FIELD CHANGE AUTHORIZATION

BABCOCK & WILCOX

CUSTOMER	ORGINATOR	DATE	CONT. NO.	DOC. I.D.	PCA NO.	REV. NO.
FLORIDA POWER CORP.	S.L. Eschbach	4-28-79	NRC-CR704-	3110		00

SUPPLIER	P.A. NO.	PART NO., OR, TASK NO.	GROUP NO.	SEQ. NO.
		21	01	01

TITLE (MAX 30 CHARACTERS)
Reactor Trip on Loss of FWP & Turbine Trip

DESCRIPTION AND JUSTIFICATION OF CHANGE:

Implement reactor trip upon loss of both main feedwater pumps or upon turbine trip.

REASON FOR CHANGE:

- ☐ SITE PROBLEM
- ☐ ENGINEERING REQUIREMENT
- ☐ CUSTOMER REQUEST
- ☐ IMPROVEMENT
- ☒ OTHER (SPECIFY) NRC CONCERN

SPR. DOC., OR LETTER NO./REF

TASKS AFFECTED TASK NO.	TASK TITLE	NO. DOCS	COMPLETED (T.E. SIGN)	DATE
21	ICS	1	S.L. Eschbach	4/29/79
43	CRD	"	"	"

CONCUR TO PROCEED	APPROVALS NAME	DATE
✓	S.L. Eschbach	4-29-79
HAB	Ltr. sent to H.A. BAKER	4/29/79
✓	[illegible]	4/29/79

CUSTOMER/CUSTOMER AGENT DISPOSITION OF FIELD CHANGE:

☐ IMPLEMENTED ☐ NOT IMPLEMENTED

REF. _____

PROJECT MANAGER _____ DATE _____

AUTH. CHANGE NO. 8003130277 PCA NO.

SHEET 1 OF 14

FIELD CHANGE AUTHORIZATION-CONTINUATION

☒ EXPEDITE
☐ NORMAL

REFERENCE DOCUMENT TITLE

Reactor Trip on Loss of FWP & Turbine Trip

REF DOCUMENT NO.

SHEET 1 OF 10

DESCRIPTION OF CHANGE:

1.0 Purpose

Produce a reactor trip in response to a trip of the main turbine or a trip of both main feedwater pumps.

2.0 Philosophy

The philosophy is that the main feedwater pumps A and B trip signals may be ANDED to yield a signal indicating loss of both main feedwater pumps. This signal may be ORed with the main turbine trip signal fanned out, and utilized to trip both CRD trip breakers. This will result in a trip of the reactor control rods.

3.0 Theory of Operation

3.1 Existing ICS Hardware

Relays 86TT, 86 AFWPT, and 86 BFWPT including the field contacts associated with them already reside in the ICS. Note that the field contacts close to convey the respective trip states.

3.2 Conveying Main Feedwater Pump Trips

The trip of both main feedwater pumps energizes relays 86 AFWPT and 86 BFWPT. Upon loss of both main feedwater pumps relay K3 de-energizes due to the opening of parallel contacts from 86 AFWPT and 86 BFWPT.

When relay K3 de-energizes 2 output contacts cause a reactor trip by means of the CRD trip breakers.

3.3 Conveying Main Turbine Trip

A trip of the main turbine causes closure of the contact in series with relay 86TT. Relay 86TT energizes. This opens a contact in series with relay K3 de-energizing relay K3. K3 propagates a reactor trip as described in paragraph 3.2 above.

REVISED REQUIREMENTS (CONTINUATION SHEET)		SUPPLIER REVISIONS		TASK NO.	TASK TITLE
PREPARED BY	DATE	REVIEWED BY	DATE	21	ICS
J J Eschbach	4-28-79	J. J. Eschbach	4-28-79		
REVIEWED BY	DATE			FCA NO.	
				04-	
APPROVED BY	DATE				
A A Castano	4/28/79			SHEET 2	OF 14

REFERENCE DOCUMENT TITLE

Reactor Trip on Loss of FWP & Turbine Trip

REF DOCUMENT NO.

