SUPERSEDED

1.0 Purpose

1.1 This procedure provides instruction for calibrating the Reactor Coolant Temperature and Pressurizer Pressure Instrument Loop Channel 2 (White).

1.2 The Reactor Protection System (RPS) maintains an allowable region of power, pressure, and coolant temperature. The RPS protects the integrity of the four fission product boundaries to avoid undue risk to health and safety of the public. The RPS is arranged into four independent channels for redundancy.

2.0 Operational Considerations

2.1 Initial Conditions

2.1.1 Perform this procedure with plant shutdown OR power greater than 10% AND TAVG is greater than 554ºF.

2.1.2 IF performing this procedure at power, THEN perform SP-47-316F, "Channel 2 (White) Reactor Protection Logic Test" OR SP-47-316B, "Channel 2 (White) Instrument Channel Test," through Reactor Trip and Bypass Breaker Test and Reactor Protection Test sections prior to this calibration.

2.2 Control Room Indications

2.2.1 Performing this procedure causes numerous Control Room alarms.

2.2.2 Performing this procedure affects numerous Control Room instruments.

2.2.3 Performing this procedure may alarm TLA-9 "Core Exit T/C Tilts." **[CAP032326] [PCR022832]**

2.3 Technical Specifications And Limiting Conditions For Operation

2.3.1 The following references are information only. Refer to the actual ***Technical Specifications and Operating License*** for exact impact.

Tech Spec No.	Summary
3.5.b	For on-line testing or in the event of failure of a subsystem…
3.5.c	If for Tables TS 3.5-2 through TS 3.5-5 the number of channels…
3.5.d	In the event of subsystem instrumentation channel failure…

Table No.	Table Item No.	Affected Functional Unit
TS 3.5-2	5	Overtemperature ΔT
TS 3.5-2	6	Overpower ΔT
TS 3.5-2	7	Low Pressurizer Pressure
TS 3.5-2	8	High Pressurizer Pressure
TS 3.5-3	1d	High Pressurizer Pressure
TS 3.5-6	2	Reactor Coolant System Subcooling Margin…

(1) With number of OPERABLE accident monitoring instrumentation channels…
(2) With number of OPERABLE accident monitoring instrumentation channels…

3.0 Precautions

3.1 This procedure requires working with potentially dangerous electrical circuits. Refer to the Site Safety Procedures and Policies for safe work practices.

3.2 Remove power to an R/E converter before opening the output circuit.

3.3 Prior to restoring Channel 2 (White), allow the R/E converter to warm up for one hour after restoring the power.

3.4 This procedure might require working with static sensitive devices. Use anti static work precautions as necessary.

3.5 Observe Foreign Material Exclusion as required by MA-AA-102, "Dominion Foreign Material Exclusion Process."

SUPERSEDED

4.0 General Instructions

4.1 Overview

4.1.1 This procedure requires two technicians.

4.1.2 The following equipment is affected by this procedure:

- 42301 PRZR Pressure Recorder (PR-429)
  Mechanical Control Console C
- 4121701 OTΔT Setpoint Indicator (TI-406A)
  Mechanical Control Console B
- 4121702 Full Power ΔT Indicator (TI-406B)
  Mechanical Control Console B
- 4121703 OPΔT Setpoint Indicator (TI-406C)
  Mechanical Control Console B
- 4122202 PRZR Pressure Indicator (PI-430)
  Mechanical Control Console B
- 4122402 TAVE Loop A Temperature Indicator (TI-402)
  Mechanical Control Console B
- 4255301 OTΔT Setpoint Recorder (TR-405A red pen)
  Mechanical Vertical Panel A
- 4255302 ΔT Recorder (TR-405A green pen)
  Mechanical Vertical Panel A
- 4255303 OPΔT Setpoint Recorder (TR-405A blue pen)
  Mechanical Vertical Panel A
- 4840101 PRZR Pressure Instrument Power Supply (PQ-430)
  Relay Rack RR-114
- 4840102 PRZR Pressure High Reactor Trip Bistable (PC-430A)
  Relay Rack RR-114
- 4840103 PRZR Pressure Safety Injection Trip Bistable (PC-430E/F)
  Relay Rack RR-114

SUPERSEDED

4.1.3 The following equipment is affected by this procedure (cont'd):

- 4840104 PRZR Pressure Compensation Unit (PM-430C)
  Relay Rack RR-114
- 4840105 PRZR Pressure Low Reactor Trip Bistable (PC-430H)
  Relay Rack RR-114
- 4840106 PRZR Pressure Instrument I/I (PM-430A)
  Relay Rack RR-114
- 4840107 PRZR Pressure Instrument I/I (PM-430B)
  Relay Rack RR-105
- 4840108 PRZR Pressure Power Relief Valve 1B Alarm (PC-430B)
  Relay Rack RR-105
- 4840109 PRZR High Pressure Alarm (PC-430C)
  Relay Rack RR-105)
- 4840110 PRZR Pressure Instrument I/I (PM-430D)
  Relay Rack RR-114
- 4857101 QU>QL Proportional Controller (TC-406L)
  Relay Rack RR-114
- 4857102 ΔT Lag Unit (TM-406R)
  Relay Rack RR-114
- 4857103 ΔT Lag E/I Converter (TM-406C)
  Relay Rack RR-114
- 4857104 ΔT Lag E/I Converter (TM-406P)
  Relay Rack RR-114
- 4857105 OTΔT Rx Trip/Rod Stop Bistable (TC-406C/D)
  Relay Rack RR-114
- 4857106 ΔT SP1 I/I Converter (TM-406D)
  Relay Rack RR-114
- 4857107 OPΔT Rx Trip/Rod Stop Bistable (TC-406A/B)
  Relay Rack RR-114
- 4892701 TH R/E Converter (TT-402A)
  Relay Rack RR-114
- 4892702 TC R/E Converter (TT-402B)
  Relay Rack RR-114
- 4892703 TAVG E/I Lead/Lag Unit (TM-402BB)
  Relay Rack RR-114

SUPERSEDED

4.1.4 The following equipment is affected by this procedure (cont'd):

- 4892704 TAVG High/Low Trip Unit (TC-402A/D)
  Relay Rack RR-114
- 4892705 TAVG Low FW Valve Override Trip Unit (TC-402F)
  Relay Rack RR-114
- 4892706 TAVG Impulse Lead/Lag Converter (TM-402O)
  Relay Rack RR-114
- 4892707 ΔT SP2 Summer (TM-402V)
  Relay Rack RR-114
- 4892708 TAVG I/I Converter (TM-402C)
  Relay Rack RR-114
- 4892709 ΔT SP2 I/I Converter (TM-402S)
  Relay Rack RR-114
- 4892710 QL>QU Proportional Controller (TC-402R)
  Relay Rack RR-114
- 4892711 ΔT SP1 Lead/Lag Converter (TM-402B)
  Relay Rack RR-114
- 4892712 ΔQ Current Source (TM-402U)
  Relay Rack RR-114
- 4892713 ΔQ Signal Selector (TM-402T)
  Relay Rack RR-114
- 4892714 TAVG I/I Converter (TM-402W)
  Relay Rack RR-102
- 4892715 TAVG I/I Converter (TM-402EE)
  Relay Rack RR-103
- P0430A PRZR Pressure Computer Point
- T0401A RCS Channel 2 (White) TAVG Computer Point
- T0404A RCS Channel 2 (White) ΔT Computer Point
- T0408A RCS Channel 2 (White) OPΔT Computer Point
- T0411A RCS Channel 2 (White) OTΔT Computer Point

4.1.5 IF As Found data is NOT within the Acceptance Range, THEN immediately notify the Shift Manager before continuing.

4.1.6 IF As Found data is NOT within the Acceptance Range, THEN immediately notify the First Line supervisor before continuing.

4.1.7 Complete a Condition Report for nonconforming conditions as required by Corrective Action Program.

SUPERSEDED

4.1.8 IF the plant is shut down, THEN Annunciator, Status Lamp and Computer Point indications might differ from the expected indication. A CR Form is not required for this plant condition, if the reason for the condition is understood.

4.1.9 IF any channel alert is actuated during this test, except for the instrument under test, THEN stop testing AND return all channels to normal (untripped) conditions.

4.1.10 Underlined step numbers designate steps requiring independent verification or concurrent verification of performance.

4.1.11 This procedure is based on Full Power Delta-T 61.785°F.

4.1.12 Because of lead/lag units, allow adequate time for circuits to stabilize before recording outputs.

4.1.13 Some independent verifications are provided by annunciator and end-device indications.

4.2 Other Work Groups And Support Personnel

- Operations

4.3 References

4.3.1 Drawings

• Flow	XK-100-10
• Logic	E-2038, E-2042
• Wiring	XK-100-566, E-2534, E-2535, E-3827
• Interconnection	XK-100-624, XK-100-625, XK-100-656, XK-100-661
• Block	XK-100-546, XK-100-549, XK-100-552

SUPERSEDED

4.3.2 Technical manuals and instruction books

- 4840101, 4840104, 4840106, 4840107, 4857102, 4857105, 4857106, 4857107, 4892703, 4892707, 4892708, 4892709, 4892712, 4892713, 4892714, 4892715 — 100-1744-1, 100-1762-1, Foxboro
- 4122202, 4121701, 4121702, 4121703, 4122402 — 445-1, Westinghouse
- 42301, 42553 — 272239, Yokogawa
- 4892706 — 236398, NUS Instrument Inc
- 4892701, 4892702, 4892711 — P008486, NUS Instrument Inc
- 4840102, 4840103, 4840105, 4840108, 4840109, 4857101, 4857103, 4857104, 4892704, 4892705, 4892710 — C-N-430-9, NUS Instrument Inc

SUPERSEDED

4.3.3 Bill of materials

- 42301, 42553 5147
- 4840101 1254

- 4840003, 3522
- 4840104 3505
- 4840005 1282
- 4840102, 4840103, 4840105, 4840108, 4840109, 4857103, 4857104, 4892704, 4892705 5351

- 4840106, 4840107, 4840110, 4857106, 4892708, 4892709, 4892714, 4892715 1292
- 4121701, 4121702, 4121703, 4122202, 4122402 1211
- 4857101, 4892710 1270

- 4857107, 4857105 1277
- 4891406 1288
- 4857102 1263

- 4892701, 4892702 5207
- 4892703 3506
- 4892706 1258

- 4892707 1256
- 4892711 5206
- 4892712 1297
- 4892713 1283
- 4857101, 4892710 5255

4.3.4 Performance calculations, verifications, and data entry

- PRZR High Press RX Trip Calculation C10818-1 Rev.1
- PRZR Lo Safety Injection Calculation C10818-2 Rev.1
- PRZR Hi Unblock Safety Injection Calculation C10818-3 Rev.1
- PRZR Press Lo Press RX Trip Calculation C10818-4 Rev.1

SUPERSEDED

5.0 Equipment Required

5.1 Measuring And Test Equipment

- Decade resistance box, 0 to 1K ohms (2)
- Current calibrator (2)
- Analog simulator
- DC voltage source (4)

- Precision voltmeter (3)
- Precision test resistor
- AC voltmeter
- Step function current calibrator

- Ramp generator
- Plotter, two-channel
  (Data acquisition devices)
- Fluke 45 precision voltmeter (2)

5.2 Special Tools

- I&C output test connector
- Controlled jumper

5.3 Protective And Safety Equipment

- As required by Site Safety Procedures and Policies

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.0 Procedure

6.1 Check ICCMS Train A is OPERABLE. _____ (Operator)

6.2 Notify Shift Manager/Unit Supervisor performing this procedure will make ICCMS Train B INOPERABLE in step 6.6.22. _____ (SM/US)

6.3 Initial Conditions for Testing

6.3.1 At Mechanical Control Console C, have a Control Room Operator verify "DELTA TEMPERATURE RX PROTECTION CHANNEL DEFEAT" switch (ES-46374) to position 2 (WHITE) AND PULLOUT.

2 (WHITE) / PULLOUT _____ (Operator)

Concurrent Verification _____ (Operator)

6.3.2 At Mechanical Control Console C, have a Control Room Operator verify "TAVE RX PROTECTION CHANNEL DEFEAT" switch (ES-46375) to position 2 (WHITE) AND PULLOUT.

