G on 230 kV duplex Panel 1F:

Panel 1F - Device 3G	
Test Switch	Description
Pole 5-6	Direct Transfer Trip (μW) to Midway
Pole 7-8	Permissive Transfer Trip (μW) to Midway

- 7.7.2 Disable the **SEL Set #2** Direct and Permissive Transfer Trip (μW) functions by **OPENING** the following test switch poles located on device 6G on 230 kV duplex Panel 1F:

Panel 1F - Device 6G	
Test Switch	Description
Pole 5-6	Direct Transfer Trip (μW) to Midway
Pole 7-8	Permissive Transfer Trip (μW) to Midway

- 7.7.3 Establish communications with the **SEL Set #1** Relay using the SEL PRTU relays using a portable computer (PC).

- 7.7.4 Using the PRTU relay and PC, **CLOSE** the **SEL Set #1** Relay TRIP contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #1 -- TRIP CONTACT		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
A-372		
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		

- 7.7.5 Establish communications with the **SEL Set #2** Relay using the SEL PRTU relays.

- 7.7.6 Using the PRTU relay and PC, **CLOSE** the **SEL Set #2** Relay TRIP contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #2 -- TRIP CONTACT		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
A-372		
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		

7.8 Local Trip Tests Acceptance

- 7.8.1 The **Lead Meter\Relay Technician** and **EUE System Protection Engineer** shall sign below indicating tests have been completed successfully.

Lead Meter\Relay Technician

Date

EUE System Protection Engineer

Date

8.0 LOCAL RFL 6750 FUNCTION TESTS AND START-UP

8.1 Equipment Required

- Digital multimeter with true-rms response (Fluke model 8010A or equivalent).
- Small screwdriver or potentiometer adjustment wand.

NOTE: THE FOLLOWING MUST BE PERFORMED AT EACH MODEL 6750 STATION TO ADJUST THE OUTPUT OF THE TRANSMITTER CARD AND THE INPUT SENSITIVITY OF THE TWO WIDEBAND RECEIVER CARDS.

8.2 Power Up the RFL Relay

- _____ 8.2.1 Close the 125 Vdc breakers to the RFL relays - device **1E** and **2E**, located on Rack **C1**.
- _____ 8.2.2 Place the power switch, located on the dc-dc converter (card 68HPS 129DC-11), to the **ON** (up) position.
- _____ 8.2.3 Verify the expected annunciator and SCADA point clears after the they have been acknowledged and reset.

Rack C1				
Device Number	Description	Annunciator Window	SCADA	
			Point	Status
1E	A-372 RFL POWER SUPPLY	W25 - A-372 ITTS EQUIPMENT FAILURE	21 - A-372 ITTS EQUIPMENT FAILURE	NORMAL
2E	A-376 RFL POWER SUPPLY	W27 - A-376 ITTS EQUIPMENT FAILURE	22 - A-376 ITTS EQUIPMENT FAILURE	NORMAL
		W29 - ITTS LOW TRANSMIT LEVEL	49 - ITTS LOW TRANSMIT LEVEL	NORMAL

- 8.2.4 Verify the following RFL 6750 indicators, located on each RFL relay, are lit and functioning properly:

CONDITION	Check if OK		Provide comments if condition is not verified
	A-372	A-376	
Power indicator DS1 on card 68HPS 129DC-11 dc-dc converter power supply is lit.			
GUARD indicator on card 67A LOGIC-63 is lit			
GUARD indicator on card 67A LOGIC-64 is lit			
NORM indicator on the manual test panel is lit			

8.3 A-372 RFL - Adjust Output Level

- 8.3.1 Set the multimeter for ac voltage measurements.
- 8.3.2 Connect the positive meter lead to **T3-1** on the rear panel of the chassis; connect the negative meter lead to **T3-2**.
- 8.3.3 Record the guard level signal, as indicated on the multimeter. If necessary, adjust **TRANS LEVEL** potentiometer **R56** for the desired value.

NOTE: POTENTIOMETER R56 IS LOCATED ON CARD 67 TRANS (REFERENCE RFL 6750 ITTS INSTRUCTION MANUAL, FIGURE 3-14).

Desired	As-Found	As-Left	Was Adjustment necessary
3 dB Boost Level and 70 ms Trip Boost Time [0.765 Volts]			

- 8.3.4 Disconnect the meter leads from terminal block **T3** on the rear of the chassis.

8.4 A-376 RFL - Adjust Output Level

- _____ 8.4.1 Set the multimeter for ac voltage measurements.
- _____ 8.4.2 Connect the positive meter lead to **T3-1** on the rear panel of the chassis; connect the negative meter lead to **T3-2**.
- _____ 8.4.3 Record the guard level signal, as indicated on the multimeter. If necessary, adjust **TRANS LEVEL** potentiometer **R56** for the desired value.

NOTE: POTENTIOMETER R56 IS LOCATED ON CARD 67 TRANS (REFERENCE RFL 6750 ITTS INSTRUCTION MANUAL, FIGURE 3-14).

Desired	As-Found	As-Left	Was Adjustment necessary
3 dB Boost Level and 70 ms Trip Boost Time [0.765 Volts]			

- _____ 8.4.4 Disconnect the meter leads from terminal block **T3** on the rear of the chassis.