DESCRIPTION OF CHANGE:

3.4 Turbine Trip Bypass

In order to allow for power escallation to provide for starting the main turbine, a bypass arrangement is provided. The bypass can be placed in effect only by manual action and then only if the turbine is tripped. Once the turbine has been started (un-tripped) the bypass automatically removes itself.

Assume the turbine is tripped. 86TT is energized closing a contact in series with K1. K1 may now be energized by pressing the bypass switch. K1 will seal by means of contact K1A. Contact K1C causes a control room alarm indicating a bypass state. Contact K1B is closed causing relay K3 to energize. With K3 energized control rod out motion is permitted.

3.5 Main Feedwater Pump Bypass

In order to allow for control rod drive testing during reactor shutdown a bypass arrangement is provided. The bypass can be placed in effect only by manual action and then only if both main feedwater pumps are tripped. Once a main feedwater pump has started (un-tripped) the bypass automatically removes itself.

Assume both main feedwater pumps are tripped. 86 AFWPT and 86 BFWPT are energized closing contacts in series with relay K2. K2 may now be energized by pressing the bypass switch. K2 will seal in by means of contact K2A. Contact K2C causes a control room alarm indicating a bypass state. Contact K2B is closed causing relay K3 to energize. With K3 energized control rod testing can be performed.

REVISED REQUIREMENTS (CONTINUATION SHEET)	SUPPLIER REVISIONS	TASK NO. 21	TASK TITLE ICS
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FIELD CHANGE AUTHORIZATION-CONTINUATION

☒ EXPEDITE
☐ NORMAL

REFERENCE DOCUMENT TITLE

REACTOR TRIP ON LOSS OF FWP & TURBINE TRIP

REF DOCUMENT NO.

SHEET 3 OF 10

DESCRIPTION OF CHANGE:

3.6 Normal Turbine Shutdown Bypass

In order to allow for normal turbine shutdown, a bypass arrangement is provided. The bypass can be placed in effect only by manual action. Depressing the bypass switch energizes Relay K4 which closes contacts K4A, K4B and K4C. Contact K4A maintains the circuit to K4 when the bypass switch is released. Contact K4B maintains the circuit to relay K3 thus enabling shutdown of the turbine without reactor trip. Contact K4C provides an annunciator alarm to the control room indicating that the normal turbine shutdown bypass is implemented.

When the operator trips the turbine, Relay 86TT energizes closing a contact in series with relay K1 allowing K1 to implement the turbine trip bypass, annunciate that the turbine trip is bypassed and close contact K1d energizing Relay K5. Relay K5 then opens contact K5A denergizing Relay K4 thus automatically removing the normal turbine shutdown bypass.

3.7 Bypass Removal

Bypasses are automatically removed as described in Paragraphs 3.4, 3.5, and 3.6.

Bypasses can be manually removed at any time by depressing the reset switch.

REVISED REQUIREMENTS (CONTINUATION SHEET)	SUPPLIER REVISIONS	TASK NO. 21	TASK TITLE ICS
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☐ NORMAL

REFERENCE DOCUMENT TITLE	REF DOCUMENT NO.
Reactor Trip on Loss of FWP & Turbine Trip	SHEET 4 OF 10

DESCRIPTION OF CHANGE:

Installation Instruction

Turn off power to the ICS cabinets.

Install the two relay modules in ICS cabinet 2 row 7 positions 3 and 4.

Install the bypass and reset switches. The suggested installation location is on the blank cover located in cabinet 2 row 7 position 5.