2 (WHITE) / PULLOUT _____ (Operator)

Concurrent Verification _____ (Operator)

6.3.3 At Mechanical Control Console C, circle the position of "PRZR PRESSURE CONTROL CHANNEL SELECTOR" switch (ES-46324).

4-3 / 2-3 / 2-1 _____ (Operator)

6.3.4 IF the "PRZR PRESSURE CONTROL CHANNEL SELECTOR" switch (ES-46324) is selected to 4-3, THEN N/A Step 6.3.5. _____ (Operator)

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.3.5 Notify the Control Room Operator, IF desired, operate Pressurizer Pressure controls in MANUAL using Operations procedure N-RC-36C, "Pressurizer Pressure Control" before transferring the "PRZR PRESSURE CONTROL CHANNEL SELECTOR" switch (Step 6.3.6).

_____
(Operator)

6.3.6 At Mechanical Control Console C, have a Control Room Operator place "PRZR PRESSURE CONTROL CHANNEL SELECTOR" switch (ES-46324) to position 4-3.

4-3 _____
(Operator)

Concurrent Verification _____
(Operator)

6.3.7 Notify the Control Room Operator, IF desired, the controllers may be placed to AUTO.

_____
(Operator)

Concurrent Verification _____
(Operator)

6.3.8 At Mechanical Control Console C, have a Control Room Operator verify "PRZR PRESSURE RECORDER INPUT SELECTOR" switch (ES-46325) to position 1, 3, or 4 AND circle that position.

1 / 3 / 4 _____
(Operator)

Concurrent Verification _____
(Operator)

6.3.9 At Mechanical Vertical Panel A, have a Control Room Operator verify "TR-405 RX CLNT DELTA-TEMP RECORDER SELECTOR" switch (ES-46551) to position 2 (WHITE).

2 (WHITE) _____
(Operator)

Concurrent Verification _____
(Operator)

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.3.10 IF reactor trip breakers are open AND auto SI is disabled, THEN N/A Steps 6.3.11 through 6.3.15. _____

6.3.11 At Mechanical Vertical Panel A, check the following status lamps are DIM:

6.3.11.1 LOOP A CHAN 2 OTΔT (44904-0101) _____

6.3.11.2 LOOP B CHAN 1 OTΔT (44904-0102) _____

6.3.11.3 LOOP A CHAN 4 OTΔT (44904-0201) _____

6.3.11.4 LOOP B CHAN 3 OTΔT (44904-0202) _____

6.3.11.5 LOOP A CHAN 2 OPΔT (44904-0401) _____

6.3.11.6 LOOP B CHAN 1 OPΔT (44904-0402) _____

6.3.11.7 LOOP A CHAN 4 OPΔT (44904-0501) _____

6.3.11.8 LOOP B CHAN 3 OPΔT (44904-0502) _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.3.12 At Mechanical Vertical Panel B, check the following status lamps are DIM:

6.3.12.1 PRESSURIZER 1900 PSIG (44907-0205) _____

6.3.12.2 PRESSURIZER 1900 PSIG (44907-0206) _____

6.3.12.3 PRESSURIZER 1900 PSIG (44907-0207) _____

6.3.12.4 PRESSURIZER 1900 PSIG (44907-0208) _____

6.3.12.5 PRESSURIZER 2385 PSIG (44907-0305) _____

6.3.12.6 PRESSURIZER 2385 PSIG (44907-0306) _____

6.3.12.7 PRESSURIZER 2385 PSIG (44907-0307) _____

6.3.12.8 LOOP B OTΔT (44907-0505) _____

6.3.12.9 LOOP A OTΔT (44907-0506) _____

6.3.12.10 LOOP B OTΔT (44907-0507) _____

6.3.12.11 LOOP A OTΔT (44907-0508) _____

6.3.12.12 LOOP B OPΔT (44907-0605) _____

6.3.12.13 LOOP A OPΔT (44907-0606) _____

6.3.12.14 LOOP B OPΔT (44907-0607) _____

6.3.12.15 LOOP A OPΔT (44907-0608) _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.3.13 At Mechanical Vertical Panel C, check the following status lamps are DIM:

6.3.13.1 PRESSURIZER 1815 PSIG (44908-0201) _____

6.3.13.2 PRESSURIZER 1815 PSIG (44908-0202) _____

6.3.13.3 PRESSURIZER 1815 PSIG (44908-0203) _____

6.3.13.4 LOOP A LOW TAVE (44908-0302) _____

6.3.13.5 LOOP A LOW TAVE (44908-0304) _____

6.3.13.6 LOOP B LOW TAVE (44908-0305) _____

6.3.13.7 LOOP B LOW TAVE (44908-0307) _____

6.3.13.8 LOOP A LOW-LOW TAVE (44908-0402) _____

6.3.13.9 LOOP A LOW-LOW TAVE (44908-0404) _____

6.3.13.10 LOOP B LOW-LOW TAVE (44908-0405) _____

6.3.13.11 LOOP B LOW-LOW TAVE (44908-0407) _____

6.3.14 At Mechanical Vertical Panel C, check the following status lamps are BRIGHT:

6.3.14.1 PRESSURIZER >2000 PSIG (44908-0101) _____

6.3.14.2 PRESSURIZER >2000 PSIG (44908-0102) _____

6.3.14.3 PRESSURIZER >2000 PSIG (44908-0103) _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.3.15 Check the following annunciators are OFF:

6.3.15.1 OTΔT HIGH (47033C) _____

6.3.15.2 OPΔT HIGH (47033D) _____

6.3.15.3 PRESSURIZER PRESSURE 2385 (47041C) _____

6.3.15.4 PRZR PRESS SI CHANNEL ALERT (47041D) _____

6.3.15.5 OPΔT CHANNEL RNBACK/RDSTP ALERT (47041Q) _____

6.3.15.6 OTΔT CHANNEL RNBACK/RDSTP ALERT (47041R) _____

6.3.15.7 PRESSURIZER PRESSURE <1900 (47042D) _____

6.3.15.8 RCS TAVG HIGH (47042H) _____

6.3.15.9 PRESSURIZER PRESSURE LOW (47043D) _____

6.3.15.10 RCS LOOP B TAVG LOW LOW (47043G) _____

6.3.15.11 RCS LOOP A TAVG LOW LOW (47043H) _____

6.3.16 At Recorder 42553, select "CAL START" message. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.3.17 In Relay Rack RR-114, place the following bistable output switches to TEST (up):

6.3.17.1 HI TAVG (402A) _____

6.3.17.2 LO/LO TAVG (402D) _____

6.3.17.3 F.W. VALVE OVERRIDE (402F) _____

6.3.17.4 OVER POWER TRIP (406A) _____

6.3.17.5 ROD STOP (directly below OVER POWER TRIP) (406B) _____

6.3.17.6 OVER TEMP. TRIP (406C) _____

6.3.17.7 ROD STOP (directly below OVER TEMP. TRIP) (406D) _____

6.3.17.8 HI PRESS. TRIP (430A) _____

6.3.17.9 LO PRESS. TRIP (430H) _____

6.3.17.10 UNBLOCK S.I. (430F) _____

6.3.17.11 S.I. (430E) _____

6.3.18 IF reactor trip breakers are open AND auto SI is disabled, THEN N/A Steps 6.3.19 through 6.3.22. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.3.19 Check the following annunciators are ON:

6.3.19.1	PRESSURIZER PRESSURE 2385	(47041C)	_____
6.3.19.2	PRZR PRESS SI CHANNEL ALERT	(47041D)	_____
6.3.19.3	PRESSURIZER PRESSURE < 1900	(47042D)	_____
6.3.19.4	OTΔT HIGH	(47033C)	_____
6.3.19.5	OPΔT HIGH	(47033D)	_____
6.3.19.6	OPΔT CHANNEL RNBACK/RDSTP ALERT	(47041Q)	_____
6.3.19.7	OTΔT CHANNEL RNBACK/RDSTP ALERT	(47041R)	_____
6.3.19.8	RCS TAVG HIGH	(47042H)	_____
6.3.19.9	RCS LOOP A TAVG LOW LOW	(47043H)	_____

6.3.20 Check the following SER points are ALARMED:

6.3.20.1	REACTOR COOLANT SYSTEM LOOP A CHANNEL 2 TAVG HIGH	(944)	_____
6.3.20.2	OVERTEMPERATURE DELTA TEMP HIGH	(1070)	_____
6.3.20.3	PRESSURIZER PRESSURE < 1900	(1071)	_____
6.3.20.4	OVERPOWER DELTA TEMP HIGH	(1076)	_____
6.3.20.5	PRESSURIZER PRESSURE 2385	(1080)	_____
6.3.20.6	PRESSURIZER LOW PRESSURE SI CHANNEL ALERT	(1173)	_____
6.3.20.7	REACTOR COOLANT SYSTEM LOOP A TAVG LO-LO	(1583)	_____
6.3.20.8	OVERPOWER DELTA TEMP RUNBACK/RODSTOP ALERT	(1685)	_____
6.3.20.9	OVERTEMPERATURE DELTA TEMP RUNBACK/RODSTOP ALERT	(1686)	_____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.3.21 Check the following status lamps are BRIGHT:

6.3.21.1 LOOP A CHAN 2 OTΔT (44904-0101) _____

6.3.21.2 LOOP A CHAN 2 OPΔT (44904-0401) _____

6.3.21.3 PRESSURIZER 1900 PSIG (44907-0206) _____

6.3.21.4 PRESSURIZER 2385 PSIG (44907-0306) _____

6.3.21.5 LOOP A OTΔT (44907-0506) _____

6.3.21.6 LOOP A OPΔT (44907-0606) _____

6.3.21.7 PRESSURIZER > 2000 PSIG (44908-0102) _____

6.3.21.8 PRESSURIZER 1815 PSIG (44908-0202) _____

6.3.21.9 LOOP A LOW TAVE (44908-0302) _____

6.3.21.10 LOOP A LOW-LOW TAVE (44908-0402) _____

6.3.22 Check the following computer points are TRIPPED:

6.3.22.1 RCLA OVERPOWER DT CHAN 2 (T0400D) _____

6.3.22.2 RCLA OVERTEMP DT CHAN 2 (T0403D) _____

6.3.22.3 PRESSURIZER HI P CH 2 (P0481D) _____

6.3.22.4 PRESSURIZER LOW P CHAN 2 (P0485D) _____

6.3.22.5 PRESSURIZER LO P CH 2 SI (P0490D) _____

Note

If Pressurizer Pressure is greater than 2000 psig, the following computer point will not alarm.