8.5 A-372 RFL - Adjust Input Sensitivity of the High Wideband Receiver Card

- _____ 8.5.1 Press and hold **PUSH TO ATTENUATE** switch **SW1**.
- NOTE: SWITCH SW1 HAS A BLACK KNOB WHICH IS DEPRESSED AND IS LOCATED AT THE FRONT BOTTOM OF CARD 67B REC HI (REFERENCE RFL 6750 ITTS INSTRUCTION MANUAL, FIGURE 3-7).**
- _____ 8.5.2 While holding **SW1** in, slowly turn **LEV** potentiometer **R3** until **LO SIG** indicator **DS1** lights.
- NOTE: POTENTIOMETER R3 AND INDICATOR DS1 ARE LOCATED ON THE FRONT OF CARD 67B REC HI.**
- _____ 8.5.3 Once the **LO SIG** indicator lights, release **SW1**.

8.6 A-372 RFL - Adjust Input Sensitivity of the Low Wideband Receiver Card

8.6.1 Press and hold **PUSH TO ATTENUATE** switch **SW1**.

NOTE: **SWITCH SW1 HAS A BLACK KNOB WHICH IS DEPRESSED AND IS LOCATED AT THE FRONT BOTTOM OF CARD 67B REC LO (REFERENCE RFL 6750 ITTS INSTRUCTION MANUAL, FIGURE 3-7).**

8.6.2 While holding **SW1** in, slowly turn **LEV** potentiometer **R3** until **LO SIG** indicator **DS1** lights.

NOTE: **POTENTIOMETER R3 AND INDICATOR DS1 ARE LOCATED ON THE FRONT OF CARD 67B REC LO.**

8.6.3 Once the **LO SIG** indicator lights, release **SW1**.

8.7 A-376 RFL - Adjust Input Sensitivity of the High Wideband Receiver Card

8.7.1 Press and hold **PUSH TO ATTENUATE** switch **SW1**.

NOTE: **SWITCH SW1 HAS A BLACK KNOB WHICH IS DEPRESSED AND IS LOCATED AT THE FRONT BOTTOM OF CARD 67B REC HI (REFERENCE RFL 6750 ITTS INSTRUCTION MANUAL, FIGURE 3-7).**

8.7.2 While holding **SW1** in, slowly turn **LEV** potentiometer **R3** until **LO SIG** indicator **DS1** lights.

NOTE: **POTENTIOMETER R3 AND INDICATOR DS1 ARE LOCATED ON THE FRONT OF CARD 67B REC HI.**

8.7.3 Once the **LO SIG** indicator lights, release **SW1**.

8.8 A-376 RFL - Adjust Input Sensitivity of the Low Wideband Receiver Card

8.8.1 Press and hold **PUSH TO ATTENUATE** switch **SW1**.

NOTE: **SWITCH SW1 HAS A BLACK KNOB WHICH IS DEPRESSED AND IS LOCATED AT THE FRONT BOTTOM OF CARD 67B REC LO (REFERENCE RFL 6750 ITTS INSTRUCTION MANUAL, FIGURE 3-7).**

8.8.2 While holding **SW1** in, slowly turn **LEV** potentiometer **R3** until **LO SIG** indicator **DS1** lights.

NOTE: POTENTIOMETER R3 AND INDICATOR DS1 ARE LOCATED ON THE FRONT OF CARD 67B REC LO.

8.8.3 Once the LO SIG indicator lights, release SW1.

8.9 Station Alignment

All Model 6750 stations are aligned at the factory. Alignment should only be performed in the field after one or more circuit cards have been repaired or replaced, or if a malfunction is suspected. If a malfunction is suspected, **STOP** work and contact the EUE System Protection Engineer.

8.10 Verify Tone Frequencies

8.10.1 Using the Wandel & Goltermann SPM-33 selective level meter, verify that the A-372 RFL tones are correct. Record results below.

A-372 RFL RELAY

Channel Spacing (Hz)	Frequency Shift (Hz)	Operating Frequencies (Hz)				
		Subchannel	Trip	Check	Guard	Check
680	±150	A	1465		1765	
		B	2445		2145	

A-376 RFL RELAY

Channel Spacing (Hz)	Frequency Shift (Hz)	Operating Frequencies (Hz)				
		Subchannel	Trip	Check	Guard	Check
680	±150	A	1465		1765	
		B	2445		2145	

8.11 Secure RFL Units

8.11.1 Open and tag the 125 Vdc breaker to the A-376 RFL relay - device 2E, located on Rack C1. RFL unit will remain out of service until relay upgrade work at breakers A-376, A382 and Ashe Substation are completed.

8.12 Local RFL Function Tests and Start-Up Acceptance

8.12.1 The **Lead Meter/Relay Technician** and **EUE System Protection Engineer** shall sign below indicating tests have been completed successfully.

Lead Meter/Relay Technician

Date

EUE System Protection Engineer

Date

9.0 INITIALIZE THE A7/MIDWAY μ WAVE RADIO LINK

9.1 230 kV Breaker Configuration

NOTE: PROPER BREAKER CONFIGURATION MUST SET PRIOR TO POWERING-UP THE RFL RELAYS AND PERFORMING THE TRANSFER TRIP TESTS. THE BREAKERS MUST BE ISOLATED FROM THE 230 KV SYSTEM SO TRIP TESTING DOES NOT INTERRUPT SERVICE. THE BREAKERS THAT ARE TO BE TESTED SHALL INITIALLY BE IN THE CLOSED POSITION SO THAT A TONE 2 TRIP IS NOT INADVERTANTLY SENT TO THE REMOTE STATION WHILE THE RFL UNIT IS BEING SET UP.