Utilizing a wire wrap tool and 22 AWG solid strand wire, connect the relays, switches and power per the attached two sketches. Power connection to be the + 24Vdc bus within the cabinet

REVISED REQUIREMENTS (CONTINUATION SHEET)		SUPPLIER REVISIONS		TASK NO.	TASK TITLE
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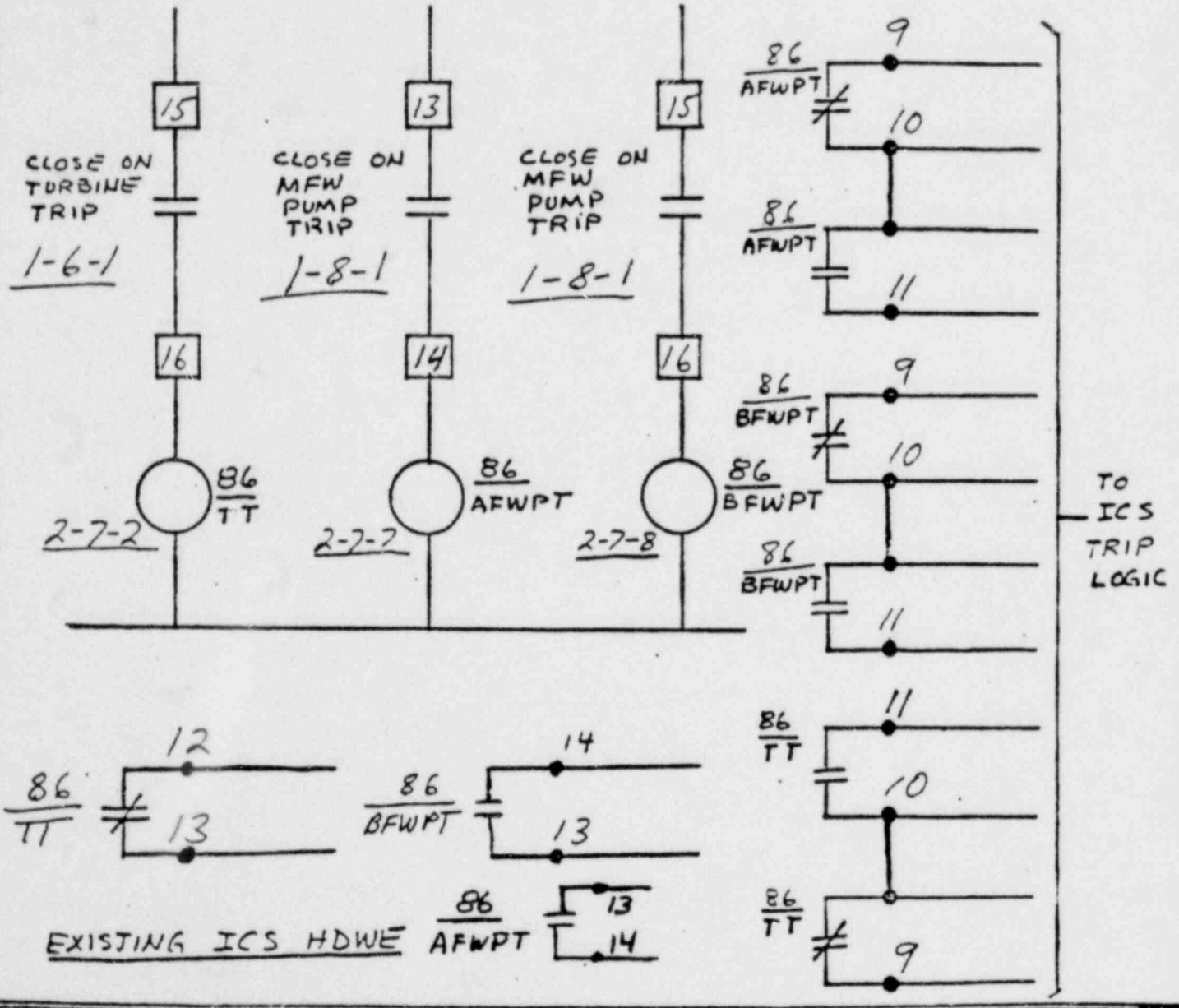
☒ EXPEDITE
☐ NORMAL