6.3.22.6 SAFETY INJECTION CHAN 2 UN BLK (P0493D) _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.3.23 IF Operations desires to avoid nuisance alarms, THEN have a Control Room Operator DISABLE the following SER points, otherwise N/A the substeps:

6.3.23.1 RCS LOOP A CHANNEL 2 TAVG DEVIATION (974) _____ (Operator)

6.3.23.2 RCS LOOP A CHANNEL 2 DELTA TEMP DEVIATION (978) _____ (Operator)

6.4 TH, TC, ΔT, and TAVG

6.4.1 In Relay Rack RR-114, open the signal injection test panel cover AND check the following:

6.4.1.1 Annunciator (47035K), "PROCESS PROTECT RACK 2 CHANNEL TEST" is ON. _____

6.4.1.2 SER (1680) "PROCESS PROTECT RACK 2 CHANNEL TEST" is ALARMED. _____

6.4.2 At the signal injection test panel, open the states block cover. _____

6.4.3 Open states block terminals, 3, 6, 9, and 12. _____

6.4.4 In Relay Rack RR-114, at the TH signal injection test jacks, connect a decade resistance box. _____

6.4.5 Adjust the TH decade resistance box to 425 ohms. _____

6.4.6 At the TC signal injection test jacks, connect a decade resistance box. _____

6.4.7 Adjust the TC decade resistance box to 425 ohms. _____

6.4.8 Place the following signal injection switches to TEST (up):

6.4.8.1 TH _____

6.4.8.2 TC _____

6.4.9 At THL test point jacks, connect a precision voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.4.10 Using Table 6-1, perform a calibration test of TT-402A. _____

Table 6-1

INPUT (ohms)		OUTPUT (vdc)			TT-402A	4892701
TH		THL			Accuracy: ± 0.05 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	400.08	0.40		0.35 to 0.45		
2	408.24	2.00		1.95 to 2.05		
3	416.38	3.60		3.55 to 3.65		
4	424.48	5.20		5.15 to 5.25		
5	432.55	6.80		6.75 to 6.85		
6	440.60	8.40		8.35 to 8.45		
7	448.62	10.00		9.95 to 10.05		
8	460.59	12.40		12.35 to 12.45		

M&TE ID	DESCRIPTION
	Decade resistance box
	Precision voltmeter

6.4.11 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.4.12 At TCL test point jacks, connect a precision voltmeter. _____

6.4.13 Using Table 6-2, perform a calibration test of TT-402B. _____

Table 6-2

INPUT (ohms)		OUTPUT (vdc)		TT-402B	4892702
TC		TCL		Accuracy: ± 0.05 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	400.17	0.40		0.35 to 0.45	
2	408.32	2.00		1.95 to 2.05	
3	416.44	3.60		3.55 to 3.65	
4	424.54	5.20		5.15 to 5.25	
5	432.60	6.80		6.75 to 6.85	
6	440.63	8.40		8.35 to 8.45	
7	448.64	10.00		9.95 to 10.05	
8	460.59	12.40		12.35 to 12.45	
M&TE ID		DESCRIPTION			
		Decade resistance box			
		Precision voltmeter			

SUPERSEDED

6.4.14 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.4.15 Place the TH signal injection switch to NORMAL (down). _____

6.4.16 Remove the decade box from the TH signal injection test jacks. _____

6.4.17 Place the TC signal injection switch to NORMAL (down). _____

6.4.18 Remove the decade box from the TC signal injection test jacks. _____

6.4.19 Remove power to TT-402A by unplugging the power cord. _____

6.4.20 At TT-402A, remove the signal cord set. _____

DATE PERFORMED _____ INITIALS

6.4.21 At pins W(+) and X(−), connect a 0 to 10 vdc voltage source. _____

6.4.22 Remove power to TT-402B by unplugging the power cord. _____

6.4.23 At TT-402B, remove the signal cord set. _____

6.4.24 At pins W(+) and X(−), connect a 0 to 10 vdc voltage source. _____

6.4.25 At ΔT test point jacks, connect a precision voltmeter. _____

6.4.26 At ΔT LAG test point jacks, connect a precision voltmeter. _____

6.4.27 Adjust the voltage source at TT-402B for a TCL output of 0.40 vdc. _____

Note

Device DB-1 is a resistive summing network with no calibration adjustments. A work order would be required to repair or replace if values are NOT within ACCEPTANCE RANGE.

6.4.28 Using Table 6-3 and Table 6-4, perform a calibration test of DB-1 and TM-406R. _____

Table 6-3

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		ΔT		Accuracy: ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	0.40	0.00		–0.04 to 0.04	
2	2.00	1.60		1.56 to 1.64	
3	3.60	3.20		3.16 to 3.24	
4	5.20	4.80		4.76 to 4.84	
5	6.80	6.40		6.36 to 6.44	
6	8.40	8.00		7.96 to 8.04	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter

SUPERSEDED

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Table 6-4

INPUT (vdc)		OUTPUT (vdc)			TM-406R	4857102
ΔT		ΔT LAG			**Accuracy:** ± 0.05 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	0.00	0.00		–0.05 to 0.05		
2	1.60	2.00		1.95 to 2.05		
3	3.20	4.00		3.95 to 4.05		
4	4.80	6.00		5.95 to 6.05		
5	6.40	8.00		7.95 to 8.05		
6	8.00	10.00		9.95 to 10.05		
M&TE ID		DESCRIPTION				
		Precision voltmeter				
		Precision voltmeter				

6.4.29 Are all Final Data entries within the acceptance range for Table 6-3 and Table 6-4?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.4.30 Adjust the voltage source at TT-402B for a TCL output of 2.40 vdc. _____

6.4.31 Using Table 6-5, perform a calibration test of DB-1. _____

Table 6-5

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		ΔT		Accuracy: ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	2.40	0.00		–0.04 to 0.04	
2	4.00	1.60		1.56 to 1.64	
3	5.60	3.20		3.16 to 3.24	
4	7.20	4.80		4.76 to 4.84	
5	8.80	6.40		6.36 to 6.44	
6	10.40	8.00		7.96 to 8.04	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.32 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

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6.4.33 Adjust the voltage source at TT-402B for a TCL output of 4.40 vdc. _____

6.4.34 Using Table 6-6, perform a calibration test of DB-1. _____

Table 6-6

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		ΔT		Accuracy: ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	4.40	0.00		–0.04 to 0.04	
2	6.00	1.60		1.56 to 1.64	
3	7.60	3.20		3.16 to 3.24	
4	9.20	4.80		4.76 to 4.84	
5	10.80	6.40		6.36 to 6.44	
6	12.40	8.00		7.96 to 8.04	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.35 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

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6.4.36 Adjust the voltage source at TT-402B for a TCL output of 6.40 vdc. _____

6.4.37 Using Table 6-7, perform a calibration test of DB-1. _____

Table 6-7

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		ΔT		Accuracy: ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	6.40	0.00		–0.04 to 0.04	
2	8.00	1.60		1.56 to 1.64	
3	9.60	3.20		3.16 to 3.24	
4	11.20	4.80		4.76 to 4.84	
5	12.40	6.00		5.96 to 6.04	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.38 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.4.39 Adjust the voltage source at TT-402B for a TCL output of 8.40 vdc. _____

6.4.40 Using Table 6-8, perform a calibration test of DB-1. _____

Table 6-8

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		ΔT		Accuracy: ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	8.40	0.00		–0.04 to 0.04	
2	10.00	1.60		1.56 to 1.64	
3	11.60	3.20		3.16 to 3.24	
4	12.40	4.00		3.96 to 4.04	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.41 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.4.42 Adjust the voltage source at TT-402B for a TCL output of 10.40 vdc. _____

6.4.43 Using Table 6-9, perform a calibration test of DB-1. _____

Table 6-9

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		ΔT		Accuracy: ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	10.4	0.00		–0.04 to 0.04	
2	12.0	1.60		1.56 to 1.64	
3	12.4	2.00		1.96 to 2.04	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.44 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

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6.4.45 Adjust the voltage source at TT-402B for a TCL output of 12.40 vdc. _____

6.4.46 Using Table 6-10, perform a calibration test of DB-1. _____

Table 6-10

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		ΔT		Accuracy: ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	12.40	0.00		–0.04 to 0.04	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.47 At ΔT test point jacks, remove the precision voltmeter. _____

6.4.48 At TM-406R, remove the signal cord set. _____

6.4.49 At pins W(+) and X(–), connect a 0 to 10 vdc voltage source. _____

6.4.50 In Relay Rack RR-103, TP/TM406C, connect a precision voltmeter. _____

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6.4.51 Using Table 6-11, perform a calibration test of TM-406C. _____

Table 6-11

INPUT (vdc)		OUTPUT (mvdc)		TM-406C	4857103
ΔT LAG		TP/TM406C		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	0.000	100.0		98.0 to 102.0	
2	2.317	200.0		198.0 to 202.0	
3	4.634	300.0		298.0 to 302.0	
4	6.951	400.0		398.0 to 402.0	
5	9.268	500.0		498.0 to 502.0	
5	9.268	500.0		498.0 to 502.0	
4	6.951	400.0		398.0 to 402.0	
3	4.634	300.0		298.0 to 302.0	
2	2.317	200.0		198.0 to 202.0	
1	0.000	100.0		98.0 to 102.0	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter

SUPERSEDED

6.4.52 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.4.53 In Relay Rack RR-103, TP/TM406C, remove the precision voltmeter. _____

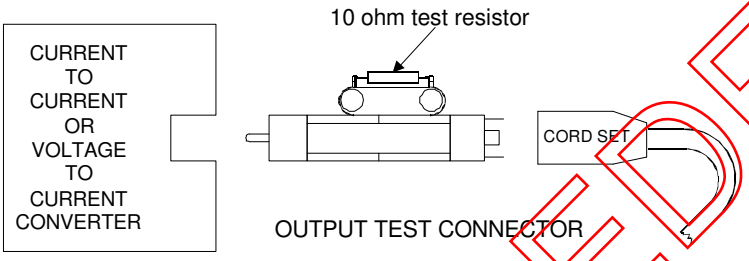
6.4.54 In Relay Rack RR-114, TM-406P, remove the signal cord set. _____

DATE PERFORMED _____ INITIALS

Note

Figure 1 shows the I&C output test connector.

Figure 1



6.4.55 At TM-406P, connect an I&C output test connector and 10 ohm precision test resistor. _____

6.4.56 At TM-406P, connect the signal cord set. _____

6.4.57 At TM-406P, at the I&C output test connector, connect a precision voltmeter. _____

SUPERSEDED

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Note

Table 6-12, Table 6-13, Table 6-14, and Table 6-15 may be performed concurrently.

6.4.58 Using Table 6-12, perform a calibration test of TM-406P. _____

Table 6-12

INPUT (vdc)		OUTPUT (mvdc)		TM-406P	4857104
ΔT LAG		TM-406P		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	0.000	100.0		98.0 to 102.0	
2	2.317	200.0		198.0 to 202.0	
3	4.634	300.0		298.0 to 302.0	
4	6.951	400.0		398.0 to 402.0	
5	9.268	500.0		498.0 to 502.0	
5	9.268	500.0		498.0 to 502.0	
4	6.951	400.0		398.0 to 402.0	
3	4.634	300.0		298.0 to 302.0	
2	2.317	200.0		198.0 to 202.0	
1	0.000	100.0		98.0 to 102.0	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter
	Precision test resistor

SUPERSEDED

6.4.59 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

6.4.60 Using Table 6-13, perform a calibration test of TI-406B. _____

Table 6-13

INPUT (mvdc)		OUTPUT (%)			TI-406B	4121702
TM-406P					Accuracy: ± 3%	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	100	0.0		<0 to 3.0		
2	200	37.5		34.5 to 40.5		
3	300	75.0		72.0 to 78.0		
4	400	112.5		109.5 to 115.5		
5	500	150.0		147.0 to >150		
5	500	150.0		147.0 to >150		
4	400	112.5		109.5 to 115.5		
3	300	75.0		72.0 to 78.0		
2	200	37.5		34.5 to 40.5		
1	100	0.0		<0 to 3.0		

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision test resistor

SUPERSEDED

6.4.61 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

6.4.62 Using Table 6-14, perform a calibration test of T0404A. _____

Table 6-14

INPUT (mvdc)		OUTPUT (%)			T0404A
TM-406P				Accuracy: ± 1.5%	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	0.0		–1.5 to 1.5	
2	200	37.5		36.0 to 39.0	
3	300	75.0		73.5 to 76.5	
4	400	112.5		111.0 to 114.0	
5	500	150.0		148.5 to 151.5	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision test resistor			

6.4.63 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Recorder TR-405A is calibrated in SP-47-011A.

6.4.64 Using Table 6-15, check TR-405A (green pen). _____

Table 6-15

INPUT (mvdc)		OUTPUT (%)			TR-405A	4255302
TM-406P					Accuracy: ± 0.5%	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	300	75.0		74.5 to 75.5		
M&TE ID		DESCRIPTION				
		Precision voltmeter				
		Precision test resistor				

6.4.65 At TM-406P, remove all test equipment. _____

6.4.66 At TM-406P, connect the signal cord set. _____

6.4.67 At TM-406R, remove all test equipment. _____

6.4.68 At TM-406R, connect the signal cord set. _____

6.4.69 At ΔT LAG test point jacks, remove the precision voltmeter. _____

6.4.70 At TAVG VOLTS test point jacks, connect a precision voltmeter. _____

6.4.71 At TAVG MA test point jacks, connect a precision voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.4.72 Adjust the voltage source at TT-402B for a TCL output of 0.40 vdc. _____

Note

Device DB-1 is a resistive summing network with no calibration adjustments. A work order would be required to repair or replace if values are NOT within ACCEPTANCE RANGE.