NOTE: SECTIONS 9 AND 10 SHALL BE COORDINATED WITH THE BPA.

9.1.1 Verify the following breakers are in the closed position.

- OCB A-372
- OCB A-374
- BPA OCB A-994 or A-336 (BPA WILL IDENTIFY WHICH WHICH BREAKER WILL BE TESTED FIRST)

9.2 Power Up the A-372 RFL Relay

NOTE: INITIALIZATION OF THE RADIO LINK SHALL BE COORDINATED WITH THE BPA AND BCS RICHLAND TELECOMMUNICATIONS.

9.2.1 Verify the 125 Vdc breakers to the A-372 RFL relay is closed - device 1E, located on Rack C1.

9.2.2 Verify the power switch, located on the dc-dc converter (card 68HPS 129DC-11), is in the **ON** (up) position.

9.3 Verify A-372 RFL Tones

9.3.1 Using the Wandel & Goltermann SPM-33 selective level meter, verify that the RFL tones are correct. Record results below.

Channel Spacing (Hz)	Frequency Shift (Hz)	Operating Frequencies (Hz)				
		Subchannel	Trip	Check	Guard	Check
680	± 150	A	1465		1765	
		B	2445		2145	

9.4 Round Trip Timing Shots

- _____ 9.4.1 Assist the BPA in performing round trip timing shots between the Midway Substation and Sustation A7. The round trip timing tests will be performed by BPA from the Midway Substation. If temporary jumpers are placed on the A-372 RFL relay to support timing tests, then record jumpers below. Obtain a copy of the BPA test results and attach to this ATP.

ROUND TRIP TIMING NOTES

9.5 A372 A-RFL Station AUTO TEST

The autotest routine checks the communication link between Model 6750 stations for proper operation.

NOTE:

The term "local station" refers to the Model 6750 station that initiates the test; the term "remote station" refers to the Model 6750 station that receives the autotest commands from the local station during the test. These are not fixed assignments, since an autotest can be run from any Model 6750 station.

When the autotest button is depressed, the local Model 6750 station performs the autotest routine that checks the communication link between stations for proper operation. For further information, reference the Instruction Manual Model 6750 ITTS. The following describes the actions that take place when the autotest button is depressed at the local station initiating the autotest sequence.

1. The local station will disable its TR1 and TR2 output devices. (The TRIP OUTPUT DISABLED indicator will be lit).
2. The remote station will receive a signal from the local station that is identified as an "autotest signal" and disable its TR1 and TR2 output devices. (The TRIP OUTPUT DISABLED indicator will be lit).
3. The local station will key Tone 1. (The TT-1 counter will increment by one).
4. The remote station will receive Tone 1. (The TR-1 counter will increment by one).
5. The remote station will key Tone 1. (The TT-1 counter will increment by one).
6. The local station will receive Tone 1. (The TR-1 counter will increment by one).
7. The local station will key Tone 2. (The TT-2 counter will increment by one).
8. The remote station will receive Tone 2. (The TR-2 counter will increment by one).
9. The remote station will key Tone 2. (The TT-2 counter will increment by one).
10. The local station will receive Tone 2. (The TR-2 counter will increment by one).
11. The local station's AUTO TEST event counter will increment by one.
12. The local station will enable its TR1 and TR2 output devices. (The TRIP OUTPUT DISABLED indicator will not be lit).
13. The remote station will enable its TR1 and TR2 output devices. (The TRIP OUTPUT DISABLED indicator will not be lit).

9.5.1 Depress the **AUTOTEST** button and verify the following actions take place when the autotest button is depressed at Substation A7 A-372 RFL.

NOTE: **AUTOTEST BUTTON IS A WHITE KNOB LOCATED UPPER LEFT HAND CORNER IN THE STCL PANEL.**

CONDITION	Check if Condition is Verified	Provide comments if condition is not verified
TRIP OUTPUT DISABLED indicator lit at Substation A7 (A-372)		
*TRIP OUTPUT DISABLED indicator lit at Midway Substation (Hanford #1 Line)		
TT-1 counter increments by one at Substation A7 (A-372)		
*TR-1 counter increments by one at Midway Substation (Hanford #1 Line)		
*TT-1 counter increments by one at Midway Substation (Hanford #1 Line)		
TR-1 counter increments by one at Substation A7 (A-372)		
TT-2 counter increments by one at Substation A7 (A-372)		
*TR-2 counter increments by one at Midway Substation (Hanford #1 Line)		
*TT-2 counter increments by one at Midway Substation (Hanford #1 Line)		
TR-2 counter increments by one at Substation A7 (A-372)		
# OF AUTO TESTS counter increments by one at Substation A7 (A-372)		
TRIP OUTPUT DISABLED indicator is not lit at Substation A7 (A-372)		
*TRIP OUTPUT DISABLED indicator is not lit at Midway Substation (Hanford #1 Line)		

* MUST GET CONFIRMATION FROM THE BPA ON THESE STEPS

9.6 Midway (Hanford #1 Line) RFL Station AUTO TEST

9.6.1 Verify the following actions take place when the autotest button is depressed at the Midway Substation (Hanford Line #1).