REFERENCE DOCUMENT TITLE: REACTOR TRIP ON LOSS OF FWP OR TURBINE TRIP

REF DOCUMENT NO.:

SHEET 5 OF 10

DESCRIPTION OF CHANGE:



REVISED REQUIREMENTS (CONTINUATION SHEET)		SUPPLIER REVISIONS	TASK NO. 21 / TASK TITLE: ICS
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FIELD CHANGE AUTHORIZATION-CONTINUATION

☒ EXPEDITE
☐ NORMAL

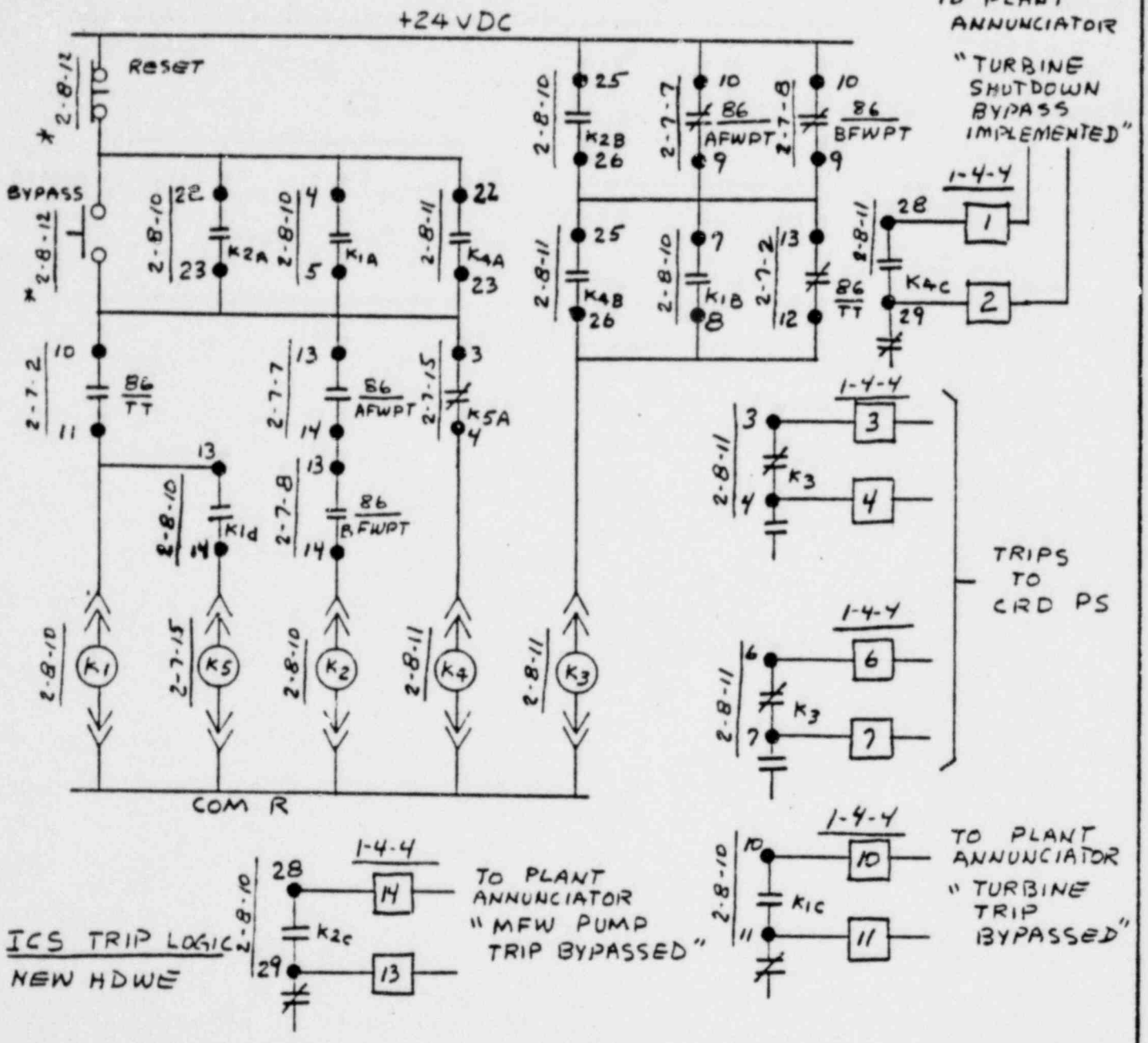
REFERENCE DOCUMENT TITLE

REACTOR TRIP ON LOSS OF FWP OR TURBINE TRIP

REF DOCUMENT NO.

SHEET 6 OF 10

DESCRIPTION OF CHANGE:



ICS TRIP LOGIC
NEW HDWE

* RECOMMENDED LOCATION OF BYPASS AND RESET SWITCHES.

REVISED REQUIREMENTS (CONTINUATION SHEET)	SUPPLIER REVISIONS	TASK NO. 21	TASK TITLE ICS
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☒ EXPEDITE
☐ NORMAL

REFERENCE DOCUMENT TITLE

Reactor Trip on Loss of FWP or Turbine Trip

REF DOCUMENT NO.

SHEET 7 OF 10

DESCRIPTION OF CHANGE:

CHECKOUT PROCEDURE

NOTE: READ AND STUDY THIS PROCEDURE COMPLETELY BEFORE STARTING THE CHECKOUT

1.0 Purpose

The purpose of this procedure is to checkout the ICS turbine trip logic once installation has been completed.

2.0 Initial Condition

A. The NSS is in shutdown
B. The control rod drive system is in a tripped state.
C. The ICS is operational and the plant status is so that power to the ICS can be interrupted.
D. SHUNT trip power is present in the control rod drive breaker cabinets.

3.0 Required Equipment

A. A.C. voltmeter capable of reading 125 VAC
B. Hand Tools
C. Jumper Leads

4.0 Checkout Procedure

In all steps where wiring is removed or reinstalled or jumpers are installed first remove power from the ICS. When measurements are called for reapply power to the ICS. Remove the module containing K4 and K5 and do not install until directed.