Note

Use the voltage sources at TT-402A and TT-402B to vary input.

6.4.73 Using Table 6-16 and Table 6-17, perform a calibration test of DB-1 and TM-402BB. _____

Table 6-16

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		TAVG VOLTS		**Accuracy:** ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	3.60	2.00		1.96 to 2.04	
2	5.20	2.80		2.76 to 2.84	
3	6.80	3.60		3.56 to 3.64	
4	8.40	4.40		4.36 to 4.44	
5	10.00	5.20		5.16 to 5.24	
6	11.60	6.00		5.96 to 6.04	
7	12.40	6.40		6.36 to 6.44	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

SUPERSEDED

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Table 6-17

INPUT (vdc)		OUTPUT (mvdc)		TM-402BB	4892703
TAVG VOLTS		TAVG MA		**Accuracy:** ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	2.00	100.0		98.0 to 102.0	
2	4.00	200.0		198.0 to 202.0	
3	6.00	300.0		298.0 to 302.0	
4	8.00	400.0		398.0 to 402.0	
5	10.00	500.0		498.0 to 502.0	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.74 Are all Final Data entries within the acceptance range for Table 6-16 and Table 6-17?

☐ Yes ☐ No _____

SUPERSEDED

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6.4.75 Adjust the voltage source at TT-402B for a TCL output of 3.40 vdc. _____

6.4.76 Using Table 6-18, perform a calibration test of DB-1. _____

Table 6-18

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		TAVG VOLTS		Accuracy: ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	3.40	3.40		3.36 to 3.44	
2	5.00	4.20		4.16 to 4.24	
3	6.60	5.00		4.96 to 5.04	
4	8.20	5.80		5.76 to 5.84	
5	9.80	6.60		6.56 to 6.64	
6	11.40	7.40		7.36 to 7.44	
7	12.40	7.90		7.86 to 7.94	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.77 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

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6.4.78 Adjust the voltage source at TT-402B for a TCL output of 6.40 vdc. _____

6.4.79 Using Table 6-19, perform a calibration test of DB-1. _____

Table 6-19

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		TAVG VOLTS		Accuracy: ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	6.40	6.40		6.36 to 6.44	
2	8.00	7.20		7.16 to 7.24	
3	9.60	8.00		7.96 to 8.04	
2	11.20	8.80		8.76 to 8.84	
3	12.40	9.40		9.36 to 9.44	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.80 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

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6.4.81 Adjust the voltage source at TT-402B for a TCL output of 9.40 vdc. _____

6.4.82 Using Table 6-20, perform a calibration test of DB-1. _____

Table 6-20

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		TAVG VOLTS		**Accuracy:** ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	9.40	9.40		9.36 to 9.44	
2	10.60	10.00		9.96 to 10.04	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.4.83 Adjust the voltage source at TT-402B for a TCL output of 10.00 vdc. _____

6.4.84 Using Table 6-21, perform a calibration test of DB-1. _____

Table 6-21

INPUT (vdc)		OUTPUT (vdc)			DB-1
THL		TAVG VOLTS		**Accuracy:** ± 0.04 vdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	10.00	10.00		9.96 to 10.04	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

SUPERSEDED

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6.4.85 At THL test point jacks, remove the precision voltmeter. _____

6.4.86 At TCL test point jacks, remove the precision voltmeter. _____

6.4.87 At TAVG VOLTS test point jacks, remove the precision voltmeter. _____

6.4.88 At the TAVG signal injection test jacks, connect a current calibrator. _____

6.4.89 Place the TAVG signal injection switch to TEST (up). _____

Note

Table 6-22, Table 6-23, and Table 6-24 may be performed in any order.

6.4.90 Using Table 6-22, perform a calibration test by raising the current calibrator output at TAVG until the HI TAVG (402A) bistable proving lamp is OFF. _____

Table 6-22

High TAVG			**(576.5°F)**	**TC-402A**	**4892704**
TAVG MA				**Accuracy:** ± 2.0 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**		**FINAL**
Set (mvdc) ↑	**326.0**		**324.0 to 328.0**		
Reset (mvdc)	**322.0**		**320.0 to 324.0**		
M&TE ID	**DESCRIPTION**				
	Fluke 45 precision voltmeter*				

**1000 mvdc slow resolution*

SUPERSEDED

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6.4.91 Using Table 6-23, perform a calibration test by lowering the current calibrator output at TAVG until the F.W. VALVE OVERRIDE (402F) bistable proving lamp is OFF. _____

Table 6-23

Low TAVG FW Valve Override			(554.5 °F)	TC-402F	4892705
TAVG MA				**Accuracy:** ± 2.0 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**		**FINAL**
Set (mvdc) ↓	**238.0**		**236.0 to 240.0**		
Reset (mvdc)	**242.0**		**240.0 to 244.0**		
M&TE ID	**DESCRIPTION**				
	Fluke 45 precision voltmeter*				

**1000 mvdc slow resolution*

6.4.92 Using Table 6-24, perform a calibration test by lowering the current calibrator output at TAVG until the LO/LO TAVG (402D) bistable proving lamp is OFF. _____

Table 6-24

Low-Low TAVG Steam Line Isolation			(541 °F)	TC-402D	4892704
TAVG MA				**Accuracy:** ± 2.0 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**		**FINAL**
Set (mvdc) ↓	**184.0**		**182.0 to 186.0**		
Reset (mvdc)	**188.0**		**186.0 to 190.0**		
M&TE ID	**DESCRIPTION**				
	Fluke 45 precision voltmeter*				

**1000 mvdc slow resolution*

6.4.93 In Relay Rack RR-102, TP/TM402C, connect a precision voltmeter. _____

6.4.94 In Relay Rack RR-102, TM-402W, remove the signal cord set. _____

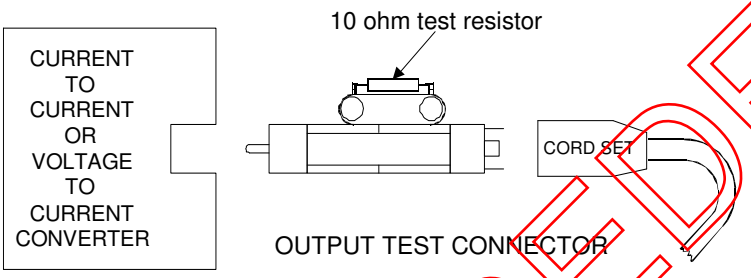
SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Figure 2 shows the I&C output test connector.

Figure 2



6.4.95 At TM-402W, connect an I&C output test connector and 10 ohm precision test resistor. _____

6.4.96 At TM-402W, connect the signal cord set. _____

6.4.97 At TM-402W, at the I&C output test connector, connect a precision voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Table 6-25, Table 6-26, Table 6-27, and Table 6-28 may be performed concurrently.

6.4.98 Using Table 6-25, perform a calibration test of TM-402C. _____

Table 6-25

INPUT (mvdc)		OUTPUT (mvdc)		TM-402C	4892708
TAVG MA		TP/TM402C		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	100.0		98.0 to 102.0	
2	200	200.0		198.0 to 202.0	
3	300	300.0		298.0 to 302.0	
4	400	400.0		398.0 to 402.0	
5	500	500.0		498.0 to 502.0	
5	500	500.0		498.0 to 502.0	
4	400	400.0		398.0 to 402.0	
3	300	300.0		298.0 to 302.0	
2	200	200.0		198.0 to 202.0	
1	100	100.0		98.0 to 102.0	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter

SUPERSEDED

6.4.99 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

6.4.100 Using Table 6-26, perform a calibration test of TI-402. _____

Table 6-26

INPUT (mvdc)		OUTPUT (°F)			TI-402	4122402
TP/TM402C					Accuracy: ± 2°F	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	100	520		<520 to 522		
2	200	545		543 to 547		
3	300	570		568 to 572		
4	400	595		593 to 597		
5	500	620		618 to >620		
5	500	620		618 to >620		
4	400	595		593 to 597		
3	300	570		568 to 572		
2	200	545		543 to 547		
1	100	520		<520 to 522		
M&TE ID		DESCRIPTION				
		Precision voltmeter				

SUPERSEDED

6.4.101 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

6.4.102 Using Table 6-27, perform a calibration test of TM-402W. _____

Table 6-27

INPUT (mvdc)		OUTPUT (mvdc)			TM-402W	4892714
TP/TM402C		TM-402W			Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	100	100.0		98.0 to 102.0		
2	200	200.0		198.0 to 202.0		
3	300	300.0		298.0 to 302.0		
4	400	400.0		398.0 to 402.0		
5	500	500.0		498.0 to 502.0		
5	500	500.0		498.0 to 502.0		
4	400	400.0		398.0 to 402.0		
3	300	300.0		298.0 to 302.0		
2	200	200.0		198.0 to 202.0		
1	100	100.0		98.0 to 102.0		

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter
	Precision test resistor

SUPERSEDED

6.4.103 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

6.4.104 Using Table 6-28, perform a calibration test of T0401A. _____

Table 6-28

INPUT (mvdc)		OUTPUT (°F)			T0401A
TM-402W				Accuracy: ± 1.0°F	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	520.0		519.0 to 521.0	
2	200	545.0		544.0 to 546.0	
3	300	570.0		569.0 to 571.0	
4	400	595.0		594.0 to 596.0	
5	500	620.0		619.0 to 621.0	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision test resistor

6.4.105 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.4.106 At TM-402W, remove all test equipment. _____

6.4.107 At TM-402W, connect the signal cord set. _____

6.4.108 In Relay Rack RR-102, TP/TM402EE, connect a precision voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.4.109 Using Table 6-29, perform a calibration test of TM-402EE. _____

Table 6-29

INPUT (mvdc)		OUTPUT (mvdc)			TM-402EE	4892715
TP/TM402C		TP/TM402EE			Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	100	100.0		98.0 to 102.0		
2	200	200.0		198.0 to 202.0		
3	300	300.0		298.0 to 302.0		
4	400	400.0		398.0 to 402.0		
5	500	500.0		498.0 to 502.0		
5	500	500.0		498.0 to 502.0		
4	400	400.0		398.0 to 402.0		
3	300	300.0		298.0 to 302.0		
2	200	200.0		198.0 to 202.0		
1	100	100.0		98.0 to 102.0		

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter

SUPERSEDED

6.4.110 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.4.111 At TP/TM402EE, remove the precision voltmeter. _____

6.4.112 At TP/TM402C, remove the precision voltmeter. _____

6.4.113 In Relay Rack RR-114, TAVG MA test point jacks, remove the precision voltmeter. _____

6.4.114 Place the TAVG signal injection switch to NORMAL (down). _____

6.4.115 At the TAVG signal injection test jacks, remove the current calibrator. _____

DATE PERFORMED _____ INITIALS

6.5 Flux Tilt

6.5.1 In Relay Rack RR-114, Q0 test point jacks, connect a precision voltmeter. _____

Note

Adjust TM-402U as necessary.

6.5.2 Using Table 6-30, perform a calibration test of Q0. _____

Table 6-30

Q0				TM-402U	4892712
Q0				**Accuracy:** ± 2.0 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**		**FINAL***
Set (mvdc)	**100.0**		**98.0 to 102.0**		
M&TE ID	**DESCRIPTION**				
	Precision voltmeter				

**Final value should be optimized to 100.0 mvdc*

6.5.3 In Relay Rack RR-114, at the QU signal injection test jacks, connect a 0 to 10 vdc source. _____

6.5.4 At the QL signal injection test jacks, connect a 0 to 10 vdc source. _____

6.5.5 Place the following signal injection switches to TEST (up):

6.5.5.1 QU _____

6.5.5.2 QL _____

6.5.6 At the following test point jacks, connect a precision voltmeter as necessary:

6.5.6.1 QU _____

6.5.6.2 QL _____

6.5.6.3 QU > QL _____

6.5.6.4 QL > QU _____

6.5.7 Adjust the voltage source at QL for a QL output of 0.00 vdc. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Table 6-31 AS FOUND values may be out of acceptance range due to cycle Reload Safety Evaluation for COLR. A CR is NOT required for that circumstance.

Note

Obtain AS FOUND values for Table 6-31 and Table 6-32 prior to making adjustments to TC-406L.