NOTE: AUTOTEST BUTTON IS A WHITE KNOB LOCATED UPPER LEFT HAND CORNER IN THE STCL PANEL.

CONDITION	Check if Condition is Verified	Provide comments if condition is not verified
*TRIP OUTPUT DISABLED indicator lit at Midway Substation (Hanford #1 Line)		
TRIP OUTPUT DISABLED indicator lit at Substation A7 (A-372)		
*TT-1 counter increments by one at Midway Substation (Hanford #1 Line)		
TR-1 counter increments by one at Substation A7 (A-372)		
TT-1 counter increments by one at Substation A7 (A-372)		
*TR-1 counter increments by one at Midway Substation (Hanford #1 Line)		
*TT-2 counter increments by one at Midway Substation (Hanford #1 Line)		
TR-2 counter increments by one at Substation A7 (A-372)		
TT-2 counter increments by one at Substation A7 (A-372)		
*TR-2 counter increments by one at Midway Substation (Hanford #1 Line1)		
*# OF AUTO TESTS counter increments by one at Midway Substation (Hanford #1 Line)		
*TRIP OUTPUT DISABLED indicator is not lit at Midway Substation (Hanford #1 Line)		
TRIP OUTPUT DISABLED indicator is not lit at Substation A7 (A-372)		

*** MUST GET CONFIRMATION FROM THE BPA ON THESE STEPS**

9.7 Substation A7 (A-372) RFL Station TONE 1 TRANSMIT TEST

9.7.1 At Substation A7 (A-372), move the **MANUAL TEST SWITCH** from the **OFF** to the **T1** position.

9.7.2 At Substation A7 (A-372), verify the following:

CONDITION	Check is Condition is Verified	Provide comments is condition is not verified
TT-1 counter increments by one		
TT1 indicator is lit (TT1 indicator is located on the 67 SYS Status Card)		

9.7.3 Confirm with BPA that the following occurred at the Midway Substation (Hanford Line #1).

CONDITION	Check is Condition was Confirmed	Provide comments is condition is not verified
TR-1 counter increments by one		
TR1 indicator is lit (TR1 indicator is located on the 67 SYS Status Card)		

9.7.4 At Substation A7 (A-372), move the **MANUAL TEST SWITCH** from the **T1** position to the **OFF** position.

9.7.5 At Substation A7 (A-372), verify the **TT1** indicator is not lit.

9.7.6 Confirm with BPA, at Midway Substation (Hanford Line #1), that the **TR1** indicator is not lit.

9.7.7 Request BPA, at Midway Substation (Hanford Line #1), to reset the **TRIP SEAL IN 2** target.

9.8 **Midway Substation (Hanford Line #1) RFL TONE 1 TRANSMIT TEST**

- _____ 9.8.1 Request BPA, at Midway Substation (Hanford Line #1), to move the **MANUAL TEST SWITCH** from **OFF** to the **T1** position.
- _____ 9.8.2 Confirm with BPA that the following occurred at the Midway Substation (Hanford Line #1).verify the following

CONDITION	Check is Condition is Confirmed	Provide comments is condition is not verified
TT-1 counter increments by one		
TT1 indicator is lit (TT1 lamp is located on the 67 SYS Status Card)		

- _____ 9.8.3 At Substation A7 (A-372), verify the following

CONDITION	Check is Condition is Verified	Provide comments is condition is not verified
TR-1 counter increments by one		
TR1 indicator is lit (TR1 indicator is located on the 67 SYS Status Card)		

- _____ 9.8.4 Request BPA, at Midway Substation (Hanford Line #1), to move the **MANUAL TEST SWITCH** from the **T1** position to the **OFF** position.
- _____ 9.8.5 Confirm with BPA, at Midway Substation (Hanford Line #1), that the **TT1** indicator is not lit.
- _____ 9.8.6 At Substation A7 (A-372), verify the **TR1** indicator is not lit.
- _____ 9.8.7 At Substation A7 (A-372), reset the **TRIP SEAL IN 2** target.

9.9 Substation A7 (A-372) RFL TONE 2 TRANSMIT TEST

_____ 9.9.1 At Substation A7 (A-372), move the **MANUAL TEST SWITCH** from the **OFF** position, past the **T1** position to the **T2** position.

_____ 9.9.2 At Substation A7 (A-372), verify the following

CONDITION	Check is Condition is Verified	Provide comments is condition is not verified
TT-1 counter increments by one		
TT-2 counter increments by one		
TT2 indicator is lit (TT2 indicator is located on the 67 SYS Status Card)		

_____ 9.9.3 Confirm with BPA that the following occurred at the Midway Substation (Hanford Line #1).

CONDITION	Check is Condition is Verified	Provide comments is condition is not verified
TR-1 counter increments by one		
TR-2 counter increments by one		
TR2 indicator is lit (TR2 indicator is located on the 67 SYS Status Card)		

_____ 9.9.4 At Substation A7 (A-372), move the **MANUAL TEST SWITCH** from the **T2** position, through the **T1** position to the **OFF** position.

_____ 9.9.5 At Substation A7 (A-372), verify the **TT1** and **TT2** indicators are not lit.

_____ 9.9.6 Confirm with BPA, at Midway Substation (Hanford Line #1), that the **TR1** and **TR2** indicators are not lit.