A. Remove Power - Disconnect field contact wiring

For turbine trip input 1-6-1 1-5 & 16, main feedwater A trip input 1-6-1 13 & 14, and main feedwater B input 1-8-1 15 & 16.

B. Power Up - Verify that the ICS trip logic is in an untripped state. Measure for the presence of line voltage across both K3 trip contacts. (If this voltage is not present check for the presence of shunt trip power at the CRD breakers.

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☒ EXPEDITE
☐ NORMAL

REFERENCE DOCUMENT TITLE

Reactor Trip on Loss of FWP or Turbine Trip

REF DOCUMENT NO.

SHEET 8 OF 10

DESCRIPTION OF CHANGE:

C. Remove Power - Install jumpers across the terminals for turbine trip input. (See A above).

D. Power Up - Verify that the ICS trip logic is in a tripped state. Measure for the absence of line voltage across both K3 trip contacts.

E. Check the turbine trip bypass - Operate the bypass switch. Note that the turbine trip bypass annunciator in the control room is indicating a turbine trip bypass.

F. Check that the turbine trip is bypassed - Measure for the presence of line voltage across both K3 trip contacts.

G. Check the bypass reset - Operate the reset switch. Measure for the absence of line voltage across the K3 trip contacts. Check that the turbine trip's bypassed annunciator has reset.

H. Remove Power - Remove the jumper installed in C above. Install the jumper across terminals for feedwater pump A trip - Step A above.

I. Check that a single feedwater pump trip does not produce a trip output. Measure for the presence of line voltage across both K3 trip contacts.