6.5.8 Using Table 6-31, perform a calibration test of TC-406L. _____

Table 6-31

INPUT (vdc)		OUTPUT (mvdc)		TC-406L	4857101
QU		QU > QL		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	0.24	<100.0		<100.0	
2	0.44	100.0		98.0 to 102.0	
3	1.00	123.0		121.0 to 125.0	
4	2.00	164.0		162.0 to 166.0	
5	3.00	205.1		203.1 to 207.1	
6	4.00	246.2		244.2 to 248.2	
7	5.00	287.2		285.2 to 289.2	
8	6.00	328.3		326.3 to 330.3	
9	7.00	369.4		367.4 to 371.4	
10	8.00	410.5		408.5 to 412.5	
11	9.00	451.5		449.5 to 453.5	
12	10.00	492.6		490.6 to 494.6	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter
	Precision voltmeter

6.5.9 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Table 6-32 AS FOUND values may be out of acceptance range due to cycle Reload Safety Evaluation for COLR. A CR is NOT required for that circumstance.

6.5.10 Adjust the voltage source at QL for a QL output of 4.00 vdc. _____

6.5.11 Using Table 6-32, perform a calibration test of TC-406L. _____

Table 6-32

INPUT (vdc)		OUTPUT (mvdc)		TC-406L	4857101
QU		QU > QL		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	4.00	<100.0		<100.0	
2	4.44	100.0		98.0 to 102.0	
3	5.00	123.0		121.0 to 125.0	
4	6.00	164.0		162.0 to 166.0	
5	7.00	205.1		203.1 to 207.1	
6	8.00	246.2		244.2 to 248.2	
7	9.00	287.2		285.2 to 289.2	
8	10.00	328.3		326.3 to 330.3	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter
	Precision voltmeter

6.5.12 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.5.13 Adjust the voltage source at QU for a QU output of 0.00 vdc. _____

Note

Obtain AS FOUND values for Table 6-33 and Table 6-34 prior to making adjustments to TC-402R.

6.5.14 Using Table 6-33, perform a calibration test of TC-402R. _____

Table 6-33

INPUT (vdc)		OUTPUT (mvdc)		TC-402R	4892710
QL		QL > QU		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	1.00	<100.0		<100	
2	1.32	99.6		97.6 to 101.6	
3	2.00	169.6		167.6 to 171.6	
4	3.00	272.4		270.4 to 274.4	
5	4.00	375.2		373.2 to 377.2	
6	5.00	478.0		476.0 to 480.0	
7	5.21	499.6		497.6 to 501.6	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter
	Precision voltmeter

SUPERSEDED

6.5.15 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

6.5.16 Adjust the voltage source at QU for a QU output of 4.00 vdc. _____

6.5.17 Using Table 6-34, perform a calibration test of TC-402R. _____

Table 6-34

INPUT (vdc)		OUTPUT (mvdc)		TC-402R	4892710
QL		QL > QU		**Accuracy:** ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	4.00	<100.0		<100.0	
2	5.32	99.6		97.6 to 101.6	
3	6.00	169.6		167.6 to 171.6	
4	7.00	272.4		270.4 to 274.4	
5	8.00	375.2		373.2 to 377.2	
6	9.00	478.0		476.0 to 480.0	
7	9.21	499.6		497.6 to 501.6	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter
	Precision voltmeter

SUPERSEDED

6.5.18 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

Note

Use the voltage source at QU and QL as required to vary inputs.

6.5.19 Using Table 6-35 and Table 6-36, perform a calibration test of TM-402T. _____

Table 6-35

INPUT (mvdc)		OUTPUT (mvdc)		TM-402T	4892713
QL > QU		ΔQ		**Accuracy:** ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	<98	100.0		98.0 to 102.0	
2	200	200.0		198.0 to 202.0	
3	300	300.0		298.0 to 302.0	
4	400	400.0		398.0 to 402.0	
5	500	500.0		498.0 to 502.0	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

Table 6-36

INPUT (mvdc)		OUTPUT (mvdc)		TM-402T	4892713
QU > QL		ΔQ		**Accuracy:** ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	<98	100.0		98.0 to 102.0	
2	200	200.0		198.0 to 202.0	
3	300	300.0		298.0 to 302.0	
4	400	400.0		398.0 to 402.0	
5	476	476.0		474.0 to 478.0	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

6.5.20 Are all Final Data entries within the acceptance range for Table 6-35 and Table 6-36?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.5.21 At the following test point jacks, remove the precision voltmeter:

6.5.21.1 QU > QL _____

6.5.21.2 QL > QU _____

6.6 Overtemperature ΔT Setpoint

6.6.1 In Relay Rack RR-114, at TM-402B, remove the signal cord set. _____

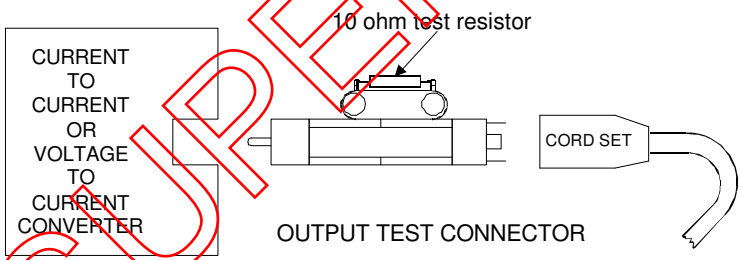
6.6.2 At pins W(+) and X(−), connect a current calibrator. _____

6.6.3 At TM-406D, remove the signal cord set. _____

Note

Figure 3 shows the I&C output test connector.

Figure 3



6.6.4 At TM-406D, connect an I&C output test connector and 10 ohm precision test resistor. _____

6.6.5 At TM-406D, connect the signal cord set. _____

6.6.6 At TM-406D, at the I&C output test connector, connect a precision voltmeter. _____

6.6.7 At TSP1 test point jacks, connect a precision voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Table 6-37, Table 6-38, Table 6-39, and Table 6-40 may be performed concurrently.

Note

Use the current calibrator at TM-402B to vary the input.

6.6.8 Using Table 6-37, perform a calibration test of TM-406D. _____

Table 6-37

INPUT (mvdc)		OUTPUT (mvdc)		TM-406D	4857106
TSP1		TM-406D		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	100.0		98.0 to 102.0	
2	200	200.0		198.0 to 202.0	
3	300	300.0		298.0 to 302.0	
4	400	400.0		398.0 to 402.0	
5	500	500.0		498.0 to 502.0	
5	500	500.0		498.0 to 502.0	
4	400	400.0		398.0 to 402.0	
3	300	300.0		298.0 to 302.0	
2	200	200.0		198.0 to 202.0	
1	100	100.0		98.0 to 102.0	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter
	Precision test resistor

6.6.9 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.10 Using Table 6-38, perform a calibration test of TI-406A. _____

Table 6-38

INPUT (mvdc)		OUTPUT (%)			TI-406A	4121701
TM-406D					Accuracy: ± 3%	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	100	0.0		<0 to 3.0		
2	200	37.5		34.5 to 40.5		
3	300	75.0		72.0 to 78.0		
4	400	112.5		109.5 to 115.5		
5	500	150.0		147.0 to >150		
5	500	150.0		147.0 to >150		
4	400	112.5		109.5 to 115.5		
3	300	75.0		72.0 to 78.0		
2	200	37.5		34.5 to 40.5		
1	100	0.0		<0 to 3.0		

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision test resistor

SUPERSEDED

6.6.11 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

6.6.12 Using Table 6-39, perform a calibration test of T0411A. _____

Table 6-39

INPUT (mvdc)		OUTPUT (%)			T0411A
TM-406D				Accuracy: ± 1.5%	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	0.0		–1.5 to 1.5	
2	200	37.5		36.0 to 39.0	
3	300	75.0		73.5 to 76.5	
4	400	112.5		111.0 to 114.0	
5	500	150.0		148.5 to 151.5	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision test resistor			

6.6.13 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Recorder TR-405A is calibrated in SP-47-011A.

6.6.14 Using Table 6-40, check TR-405A (red pen). _____

Table 6-40

INPUT (mvdc)		OUTPUT (%)			TR-405A	4255301
TM-406D					Accuracy: ± 0.5%	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	300	75.0		74.5 to 75.5		
M&TE ID		DESCRIPTION				
		Precision voltmeter				
		Precision test resistor				

6.6.15 At TM-406D, remove all test equipment. _____

6.6.16 At TM-406D, connect the signal cord set. _____

6.6.17 At TM-402B, remove the current calibrator. _____

6.6.18 At TM-402B, connect the signal cord set. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.19 At the PRESS. PRESS. (430) signal injection test jacks, connect an analog simulator. _____

6.6.20 At the following test point jacks, connect a precision voltmeter:

6.6.20.1 PRESS. PRESS. (430) _____

6.6.20.2 TAVG MA _____

6.6.20.3 TAVG VOLTS _____

6.6.20.4 TSP1 _____

6.6.21 Connect data acquisition device to the following test point jacks:

6.6.21.1 Channel 1 TAVG MA _____

6.6.21.2 Channel 2 TSP1 _____

6.6.22 Notify Shift Manager/Unit Supervisor ICCMS Train B will be INOPERABLE. _____ (SM/US)

6.6.23 Notify the Control Room Operators that performing the following step causes the ICCMS B display to start flashing. _____

6.6.24 Place the PRESS. PRESS. (430) signal injection switch to TEST (up). _____

6.6.25 At the TAVG signal injection test jacks, connect a ramp generator. _____

6.6.26 Place the TAVG signal injection switch to TEST (up). _____

6.6.27 Adjust the voltage sources at QU and QL for outputs of 0.00 vdc. _____

Note

For Step 6.6.28, the Fluke 45 precision voltmeter setting is 300 mvdc medium resolution.

6.6.28 Adjust the analog simulator at PRESS. PRESS. (430) for a PRESS. PRESS. (430) output of 40.40 mvdc. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.29 Use the following guidelines to adjust the data acquisition device:

Table 6-41

Range 1	600.0 mvdc
Offset	0.00 vdc
Range 2	600.0 mvdc
Offset	0.00 vdc
Total time	26 secs
Pretrigger	2.0 secs for up ramp 4.0 secs for down ramp
Trigger level	132 mvdc + LEVEL for up ramp 470 mvdc – LEVEL for down ramp
Y axis	30 divisions
X axis	13 divisions

Note

Steps 6.6.30 and 6.6.31 may be performed as many times as needed.

6.6.30 Perform a dynamic test of TM-402B by applying an input ramp from 121 mvdc to 500 mvdc at a rate of 10 mvdc/sec. _____

6.6.31 Perform a dynamic test of TM-402B by applying an input ramp from 500 mvdc to 121 mvdc at a rate of 10 mvdc/sec. _____

6.6.32 Remove the ramp generator. _____

6.6.33 At the TAVG signal injection test jacks, connect a step function generator and current calibrator. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.34 Use the following guidelines to adjust the data acquisition device:

Table 6-42

Range 1	320.0 mvdc
Offset	–0.14 vdc for up step
	–0.26 vdc for down step
Range 2	320.0 mvdc
Offset	–0.14 vdc for up step
	–0.26 vdc for down step
Total time	26 secs
Pretrigger	–1.0 sec for up step –1.0 sec for down step
Trigger level	315 mvdc + LEVEL for up step 315 mvdc – LEVEL for down step
Y axis	32 divisions
X axis	13 divisions

Note

Steps 6.6.36 and 6.6.38 may be performed as many times as needed.

6.6.35 Adjust the analog simulator at PRESS. PRESS. (430) for PRESS. PRESS. (430) output of 147 mvdc. _____

6.6.36 Perform a dynamic test of TM-402B by applying an input step change from 308 mvdc to 328 mvdc. _____

6.6.37 Adjust the analog simulator at PRESS. PRESS. (430) for PRESS. PRESS. (430) output of 40 mvdc. _____

6.6.38 Perform a dynamic test of TM-402B by applying an input step change from 328 mvdc to 308 mvdc. _____

6.6.39 Compare the traces with the Kewaunee LEAD/LAG CAL book for TM-402B. _____

6.6.40 IF the traces are UNSAT, THEN calibrate the TM-402B dynamics AND repeat Steps 6.6.25 through 6.6.39. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.41 Attach the traces to this procedure. _____

6.6.42 Remove the data acquisition device. _____

6.6.43 Remove the step function generator. _____

6.6.44 Adjust the current calibrator at TAVG for a TAVG MA output of 205.28 mvdc**. _____

Note

Dynamic compensation is present. Allow time for the output to stabilize.