_____ 9.9.7 Request BPA, at Midway Substation (Hanford Line #1), to reset the **TRIP SEAL IN 2** target.

9.10 Midway Substation (Hanford Line #1) RFL TONE 2 TRANSMIT TEST

_____ 9.10.1 Request BPA, at Midway Substation (Hanford Line #1), to move the **MANUAL TEST SWITCH** from the **OFF** position, past the **T1** position to the **T2** position.

_____ 9.10.2 Confirm the following occurred at the Midway Substation (Hanford Line #1).

CONDITION	Check is Condition is Verified	Provide comments is condition is not verified
TT-1 counter increments by one		
TT-2 counter increments by one		
TT2 indicator is lit (TT2 indicator is located on the 67 SYS Status Card)		

_____ 9.10.3 At Substation A7 (A-372), verify the following

CONDITION	Check is Condition is Verified	Provide comments is condition is not verified
TR-1 counter increments by one		
TR-2 counter increments by one		
TR2 indicator is lit (TR2 indicator is located on the 67 SYS Status Card)		

_____ 9.10.4 Request BPA, at Midway Substation (Hanford Line #1), to move the **MANUAL TEST SWITCH** from the **T2** position, through the **T1** position to the **OFF** position.

- _____ 9.10.5 Confirm with BPA, at the Midway Substation (Hanford Line #1), that the TT1 and TT2 indicators are not lit.
- _____ 9.10.6 At Substation A7 (A-372), verify the TR1 and TR2 indicators are not lit.
- _____ 9.10.7 At Substation A7 (A-372), reset the TRIP SEAL IN 2 target.

9.11 Initialize the A7/Midway μ Wave Radio Link Acceptance

- 9.11.1 The Lead Meter\Relay Technician and EUE System Protection Engineer shall sign below indicating that the μ Wave Radio Link has been initialized successfully.

Lead Meter\Relay Technician

Date

EUE System Protection Engineer

Date

10.0 SUBSTATION A7 TO MIDWAY SUBSTATION μ WAVE TRIP TEST

NOTE: SECTION 10 SHALL BE COORDINATED WITH THE BPA.

10.1 Circuit Breaker Open/Close Operations

- _____ 10.1.1 Perform the following steps (10.1.2 through 10.1.6) at the beginning of each work day during this section.
- _____ 10.1.2 **OPEN** and **CLOSE** OCB A-372 twice from the mini-control panel and twice from the circuit breaker control box to verify it is operating correctly.
- _____ 10.1.3 **OPEN** and **CLOSE** OCB A-374 twice from the mini-control panel and twice from the circuit breaker control box to verify it is operating correctly.
- _____ 10.1.4 Verify OCB A-372 and A-374 are closed in preparation of trip testing.

10.2 Enable SEL Set #1 and #2 Direct and Permissive Transfer Trip Circuits

- _____ 10.2.1 Enable the **SEL Set #1** Direct and Permissive Transfer Trip (μ W) functions by **CLOSING** the following test switch poles located on device 3G on 230 kV duplex Panel 1F:

Panel 1F - Device 3G	
Test Switch	Description
Pole 5-6	Direct Transfer Trip (μ W) to Midway
Pole 7-8	Permissive Transfer Trip (μ W) to Midway

- 10.2.2 Enable the **SEL Set #2** Direct and Permissive Transfer Trip (μ W) functions by **CLOSING** the following test switch poles located on device 6G on 230 kV duplex Panel 1F:

Panel 1F - Device 6G	
Test Switch	Description
Pole 5-6	Direct Transfer Trip (μ W) to Midway
Pole 7-8	Permissive Transfer Trip (μ W) to Midway

10.3 A-372 & A-994 (A7 to Midway) μ Wave Trip Test - Direct Relay Trip

- 10.3.1 Verify that BPA is ready to perform End-to-End trip testing. Inform BPA that direct relay trip testing will begin with the Substation A7 (A-372) RFL trip testing the Midway breaker (A-994). Midway Substation RFL trip testing of the Substation A7 breaker (OCB A-372) will be the second test. Maintain communication with BPA throughout this trip test.

- 10.3.2 Verify Breaker A-372 is closed.

- 10.3.3 Verify with BPA that Breaker A-994 is closed.

NOTE: DIRECT RELAY TRANSFER TRIP OF BREAKER A-994 FROM SUBSTATION A7 (A-372) RFL WILL BE FIRST, THEN THE DIRECT RELAY TRANSFER TRIP OF BREAKER A-372 FROM MIDWAY (HANFORD #1 LINE) RFL WILL BE SECOND.

- 10.3.4 Establish communications with the **SEL Set #1** Relay using the SEL PRTU relays using a portable computer (PC).

- 10.3.5 Using the PRTU relay and PC, **CLOSE** the **SEL Set #1** Relay A1 contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #1 -- TRIP CONTACT - DIRECT RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
DIRECT RELAY TRIP TO MIDWAY BREAKER A-994 (VERIFY TRIP WITH BPA)		52 - A-372 DTT SENT
LOCAL ANNUNCIATION	Verify by placing a check below	

- 10.3.6 Verify with BPA that Breaker A-994 is closed.

- 10.3.7 Establish communications with the **SEL Set #2** Relay using the SEL PRTU relays.