J. Check that the feedwater pump trip's bypass will not respond with one pump tripped. Operate the bypass pushbutton. There should be no response from the plant annunciator indicating a main feedwater pump trip's bypass. Check that line voltage is still present across both K3 trip contacts.

K. Remove Power - Remove the jumper installed in step H. Install the jumper across the terminals for feedwater pump B - step A above.

L. Power Up - Repeat steps I and J.

M. Remove Power - Reinstall a jumper as in step H. Leave the jumper installed in step K in place.

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☐ NORMAL

REFERENCE DOCUMENT TITLE	REF DOCUMENT NO.
Reactor Trip on Loss of FWP or Turbine Trip	SHEET 9 OF 10

DESCRIPTION OF CHANGE:

N. Power Up - Check that with both main feedwater pumps tripped the ICS trip logic outputs a trip. Measure for the absence of line voltage across both K3 trip contacts.

Check that with both main feedwater pumps tripped the feedwater trip can be bypassed. Operate the bypass switch. Note that the plant annunciator alarms a main feedwater trip's bypassed state.

O. Check that the main feedwater pump trip is bypassed. Measure for the presence of line voltage on both K3 trip contacts.

P. Check that the bypass reset is operational. Annunciator no longer indicates a main feedwater pump trip bypassed. Measure for the absence of line voltage across both K3 trip contacts.

Q. Remove Power - Remove all jumpers.

R. Power Up - Reset both CRD breakers.

S. Check trip transmission - Use a test lead to momentarily short the main turbine trip input terminals - See A above. Check the CRD breakers both should be tripped. NOTE: It may be necessary to place the NI/RPS in shutdown bypass to complete steps R and S.

REVISED REQUIREMENTS (CONTINUATION SHEET)	SUPPLIER REVISIONS	TASK NO.	TASK TITLE
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REFERENCE DOCUMENT TITLE	REF DOCUMENT NO.
Reactor Trip on Loss of FWP & Turbine Trip	SHEET 10 OF 10

DESCRIPTION OF CHANGE:

T. This step prepares the equipment for the remaining steps.

1. Remove power.
2. Install the module containing K4 and K5.
3. Note that there are no jumpers across the trip input terminals-Step A.
4. Clip the voltmeter across one set of the K3 trip contacts.
   Caution shunt trip power is present at these terminals.

U. Power up - check that the ICS trip logic is untripped. Presence of line voltage indication on the voltmeter.

V. Press the bypass switch.

W. Check that the bypass is in effect. Hold a jumper across the turbine trip input terminals - Step A - and note that a trip is not generated - line voltage indication on the voltmeter.
Do Not Remove The Jumper.

X. Check that the bypass will remove automatically. Open the jumper and then reconnect it. Check taht line voltage is not indicated on the voltmeter.

Y. Remove power - Reinstall the wiring for turbine and main feedwater pump trip's that were removed in Step A.

Z. This completes the check out procedure.

REVISED REQUIREMENTS (CONTINUATION SHEET)	SUPPLIER REVISIONS	TASK NO. / TASK TITLE
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FIELD CHANGE AUTHORIZATION-CONTINUATION

☐ EXPEDITE
☐ NORMAL

REFERENCE DOCUMENT TITLE
REACTOR TRIP ON LOSS OF FWP OR TURB. TRIP

REF DOCUMENT NO.

SHEET 1 OF 3

DESCRIPTION OF CHANGE:

Installation Instructions

1. Remove all power from the AC breaker cabinet before starting.
2. Locate TB1 on the source interruption device of AC breaker cabinet A and B.
3. Add a new cable between the source interruption device A of AC breaker cabinet A and the ICS.
4. Add a new cable between the source interruption device B of AC breaker cabinet B and the ICS.
5. The termination of the cable on each source interruption device shall be as shown on sheets 2 and 3.
6. The termination of the cable on the ICS shall be as shown on the sheets for Task 21 (ICS).
7. The cables should be two conductor, 14 ga AWG.