Note

If performing this procedure as post SP-47-288B, "Reactor Coolant Temperature and Pressurizer Pressure Instrument Channel 2 (White) Calibration" performance, the TSP1 value will be 7% low with a TAVG of 572ºF (308 mvdc), PRESS. PRESS. of 2235 psig (147 mvdc) and NO f(Δl) (100 mvdc). TM-402B should be adjusted for 118.25% (415.3 mvdc) using the K1 potentiometer. K1 (as labeled on the box) is equivalent to KSB (as indicated on the manufacturers drawing).

6.6.45 Using Table 6-43, perform a calibration test of TM-402B. _____

Table 6-43

INPUT (mvdc*)		OUTPUT (mvdc**)		TM-402B	4892711
PRESS. PRESS. (430)		TSP1		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	40.0	415.3		413.3 to 417.3	
2	83.0	456.6		454.6 to 458.6	
3	128.0	499.8		497.8 to 501.8	

M&TE ID	DESCRIPTION
	Fluke 45 precision voltmeter*
	Fluke 45 precision voltmeter**
	Fluke 45 precision voltmeter**

** 300 mvdc medium resolution*
*** 1000 mvdc slow resolution*

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.46 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.6.47 Adjust the current calibrator at TAVG for a TAVG MA output of 260 mvdc**. _____

Note

Dynamic compensation is present. Allow time for the output to stabilize.

6.6.48 Using Table 6-44, perform a calibration test of TM-402B. _____

Table 6-44

INPUT (mvdc*)		OUTPUT (mvdc**)		TM-402B	4892711
PRESS. PRESS. (430)		TSP1		**Accuracy:** ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	40	360.6		358.6 to 362.6	
2	120	437.4		435.4 to 439.4	
3	185	499.8		497.8 to 501.8	
M&TE ID		DESCRIPTION			
		Fluke 45 precision voltmeter*			
		Fluke 45 precision voltmeter**			
		Fluke 45 precision voltmeter**			

** 300 mvdc medium resolution*
*** 1000 mvdc slow resolution*

6.6.49 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.50 Adjust the current calibrator at TAVG for a TAVG MA output of 340 mvdc**. _____

Note

Dynamic compensation is present. Allow time for the output to stabilize.

6.6.51 Using Table 6-45, perform a calibration test of TM-402B. _____

Table 6-45

INPUT (mvdc*)		OUTPUT (mvdc**)		TM-402B	4892711
PRESS. PRESS. (430)		TSP1		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	40	280.6		278.6 to 282.6	
2	110	347.8		345.8 to 349.8	
3	180	415.0		413.0 to 417.0	
M&TE ID		DESCRIPTION			
		Fluke 45 precision voltmeter*			
		Fluke 45 precision voltmeter**			
		Fluke 45 precision voltmeter**			

** 300 mvdc medium resolution*
*** 1000 mvdc slow resolution*

6.6.52 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.53 Adjust the current calibrator at TAVG for a TAVG MA output of 420 mvdc**. _____

Note

Dynamic compensation is present. Allow time for the output to stabilize.

6.6.54 Using Table 6-46, perform a calibration test of TM-402B. _____

Table 6-46

INPUT (mvdc*)		OUTPUT (mvdc**)		TM-402B	4892711
PRESS. PRESS. (430)		TSP1		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	40	200.6		198.6 to 202.6	
2	110	267.8		265.8 to 269.8	
3	180	335.0		333.0 to 337.0	

M&TE ID	DESCRIPTION
	Fluke 45 precision voltmeter*
	Fluke 45 precision voltmeter**
	Fluke 45 precision voltmeter**

** 300 mvdc medium resolution*
*** 1000 mvdc slow resolution*

6.6.55 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.56 Adjust the current calibrator at TAVG for a TAVG MA output of 500 mvdc**. _____

Note

Dynamic compensation is present. Allow time for the output to stabilize.

6.6.57 Using Table 6-47, perform a calibration test of TM-402B. _____

Table 6-47

INPUT (mvdc*)		OUTPUT (mvdc**)		TM-402B	4892711
PRESS. PRESS. (430)		TSP1		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	40	120.6		118.6 to 122.6	
2	110	187.8		185.8 to 189.8	
3	180	255.0		253.0 to 257.0	
M&TE ID		DESCRIPTION			
		Fluke 45 precision voltmeter*			
		Fluke 45 precision voltmeter**			
		Fluke 45 precision voltmeter**			

** 300 mvdc medium resolution*
*** 1000 mvdc slow resolution*

6.6.58 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.59 Adjust the analog simulator at PRESS. PRESS. (430) for a PRESS. PRESS. (430) output of 200 mvdc*. _____

6.6.60 Adjust the current calibrator at TAVG for a TAVG MA output of 274.2 mvdc**. _____

6.6.61 Adjust the voltage source at QU for a QU output of 0.00 vdc. _____

Note

Use the voltage source at QL to vary the input.

6.6.62 Using Table 6-48, perform a calibration test of TM-402B. _____

Table 6-48

INPUT (mvdc**)		OUTPUT (mvdc**)		TM-402B	4892711
ΔQ		TSP1		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100.0	500.0		498.0 to 502.0	
2	200.0	400.0		398.0 to 402.0	
3	300.0	300.0		298.0 to 302.0	
4	400.0	200.0		198.0 to 202.0	
5	500.0	100.0		98.0 to 102.0	
M&TE ID		DESCRIPTION			
		Fluke 45 precision voltmeter*			
		Fluke 45 precision voltmeter**			
		Fluke 45 precision voltmeter**			

** 300 mvdc medium resolution*
*** 1000 mvdc slow resolution*

6.6.63 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.6.64 IF adjustments were made to TM-402B temperature gain input, THEN perform dynamic test steps 6.6.27 through 6.6.40, otherwise N/A this step. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.65 Adjust the voltage sources at QU and QL for outputs of 8.33 vdc. _____

6.6.66 Adjust the current calibrator at TAVG for a TAVG MA output of 308.0 mvdc. _____

6.6.67 Adjust the analog simulator at PRESS. PRESS. (430) for a PRESS. PRESS. (430) output of >147 mvdc. _____

6.6.68 At ΔT LAG test point jacks, connect a precision voltmeter. _____

6.6.69 Adjust the voltage source at TT-402B for a TCL output of 2.00 vdc. _____

6.6.70 Adjust the voltage source at TT-402A for a ΔT LAG output of 7.306 vdc. _____

6.6.71 Using Table 6-49, perform a calibration test by lowering the analog simulator output at PRESS. PRESS. (430) until the ROD STOP (406D) bistable proving lamp is OFF. _____

Table 6-49

Overtemperature Rod Stop				**TC-406D**	**4857105**
TSP1				**Accuracy:** ± 2.0 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**		**FINAL**
Set (mvdc) ↓	**428.7**		**426.7 to 430.7**		
Reset (mvdc)	**432.7**		**430.7 to 434.7**		
M&TE ID	**DESCRIPTION**				
	Fluke 45 precision voltmeter*				
	Precision voltmeter				

**1000 mvdc slow resolution*

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.6.72 Using Table 6-50, perform a calibration test by lowering the analog simulator output at PRESS. PRESS. (430) until the OVER TEMP TRIP (406C) bistable proving lamp is OFF. _____

Table 6-50

Overtemperature Trip				TC-406C	4857105
TSP1				Accuracy: ± 2.0 mvdc	
SETPOINT	DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
Set (mvdc) ↓	415.3		413.3 to 417.3		
Reset (mvdc)	419.3		417.3 to 421.3		
M&TE ID	DESCRIPTION				
	Fluke 45 precision voltmeter*				
	Precision voltmeter				

**1000 mvdc slow resolution*

6.6.73 In Relay Rack RR-114, place the PRESS. PRESS. (430) signal injection switch to NORMAL (down). _____

6.6.74 At the following test point jacks, remove the precision voltmeter:

6.6.74.1 TSP1 _____

6.6.74.2 PRESS. PRESS. (430) _____

6.6.75 At the PRESS. PRESS. (430) signal injection test jacks, remove the analog simulator. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7 Pressurizer Pressure Loop 430

6.7.1 Using Table 6-51, at power supply PQ-430, verify the power supply load potentiometer. _____

Table 6-51

Power Supply Load Adjustment				PQ-430	4840101
Relay Rack RR-114				Accuracy: ± 25 ohms	
SETPOINT	DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
Set (ohms)	0		0 to 25		

6.7.2 In Relay Rack RR-114, connect data acquisition device to the following test points:

6.7.2.1 Channel 1 PRESS. PRESS. (430) _____

6.7.2.2 Channel 2 COMP. PRESS. (430) _____

6.7.3 In Relay Rack RR-114, place the PRESS. PRESS. (430) signal injection switch to TEST (up). _____

6.7.4 At PQ-430, remove the signal cord set. _____

6.7.5 At the PRESS. PRESS. (430) signal injection test jacks, connect a jumper. _____

Concurrent Verification _____

6.7.6 At the PQ-430 cord set, pins A(+) and U(−), connect a ramp generator. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.7 Use the following guideline to adjust the data acquisition device:

Table 6-52

	UP STEP	DOWN STEP
Range 1	600.0 mvdc	600.0 mvdc
Offset	0.00 mvdc	0.00 mvdc
Range 2	600.0 mvdc	600.0 mvdc
Offset	0.10 mvdc	0.06 mvdc
Total time	44 secs	44 secs
Pretrigger	4 secs	2 secs
Trigger level	45 mvdc ABOVE	190 mvdc BELOW
Y axis	30 divisions	30 divisions
X axis	24 divisions	24 divisions

6.7.8 Perform a dynamic test of PM-430C by applying an input ramp from 40 mvdc to 200 mvdc at a rate of 4 mvdc/sec. _____

6.7.9 Perform a dynamic test of PM-430C by applying an input ramp from 200 mvdc to 40 mvdc at a rate of 4 mvdc/sec. _____

6.7.10 Remove the ramp generator. _____

6.7.11 At the PRESS. PRESS. (430) signal injection test jacks, remove the jumper. _____

Independent Verification _____

6.7.12 At the PRESS. PRESS. (430) signal injection test jacks, connect an analog simulator. _____

6.7.13 At PQ-430, connect the cord set. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.14 Use the following guidelines to adjust the data acquisition device:

Table 6-53

	UP STEP	DOWN STEP
Range 1	200.0 mvdc	200.0 mvdc
Offset	–0.14 mvdc	0.00 mvdc
Range 2	600.0 mvdc	600.0 mvdc
Offset	0.10 mvdc	0.10 mvdc
Total time	44 secs	44 secs
Pretrigger	6 secs	6 secs
Trigger level	45 mvdc ABOVE	190 mvdc BELOW
Y axis	30 divisions	30 divisions
X axis	24 divisions	24 divisions

6.7.15 Perform a dynamic test of PM-430C by applying an input step change from 40 mvdc to 48 mvdc. _____

6.7.16 Perform a dynamic test of PM-430C by applying an input step change from 200 mvdc to 192 mvdc. _____

Note

The 8 mvdc step input used for a 4 to 20 madc loop corresponds to a 20 mvdc step for a 10 to 50 madc loop. Multiply by 2.5 to obtain the required values.

6.7.17 Compare the traces with the Kewaunee LEAD/LAG CAL book for PM-430C. _____

6.7.18 IF the traces are UNSAT, THEN calibrate the PM-430C dynamics and repeat Steps 6.7.4 through 6.7.17. _____

6.7.19 Attach the traces to this procedure. _____

6.7.20 Remove the data acquisition device. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.21 At the PRESS. PRESS. (430) test point jacks, connect a precision voltmeter. _____

6.7.22 At the COMP. PRESS. (430) test point jacks, connect a precision voltmeter. _____

Note

Dynamic compensation is used. Allow time for the output to stabilize.