- 10.3.8 Using the PRTU relay and PC, **CLOSE** the **SEL Set #2** Relay A1 contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #2 -- A1 CONTACT - DIRECT RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
DIRECT RELAY TRIP TO MIDWAY BREAKER A-994 (VERIFY TRIP WITH BPA)		52 - A-372 DTT SENT
LOCAL ANNUNCIATION	Verify by placing a check below	

- 10.3.9 Verify Breaker A-372 is closed.

- 10.3.10 Verify with the BPA that Breaker A-994 is closed.

- 10.3.11 Inform the BPA that conditions are ready for the Midway (Hanford Line #1) RFL to send a Direct Relay Transfer Trip (from their Set #1 relays) to Substation A7 (A-372). Verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL RELAY SET #1 - DIRECT RELAY TRIP FROM MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
BREAKER A-372 VIA DIRECT RELAY TRIP FROM MIDWAY (VERIFY TRIP WITH BPA)		52 - A-372 DTT RECEIVED
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		

- 10.3.12 Close breaker A-372.

- 10.3.13 Inform the BPA that conditions are ready for the Midway (Hanford Line #1) RFL to send a Direct Relay Transfer Trip (from their Set #2 relays) to Substation A7 (A-372). Verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL RELAY SET #2 - DIRECT RELAY TRIP FROM MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
BREAKER A-372 VIA DIRECT RELAY TRIP FROM MIDWAY (VERIFY TRIP WITH BPA)		52 - A-372 DTT RECEIVED
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		

10.4 A-372 & A-994 (A7 to Midway) μ Wave Trip Test - Permissive Relay Trip

_____ 10.4.1 Verify that BPA is ready to perform End-to-End trip testing. Inform BPA that permissive relay trip testing will begin with the Substation A7 (A-372) RFL trip testing the Midway breaker (A-994). Midway Substation RFL trip testing of the Substation A7 breaker (OCB A-372) will be the second test. Maintain communication with BPA throughout this trip test.

_____ 10.4.2 Verify Breaker A-372 is closed.

_____ 10.4.3 Verify with BPA that Breaker A-994 is closed.

NOTE: PERMISSIVE RELAY TRANSFER TRIP TESTING WILL INVOLVE BREAKER A-994 AND A-372. ACTUATION OF THE PERMISSIVE SIGNALS VIA THE SEL RELAYS MUST BE DONE MANUALLY.

_____ 10.4.4 Establish communications with the **SEL Set #1** Relay using the SEL PRTU relays using a portable computer (PC).

NOTE: STEP 10.4.5 MUST BE PERFORMED AT THE MIDWAY SUBSTATION AND AT THE A7 SUBSTATION AT THE SAME TIME. VOICE COMMUNICATIONS (TELEPHONE) SHALL BE ESTABLISHED SUCH THAT THE TECHNICIANS CAN COORDINATE THE TRIPPING OF THE APPLICABLE SEL CONTACT.

- 10.4.5 Using the PRTU relay and PC, **CLOSE** the **SEL Set #1** Relay **A2** contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #1 -- A2 CONTACT - PERMISSIVE RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
MIDWAY BREAKER A-994 VIA PERMISSIVE RELAY TRIP (VERIFY TRIP WITH BPA)		
A7 BREAKER A-372 VIA PERMISSIVE RELAY TRIP		
LOCAL ANNUNCIATION	Verify by placing a check below	
BREAKER A-372 OPERATION		

- 10.4.6 Verify with BPA that Breaker A-994 is closed.
- 10.4.7 Verify that Breaker A-372 is closed.
- 10.4.8 Establish communications with the **SEL Set #2** Relay using the SEL PRTU relays.

- 10.4.9 Using the PRTU relay and PC, **CLOSE** the **SEL Set #2** Relay **A2** contact – verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #2 -- A2 CONTACT - PERMISSIVE RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
MIDWAY BREAKER A-994 VIA PERMISSIVE RELAY TRIP (VERIFY TRIP WITH BPA)		
A7 BREAKER A-372 VIA PERMISSIVE RELAY TRIP		
LOCAL ANNUNCIATION	Verify by placing a check below	
BREAKER A-372 OPERATION		

10.5 A-372 & A-994 (A7 to Midway) μ Wave Trip Test - Breaker Open Relay Trip

- 10.5.1 Verify that BPA is ready to perform End-to-End trip testing. Inform BPA that the breaker open relay trip (BRT) testing will begin with the Substation A7 (A-372) RFL trip testing the A-372 breaker when the Midway breaker A-994 is open. Midway Substation RFL trip testing of the A-994 breaker when the A-372 breaker will be the second test. Maintain communication with BPA throughout this trip test.
- 10.5.2 Verify Breaker A-372 is closed.
- 10.5.3 Verify with BPA that Breaker A-994 is open.
- 10.5.4 Verify the Midway (Hanford Line #1) RFL is transmitting a permissive tone to the Substation A7 (A-372) RFL.
- 10.5.5 Establish communications with the **SEL Set #1** Relay using the SEL PRTU relays using a portable computer (PC).

- _____ 10.5.6 Using the PRTU relay and PC, CLOSE the **SEL Set #1** Relay A2 contact – verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #1 -- A2 CONTACT - PERMISSIVE RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
A7 BREAKER A-372 VIA PERMISSIVE RELAY TRIP		
LOCAL ANNUNCIATION	Verify by placing a check below	
BREAKER A-372 OPERATION		

- _____ 10.5.7 Verify Breaker A-372 is closed.
- _____ 10.5.8 Verify with BPA that Breaker A-994 is open.
- _____ 10.5.9 Verify the Midway (Hanford Line #1) RFL is transmitting a permissive tone to the Substation A7 (A-372) RFL.
- _____ 10.5.10 Establish communications with the **SEL Set #2** Relay using the SEL PRTU relays using a portable computer (PC).