REVISED REQUIREMENTS (CONTINUATION SHEET)		SUPPLIER REVISIONS	TASK NO. 43 / TASK TITLE CRDCS
PREPARED BY A.W. Brown TE	DATE 4/28/79	REVIEWED BY A.W. Brown TE	DATE 4/28/79
REVIEWED BY	DATE		FCA NO. 04-
APPROVED BY L.A. Tedesco	DATE 4/28/79		SHEET 12 OF 14

FIELD CHANGE AUTHORIZATION-CONTINUATION

☒ EXPEDITE
☐ NORMAL

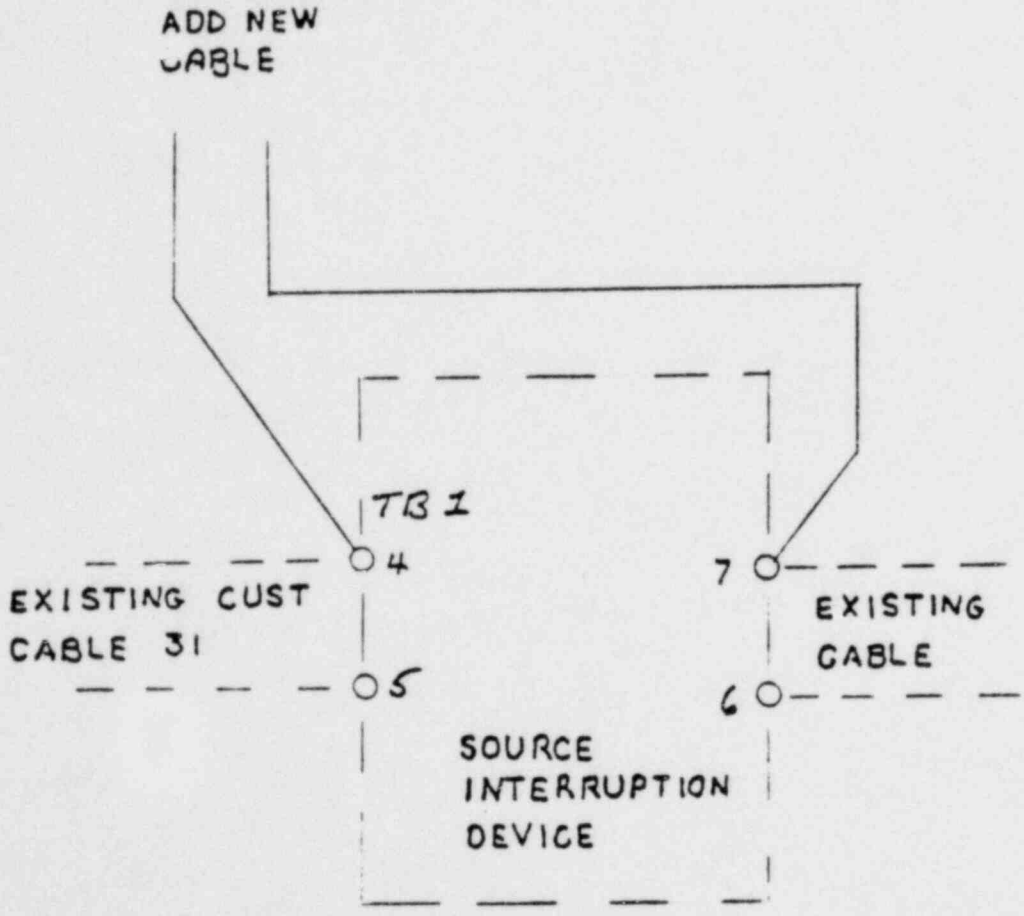
REFERENCE DOCUMENT TITLE
REACTOR TRIP ON LOSS OF FWP or TURB. TRIP

REF DOCUMENT NO.