6.7.23 Using Table 6-54, perform a calibration test of PM-430C. _____

Table 6-54

Input (mvdc*)		Output (mvdc**)		PM-430C	4840104
PRESS. PRESS. (430)		COMP. PRESS. (430)		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	40	100.0		98.0 to 102.0	
2	80	200.0		198.0 to 202.0	
3	120	300.0		298.0 to 302.0	
4	160	400.0		398.0 to 402.0	
5	200	500.0		498.0 to 502.0	
5	200	500.0		498.0 to 502.0	
4	160	400.0		398.0 to 402.0	
3	120	300.0		298.0 to 302.0	
2	80	200.0		198.0 to 202.0	
1	40	100.0		98.0 to 102.0	

M&TE ID	DESCRIPTION
	Fluke 45 precision voltmeter*
	Fluke 45 precision voltmeter**

** 300 mvdc medium resolution*
*** 1000 mvdc slow resolution*

6.7.24 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.25 At PM-430C, remove the signal cord set. _____

6.7.26 At the PM-430C cord set, pins W(+) and X(–), connect a current calibrator. _____

Note

The desired values for Table 6-55 are based on Calculation Number C10818-4 Rev.1.

6.7.27 Using Table 6-55, perform a calibration test by lowering the current calibrator output at PM-430C until the LO PRESS. TRIP (430H) bistable proving lamp is OFF. _____

Table 6-55

PRZR Low Pressure RX Trip		(1904 psig)	PC-430H	4840105
COMP. PRESS. (430)			**Accuracy:** ± 2.0 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**	**FINAL**
Set (mvdc) ↓	**202.0**		**200.0 to 204.0**	
Reset (mvdc)	**206.0**		**204.0 to 208.0**	
M&TE ID	**DESCRIPTION**			
	Fluke 45 precision voltmeter*			

**300 mvdc medium resolution*

6.7.28 At the PM-430C cord set, remove the current calibrator. _____

6.7.29 At PM-430C, connect the signal cord set. _____

6.7.30 At the COMP. PRESS. (430) test point jacks, remove the precision voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

The desired values for Table 6-56 are based on Calculation Number C10818-1 Rev.1.

6.7.31 Using Table 6-56, perform a calibration test by raising the analog simulator output at PRESS. PRESS. (430) until the HI PRESS. TRIP (430A) bistable proving lamp is OFF. _____

Table 6-56

PRZR High Pressure Rx Trip			**(2377 psig)**	**PC-430A**	**4840102**
PRESS. PRESS. (430)				**Accuracy:** ± 0.8 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**		**FINAL**
Set (mvdc) ↑	**175.4**		**174.6 to 176.2**		
Reset (mvdc)	**173.8**		**173.0 to 174.6**		
M&TE ID	**DESCRIPTION**				
	Fluke 45 precision voltmeter*				

**300 mvdc medium resolution*

Note

The desired values for Table 6-57 are based on Calculation Number C10818-3 Rev.1.

6.7.32 Using Table 6-57, perform a calibration test by raising the analog simulator output at PRESS. PRESS. (430) until the UNBLOCK S.I. (430F) bistable proving lamp is OFF. _____

Table 6-57

PRZR High Pressure Unblock SI			**(1985 psig)**	**PC-430F**	**4840103**
PRESS. PRESS. (430)				**Accuracy:** ± 0.8 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**		**FINAL**
Set (mvdc) ↑	**97.0**		**96.2 to 97.8**		
Reset (mvdc)	**95.4**		**94.6 to 96.2**		
M&TE ID	**DESCRIPTION**				
	Fluke 45 precision voltmeter*				

**300 mvdc medium resolution*

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

The desired values for Table 6-58 are based on Calculation Number C10818-2 Rev.1.

6.7.33 Using Table 6-58, perform a calibration test by lowering the analog simulator output at PRESS. PRESS. (430) until the S.I. (430E) bistable proving lamp is OFF. _____

Table 6-58

PRZR Low Pressure Safety Injection			**(1830 psig)**	**PC-430E**	**4840103**
PRESS. PRESS. (430)				**Accuracy:** ± 0.8 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**		**FINAL**
Set (mvdc) ↓	**66.0**		**65.2 to 66.8**		
Reset (mvdc)	**67.6**		**66.8 to 68.4**		
M&TE ID	**DESCRIPTION**				
	Fluke 45 precision voltmeter*				

**300 mvdc medium resolution*

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.34 In Relay Rack RR-114, TP/PM430A, connect a precision voltmeter. _____

6.7.35 Using Table 6-59, perform a calibration test of PM-430A. _____

Table 6-59

Input (mvdc*)		Output (mvdc**)		PM-430A	4840106
PRESS. PRESS. (430)		TP/PM430A		**Accuracy:** ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	40	100.0		98.0 to 102.0	
2	80	200.0		198.0 to 202.0	
3	120	300.0		298.0 to 302.0	
4	160	400.0		398.0 to 402.0	
5	200	500.0		498.0 to 502.0	
5	200	500.0		498.0 to 502.0	
4	160	400.0		398.0 to 402.0	
3	120	300.0		298.0 to 302.0	
2	80	200.0		198.0 to 202.0	
1	40	100.0		98.0 to 102.0	

M&TE ID	DESCRIPTION
	Fluke 45 precision voltmeter*
	Fluke 45 precision voltmeter**

** 300 mvdc medium resolution*
*** 1000 mvdc slow resolution*

SUPERSEDED

6.7.36 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.7.37 At the PRESS. PRESS. (430) test point jacks, remove the precision voltmeter. _____

DATE PERFORMED _____ INITIALS

6.7.38 In Relay Rack RR-105, TP/PM430D, connect a precision voltmeter. _____

6.7.39 Using Table 6-60, perform a calibration test of PM-430D. _____

Table 6-60

Input (mvdc)		Output (mvdc)		PM-430D	4840110
TP/PM430A		TP/PM430D		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	100.0		98.0 to 102.0	
2	200	200.0		198.0 to 202.0	
3	300	300.0		298.0 to 302.0	
4	400	400.0		398.0 to 402.0	
5	500	500.0		498.0 to 502.0	
5	500	500.0		498.0 to 502.0	
4	400	400.0		398.0 to 402.0	
3	300	300.0		298.0 to 302.0	
2	200	200.0		198.0 to 202.0	
1	100	100.0		98.0 to 102.0	

M&TE ID	DESCRIPTION
	Fluke 45 precision voltmeter*
	Fluke 45 precision voltmeter*

**1000 mvdc slow resolution*

SUPERSEDED

6.7.40 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.7.41 In Relay Rack RR-187, at the ICCMS Train B front panel display, enter test mode by pressing the "TEST" pushbutton. _____

6.7.42 Using the "LEVEL/MARGIN" and "ACK" pushbuttons on the front panel display, select Test 16. _____

6.7.43 Select Channel 33. _____

DATE PERFORMED _____ INITIALS

6.7.44 Using Table 6-61, perform a calibration test of ICCMS digital readout for Channel 33. _____

Table 6-61

Input (mvdc)		Output (psig)			Channel 33
TP/PM430A					Accuracy: ± 4 psig
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	1700		1696 to 1704	
2	200	1900		1896 to 1904	
3	300	2100		2096 to 2104	
4	400	2300		2296 to 2304	
5	500	2500		2496 to 2504	
M&TE ID		DESCRIPTION			
		Precision voltmeter			

6.7.45 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.7.46 Exit test 16 by pressing the "ACK" pushbutton. _____

6.7.47 Return ICCMS Train B to service by pressing the "TEST" pushbutton. _____

Concurrent Verification _____

6.7.48 At TP/PM430A, remove the precision voltmeter. _____

SUPERSEDED

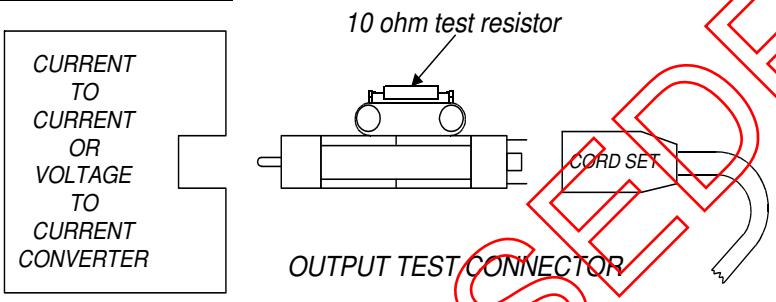
DATE PERFORMED _____ INITIALS

6.7.49 In Relay Rack RR-105, at PM-430B, remove the signal cord set. _____

Note

Figure 4 shows the I&C output test connector

Figure 4



6.7.50 At PM-430B, connect an I&C output test connector and 10 ohm precision test resistor. _____

6.7.51 At PM-430B, connect the signal cord set. _____

6.7.52 At PM-430B, at the I&C output test connector, connect a precision voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Table 6-62, Table 6-63, and Table 6-64 may be performed concurrently.

6.7.53 Using Table 6-62, perform a calibration test of PM-430B. _____

Table 6-62

Input (mvdc)		Output (mvdc)		PM-430B	4840107
TP/PM430D		PM-430B		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	100.0		98.0 to 102.0	
2	200	200.0		198.0 to 202.0	
3	300	300.0		298.0 to 302.0	
4	400	400.0		398.0 to 402.0	
5	500	500.0		498.0 to 502.0	
5	500	500.0		498.0 to 502.0	
4	400	400.0		398.0 to 402.0	
3	300	300.0		298.0 to 302.0	
2	200	200.0		198.0 to 202.0	
1	100	100.0		98.0 to 102.0	

M&TE ID	DESCRIPTION
	Fluke 45 precision voltmeter*
	Fluke 45 precision voltmeter*
	Precision test resistor

**1000 mvdc slow resolution*

6.7.54 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.55 Using Table 6-63, perform a calibration test of PI-430. _____

Table 6-63

Input (mvdc)		Output (psig)		PI-430	4122202
TP/PM430D				Accuracy: ± 16 psig	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	1700		<1700 to 1716	
2	200	1900		1884 to 1916	
3	300	2100		2084 to 2116	
4	400	2300		2284 to 2316	
5	500	2500		2484 to >2500	
5	500	2500		2484 to >2500	
4	400	2300		2284 to 2316	
3	300	2100		2084 to 2116	
2	200	1900		1884 to 1916	
1	100	1700		<1700 to 1716	
M&TE ID		DESCRIPTION			
		Fluke 45 precision voltmeter*			

**1000 mvdc slow resolution*

6.7.56 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.57 Using Table 6-64, perform a calibration test of P0430A. _____

Table 6-64

Input (mvdc)		Output (psig)			P0430A
PM-430B				Accuracy: ± 8 psig	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	1700		1692 to 1708	
2	200	1900		1892 to 1908	
3	300	2100		2092 to 2108	
4	400	2300		2292 to 2308	
5	500	2500		2492 to 2508	
M&TE ID		DESCRIPTION			
		Fluke 45 precision voltmeter*			
		Precision test resistor			

**1000 mvdc slow resolution*

6.7.58 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.7.59 At PM-430B, remove the I&C test connector, precision voltmeter, and test resistor. _____

6.7.60 At PM-430B, connect the cord set. _____

6.7.61 At Recorder 42301, select "CAL START" message. _____

6.7.62 At Mechanical Control Console C, have a Control Room Operator place "PRZR PRESSURE RECORDER INPUT SELECTOR" switch (ES-46325) to position 2.

2 _____
(Operator)

Concurrent Verification _____
(Operator)

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Recorder PR-429 is calibrated in SP-47-011A.

6.7.63 Using Table 6-65, check PR-429 (red pen). _____

Table 6-65

INPUT (mvdc)		OUTPUT (psig)			PR-429	42301
TM/PM430D					Accuracy: ± 1.6 psig	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	300	2100.0		2098.4 to 2101.6		
M&TE ID		DESCRIPTION				
		Precision voltmeter				

Note

Performing the following step prevents "PR-2B/CV-31109 PRZR PORV" from operating.

6.7.64 At Mechanical Control Console C, have a Control Room Operator verify "PR-2B/CV-31109 PRZR PORV" control switch (ES-46414) to CLOSE.