- 10.5.11 Using the PRTU relay and PC, **CLOSE** the **SEL Set #2 Relay A2** contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #2 -- A2 CONTACT - PERMISSIVE RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
A7 BREAKER A-372 VIA PERMISSIVE RELAY TRIP		
LOCAL ANNUNCIATION	Verify by placing a check below	
BREAKER A-372 OPERATION		

- 10.5.12 Open A-372 in preparation of the BPA trip testing the A-994 breaker.
- 10.5.13 Verify the Substation A7 (A-372) RFL is transmitting a permissive tone to the Midway (Hanford Line #1) RFL.
- 10.5.14 BPA will be performing steps similar to what was performed in steps Assist BPA when requested and verify that the BPA tests were completed successfully.

10.6 A-372 & A-994 (A7 to Midway) μ Wave Trip Tests

- 10.6.1 The **Lead Meter\Relay Technician** and **EUE System Protection Engineer** shall sign below indicating that the μ Wave Trip Tests have been completed successfully.

Lead Meter\Relay Technician

Date

EUE System Protection Engineer

Date

10.7 A-372 & A-336 (A7 to Midway) μ Wave Trip Test - Direct Relay Trip

_____ 10.7.1 Verify that BPA is ready to perform End-to-End trip testing of A-336.

_____ 10.7.2 Verify Breaker A-372 is closed.

_____ 10.7.3 Verify with BPA that Breaker A-336 is closed.

NOTE: DIRECT RELAY TRANSFER TRIP OF BREAKER A-336 FROM SUBSTATION A7 (A-372) RFL WILL BE FIRST, THEN THE DIRECT RELAY TRANSFER TRIP OF BREAKER A-372 FROM MIDWAY (HANFORD #1 LINE) RFL WILL BE SECOND.

_____ 10.7.4 Establish communications with the **SEL Set #1** Relay using the SEL PRTU relays using a portable computer (PC).

_____ 10.7.5 Using the PRTU relay and PC, **CLOSE** the **SEL Set #1** Relay A1 contact – verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #1 -- TRIP CONTACT - DIRECT RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
DIRECT RELAY TRIP TO MIDWAY BREAKER A-336 (VERIFY TRIP WITH BPA)		52 - A-372 DTT SENT
LOCAL ANNUNCIATION	Verify by placing a check below	

_____ 10.7.6 Verify with BPA that Breaker A-336 is closed.

_____ 10.7.7 Establish communications with the **SEL Set #2** Relay using the SEL PRTU relays.

- 10.7.8 Using the PRTU relay and PC, **CLOSE** the **SEL Set #2** Relay A1 contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #2 -- A1 CONTACT - DIRECT RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
DIRECT RELAY TRIP TO MIDWAY BREAKER A-336 (VERIFY TRIP WITH BPA)		52 - A-372 DTT SENT
LOCAL ANNUNCIATION	Verify by placing a check below	

- 10.7.9 Verify Breaker A-372 is closed.

- 10.7.10 Verify with the BPA that Breaker A-336 is closed.

- 10.7.11 Inform the BPA that conditions are ready for the Midway (Hanford Line #1) RFL to send a Direct Relay Transfer Trip (from their Set #1 relays) to Substation A7 (A-372). Verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL RELAY SET #1 - DIRECT RELAY TRIP FROM MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
BREAKER A-372 VIA DIRECT RELAY TRIP FROM MIDWAY (VERIFY TRIP WITH BPA)		52 - A-372 DTT RECEIVED
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		

- 10.7.12 Close breaker A-372.

- 10.7.13 Inform the BPA that conditions are ready for the Midway (Hanford Line #1) RFL to send a Direct Relay Transfer Trip (from their Set #2 relays) to Substation A7 (A-372). Verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL RELAY SET #2 - DIRECT RELAY TRIP FROM MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
BREAKER A-372 VIA DIRECT RELAY TRIP FROM MIDWAY (VERIFY TRIP WITH BPA)		52 - A-372 DTT RECEIVED
LOCAL ANNUNCIATION	Verify by placing a check below	
OCB A-372 OPERATION		

10.8 A-372 & A-336 (A7 to Midway) μ Wave Trip Test - Permissive Relay Trip

- 10.8.1 Verify that BPA is ready to perform End-to-End trip testing. Inform BPA that permissive relay trip testing will begin with the Substation A7 (A-372) RFL trip testing the Midway breaker (A-336). Midway Substation RFL trip testing of the Substation A7 breaker (OCB A-372) will be the second test. Maintain communication with BPA throughout this trip test.

- 10.8.2 Verify Breaker A-372 is closed.

- 10.8.3 Verify with BPA that Breaker A-336 is closed.

NOTE: PERMISSIVE RELAY TRANSFER TRIP TESTING WILL INVOLVE BREAKER A-336 AND A-372. ACTUATION OF THE PERMISSIVE SIGNALS VIA THE SEL RELAYS MUST BE DONE MANUALLY.

- 10.8.4 Establish communications with the **SEL Set #1** Relay using the SEL PRTU relays using a portable computer (PC).