SHEET 3 OF 3

DESCRIPTION OF CHANGE:

TRIP BREAKER 3



REVISED REQUIREMENTS (CONTINUATION SHEET)	SUPPLIER REVISIONS	TASK NO. / TASK TITLE
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APPROVED BY / DATE		SHEET 13 OF 14

FIELD CHANGE AUTHORIZATION-CONTINUATION

☒ EXPEDITE
☐ NORMAL

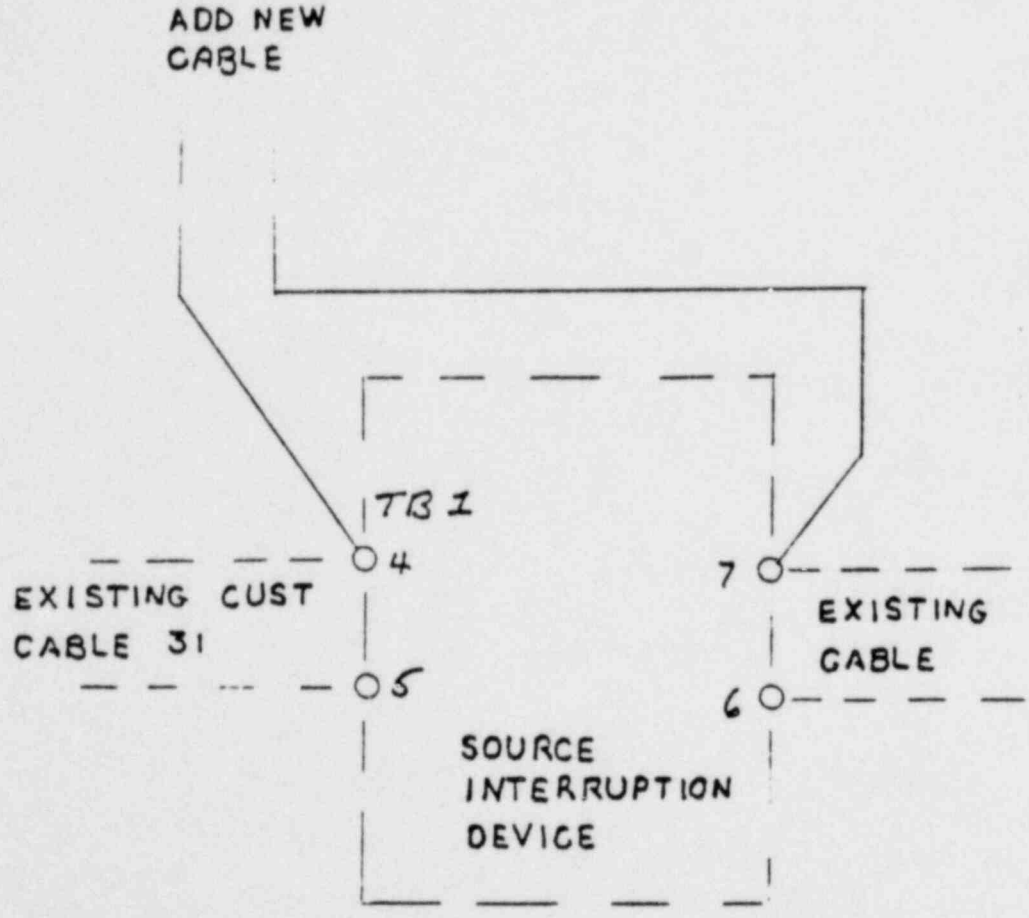
REFERENCE DOCUMENT TITLE
REACTOR TRIP ON LOSS OF FWP or TURB. TRIP

REF DOCUMENT NO.

SHEET 2 OF 3

DESCRIPTION OF CHANGE:

TRIP BREAKER A



REVISED REQUIREMENTS (CONTINUATION SHEET)	SUPPLIER REVISIONS	TASK NO. 43 / TASK TITLE CRDCS
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