NOTE: STEP 10.4.5 MUST BE PERFORMED AT THE MIDWAY SUBSTATION AND AT THE A7 SUBSTATION AT THE SAME TIME. VOICE COMMUNICATIONS (TELEPHONE) SHALL BE ESTABLISHED SUCH THAT THE TECHNICIANS CAN COORDINATE THE TRIPPING OF THE APPLICABLE SEL CONTACT.

- _____ 10.8.5 Using the PRTU relay and PC, **CLOSE** the **SEL Set #1** Relay **A2** contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #1 -- A2 CONTACT - PERMISSIVE RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
MIDWAY BREAKER A-336 VIA PERMISSIVE RELAY TRIP (VERIFY TRIP WITH BPA)		
A7 BREAKER A-372 VIA PERMISSIVE RELAY TRIP		
LOCAL ANNUNCIATION	Verify by placing a check below	
BREAKER A-372 OPERATION		

- _____ 10.8.6 Verify with BPA that Breaker A-336 is closed.
- _____ 10.8.7 Verify that Breaker A-372 is closed.
- _____ 10.8.8 Establish communications with the **SEL Set #2** Relay using the SEL PRTU relays.

- 10.8.9 Using the PRTU relay and PC, **CLOSE** the **SEL Set #2** Relay **A2** contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #2 -- A2 CONTACT - PERMISSIVE RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
MIDWAY BREAKER A-336 VIA PERMISSIVE RELAY TRIP (VERIFY TRIP WITH BPA) A7 BREAKER A-372 VIA PERMISSIVE RELAY TRIP		
LOCAL ANNUNCIATION	Verify by placing a check below	
BREAKER A-372 OPERATION		

10.9 A-372 & A-336 (A7 to Midway) μ Wave Trip Test - Breaker Open Relay Trip

- 10.9.1 Verify that BPA is ready to perform End-to-End trip testing. Inform BPA that the breaker open relay trip (BRT) testing will begin with the Substation A7 (A-372) RFL trip testing the A-372 breaker when the Midway breaker A-336 is open. Midway Substation RFL trip testing of the A-336 breaker when the A-372 breaker will be the second test. Maintain communication with BPA throughout this trip test.
- 10.9.2 Verify Breaker A-372 is closed.
- 10.9.3 Verify with BPA that Breaker A-336 is open.
- 10.9.4 Verify the Midway (Hanford Line #1) RFL is transmitting a permissive tone to the Substation A7 (A-372) RFL.
- 10.9.5 Establish communications with the **SEL Set #1** Relay using the SEL PRTU relays using a portable computer (PC).

- _____ 10.9.6 Using the PRTU relay and PC, **CLOSE** the **SEL Set #1** Relay **A2** contact -- verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #1 -- A2 CONTACT - PERMISSIVE RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
A7 BREAKER A-372 VIA PERMISSIVE RELAY TRIP		
LOCAL ANNUNCIATION	Verify by placing a check below	
BREAKER A-372 OPERATION		

- _____ 10.9.7 Verify Breaker A-372 is closed.
- _____ 10.9.8 Verify with BPA that Breaker A-336 is open.
- _____ 10.9.9 Verify the Midway (Hanford Line #1) RFL is transmitting a permissive tone to the Substation A7 (A-372) RFL.
- _____ 10.9.10 Establish communications with the **SEL Set #2** Relay using the SEL PRTU relays using a portable computer (PC).

- 10.9.11 Using the PRTU relay and PC, **CLOSE** the **SEL Set #2 Relay A2** contact – verify target operation and the following trips and annunciation. Also record the SCADA alarms in the column below.

SEL 121G-5 RELAY SET #2 -- A2 CONTACT - PERMISSIVE RELAY TRIP TO MIDWAY		
TRIPS	Verify by placing a check below	RECORD SCADA ALARMS BELOW
A7 BREAKER A-372 VIA PERMISSIVE RELAY TRIP		
LOCAL ANNUNCIATION	Verify by placing a check below	
BREAKER A-372 OPERATION		

- 10.9.12 Open A-372 in preparation of the BPA trip testing the A-336 breaker.
- 10.9.13 Verify the Substation A7 (A-372) RFL is transmitting a permissive tone to the Midway (Hanford Line #1) RFL.
- 10.9.14 BPA will be performing steps similar to what was performed in steps Assist BPA when requested and verify that the BPA tests were completed successfully.

10.10 A-372 & A-336 (A7 to Midway) μ Wave Trip Tests

- 10.10.1 The **Lead Meter\Relay Technician** and **EUE System Protection Engineer** shall sign below indicating that the μ Wave Trip Tests have been completed successfully.

Lead Meter\Relay Technician

Date

EUE System Protection Engineer

Date

11.0 RESTORATION

Ensure OCBs A-372 and A-374 are in the **OPEN** position, and breaker C7X100 is racked out.

12.0 DISCREPANCIES

Discrepancies and there corrective actions shall be listed on the following page. Make additional sheets if needed.

13.0 REGISTERED TRADEMARKS

13.1 The following are registered trademarks of Schweitzer Engineering Laboratories

- SEL
- PRTU

13.2 The following is a registered trademark of Dowtey Control Technologies.

- RFL

13.3 The following is a registered trademark of General Electric.

- JBCG

Comments, Discrepancies and Resolutions	
STEP #	