CLOSE _____
(Operator)

Concurrent Verification _____
(Operator)

6.7.65 Notify the Control Room Operator, IF desired, operate Pressurizer Pressure controls in MANUAL using Operations procedure N-RC-36C, "Pressurizer Pressure Control" before transferring the "PRZR PRESSURE CONTROL CHANNEL SELECTOR" switch (Step 6.7.66).

_____
(Operator)

6.7.66 At Mechanical Control Console C, have a Control Room Operator place "PRZR PRESSURE CONTROL CHANNEL SELECTOR" switch (ES-46324) to position 2-3.

2-3 _____
(Operator)

Concurrent Verification _____
(Operator)

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.67 Notify the Control Room Operator, IF desired, the controllers may be placed to AUTO. _____ (Operator)

Concurrent Verification _____ (Operator)

6.7.68 In Relay Rack RR-105, TB-PLPP-W, terminals 1 and 2, connect an AC voltmeter. _____

6.7.69 Using Table 6-66, perform a calibration test by raising the analog simulator output at PRESS. PRESS. (430) AND monitoring the output at TB-PLPP-W terminals 1 and 2. _____

Table 6-66

PRZR Pressure Relief Valve 2B (2335 psig)			PC-430B	4840108
TP/PM430D			**Accuracy:** ± 2.0 mvdc	
SETPOINT	**DESIRED**	**AS FOUND**	**ACCEPTANCE RANGE**	**FINAL**
Set (mvdc) ↑	**417.5**		**415.5 to 419.5**	
Reset (mvdc)	**407.5**		**405.5 to 409.5**	
M&TE ID	**DESCRIPTION**			
	Fluke 45 precision voltmeter*			

**1000 mvdc slow resolution*

6.7.70 Remove the AC voltmeter. _____

6.7.71 At Relay Rack RR-105, TB-PLPP-W, terminals 3 and 4, connect an AC voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.72 Using Table 6-67, perform a calibration test by raising the analog simulator output at PRESS. PRESS. (430) AND monitoring the output at TB-PLPP-W terminals 3 and 4. _____

Table 6-67

PRZR Pressure High (2310 psig)			PC-430C	4840109
TP/PM430D			Accuracy: ± 2.0 mvdc	
SETPOINT	DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
Set (mvdc) ↑	405.0		403.0 to 407.0	
Reset (mvdc)	401.0		399.0 to 403.0	
M&TE ID	DESCRIPTION			
	Fluke 45 precision voltmeter*			

**1000 mvdc slow resolution*

6.7.73 Check annunciator (47042C) "PRESSURIZER PRESSURE HIGH" alarms at setpoint. _____

6.7.74 Check SER (940) "PRESSURIZER PRESSURE HIGH" alarms at setpoint. _____

6.7.75 Remove the AC voltmeter. _____

6.7.76 In Relay Rack RR-114, place the PRESS. PRESS. (430) signal injection switch to NORMAL (down). _____

6.7.77 Remove the analog simulator. _____

6.7.78 At TP/PM430D, check loop integrity by measuring a voltage that is consistent with plant conditions. _____ mvdc _____

6.7.79 At TP/PM430D, remove the precision voltmeter. _____

6.7.80 At Mechanical Control Console C, have a Control Room Operator place "PR-2B/CV-31109 PRZR PORV" control switch (ES-46414) to the desired position AND circle that position.

CLOSE / AUTO / OPEN _____
(Operator)

Concurrent Verification _____
(Operator)

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.7.81 Notify Shift Manager/Unit Supervisor, ICCMS Train B is OPERABLE. _____ (SM/US)

6.8 F(TAVG)

6.8.1 Connect data acquisition device to the following test point jacks:

6.8.1.1 Channel 1 TAVG MA _____

6.8.1.2 Channel 2 F(TAVG) _____

6.8.2 At the TAVG signal injection test jacks, remove the current calibrator. _____

6.8.3 At the TAVG signal injection test jacks, connect a ramp generator. _____

6.8.4 Use the following guidelines to adjust the data acquisition device:

Table 6-68

Range 1	600.0 mvdc
Offset	0.00 mvdc
Range 2	600.0 mvdc
Offset	0.00 mvdc
Total time	54 secs
Pretrigger	3.0 secs
Trigger level	110 mvdc + LEVEL
Y axis	30 divisions
X axis	27 divisions

6.8.5 Perform a dynamic test of TM-402O by applying an input ramp from 100 mvdc to 500 mvdc at a rate of 10 mvdc/sec. _____

6.8.6 Remove the ramp generator. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.8.7 At the TAVG signal injection test jacks, connect a step function current calibrator. _____

6.8.8 Use the following guidelines to adjust the data acquisition device:

Table 6-69

Range 1	300.0 mvdc
Offset	0.00 vdc
Range 2	150.0 mvdc
Offset	–0.05 vdc
Total time	54 secs
Pretrigger	–2.0 secs
Trigger level	295 mvdc + LEVEL
Y axis	30 divisions
X axis	27 divisions

6.8.9 Perform a dynamic test of TM-402O by applying an input step change from 287 mvdc to 307 mvdc. _____

6.8.10 Compare the traces with the Kewaunee LEAD/LAG CAL book for TM-402O. _____

6.8.11 IF the traces are UNSAT, THEN calibrate the TM-402O dynamics AND repeat Steps 6.8.2 through 6.8.10. _____

6.8.12 Attach the traces to this procedure. _____

6.8.13 Remove the data acquisition device. _____

6.8.14 At F(TAVG) test point jacks, connect a precision voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Dynamic compensation is present. Allow time for the output to stabilize.

6.8.15 Using Table 6-70, perform a calibration test of TM-402O. _____

Table 6-70

INPUT (mvdc)		OUTPUT (mvdc)			TM-402O	4892706
TAVG MA		F(TAVG)			Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	100	100.0		98.0 to 102.0		
2	200	100.0		98.0 to 102.0		
3	308	100.0		98.0 to 102.0		
4	340	102.2		100.2 to 104.2		
5	420	107.7		105.7 to 109.7		
6	460	110.4		108.4 to 112.4		
7	500	113.2		111.2 to 115.2		
M&TE ID		DESCRIPTION				
		Precision voltmeter				
		Precision voltmeter				

SUPERSEDED

6.8.16 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.8.17 Place the TAVG signal injection switch to NORMAL (down). _____

6.8.18 At the TAVG signal injection test jacks, remove the current calibrator. _____

6.8.19 At TAVG MA test point jacks, remove the precision voltmeter. _____

DATE PERFORMED _____ INITIALS

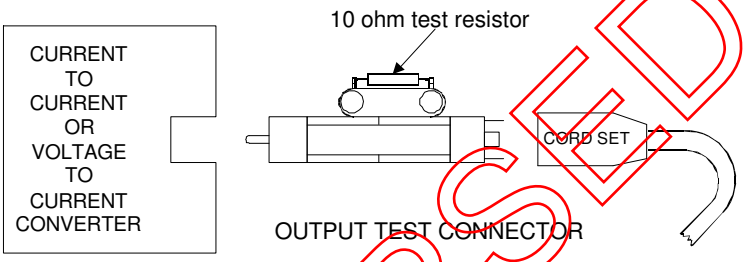
6.9 Overpower ΔT Setpoint

6.9.1 In Relay Rack RR-114, TM-402S, remove the signal cord set. _____

Note

Figure 5 shows the I&C output test connector.

Figure 5



6.9.2 At TM-402S, connect an I&C output test connector and 10 ohm precision test resistor. _____

6.9.3 At TM-402S, connect the signal cord set. _____

6.9.4 At TM-402S, at the I&C output test connector, connect a precision voltmeter. _____

6.9.5 At TM-402V, remove the signal cord set. _____

6.9.6 At pins W(+) and X(−), connect a current calibrator. _____

6.9.7 At TSP2 test point jacks, connect a precision voltmeter. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Table 6-71, Table 6-72, Table 6-73, and Table 6-74 may be performed concurrently.

6.9.8 Using Table 6-71, perform a calibration test of TM-402S. _____

Table 6-71

INPUT (mvdc)		OUTPUT (mvdc)		TM-402S	4892709
TSP2		TM-402S		Accuracy: ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	100.0		98.0 to 102.0	
2	200	200.0		198.0 to 202.0	
3	300	300.0		298.0 to 302.0	
4	400	400.0		398.0 to 402.0	
5	500	500.0		498.0 to 502.0	
5	500	500.0		498.0 to 502.0	
4	400	400.0		398.0 to 402.0	
3	300	300.0		298.0 to 302.0	
2	200	200.0		198.0 to 202.0	
1	100	100.0		98.0 to 102.0	

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision voltmeter
	Precision test resistor

SUPERSEDED

6.9.9 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

6.9.10 Using Table 6-72, perform a calibration test of TI-406C. _____

Table 6-72

INPUT (mvdc)		OUTPUT (%)			TI-406C	4121703
TM-402S					Accuracy: ± 3%	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	100	0.0		<0 to 3.0		
2	200	37.5		34.5 to 40.5		
3	300	75.0		72.0 to 78.0		
4	400	112.5		109.5 to 115.5		
5	500	150.0		147.0 to >150		
5	500	150.0		147.0 to >150		
4	400	112.5		109.5 to 115.5		
3	300	75.0		72.0 to 78.0		
2	200	37.5		34.5 to 40.5		
1	100	0.0		<0 to 3.0		

M&TE ID	DESCRIPTION
	Precision voltmeter
	Precision test resistor

SUPERSEDED

6.9.11 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

DATE PERFORMED _____ INITIALS

6.9.12 Using Table 6-73, perform a calibration test of T0408A. _____

Table 6-73

INPUT (mvdc)		OUTPUT (%)			T0408A
TM-402S				Accuracy: ± 1.5%	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100	0.0		–1.5 to 1.5	
2	200	37.5		36.0 to 39.0	
3	300	75.0		73.5 to 76.5	
4	400	112.5		111.0 to 114.0	
5	500	150.0		148.5 to 151.5	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision test resistor			

6.9.13 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

Note

Recorder TR-405A is calibrated in SP-47-011A.

6.9.14 Using Table 6-74, check TR-405A (blue pen). _____

Table 6-74

INPUT (mvdc)		OUTPUT (%)			TR-405A	4255303
TM-402S					Accuracy: ± 0.5%	
		DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
1	300	75.0		74.5 to 75.5		
M&TE ID		DESCRIPTION				
		Precision voltmeter				
		Precision test resistor				

6.9.15 At TM-402S, remove all test equipment. _____

6.9.16 At TM-402S, connect the signal cord set. _____

6.9.17 At TM-402V, remove the current calibrator. _____

6.9.18 At TM-402V, connect the signal cord set. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.9.19 At the F(TAVG) signal injection test jacks, connect a current calibrator. _____

6.9.20 Place the F(TAVG) signal injection switch to TEST (up). _____

Note

If performing this procedure as post SP-47-288B, "Reactor Coolant Temperature and Pressurizer Pressure Instrument Channel 2 (White) Calibration" performance, the TSP2 value will be 7% low with a TAVG of 572ºF (308 mvdc). TM-402V should be adjusted for 108.25% (388.7 mvdc) using the BIAS potentiometer.

6.9.21 Using Table 6-75, perform a calibration test of TM-402V. _____

Table 6-75

INPUT (mvdc)		OUTPUT (mvdc)		TM-402V	4892707
F(TAVG)		TSP2		**Accuracy:** ± 2.0 mvdc	
		DESIRED	AS FOUND	ACCEPTANCE RANGE	FINAL
1	100.0	388.7		386.7 to 390.7	
2	101.9	386.8		384.8 to 388.8	
3	113.2	375.5		373.5 to 377.5	
4	121.4	367.3		365.3 to 369.3	
M&TE ID		DESCRIPTION			
		Precision voltmeter			
		Precision voltmeter			

**1000 mvdc slow resolution*

6.9.22 Are all Final Data entries within the acceptance range?

☐ Yes ☐ No _____

6.9.23 Adjust the TCL voltage source for a TCL output of 2.00 vdc. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.9.24 Using the THL voltage source, adjust the ΔT LAG output to 6.688 vdc. _____

6.9.25 Using Table 6-76, perform a calibration test by raising the current calibrator output at F(TAVG) until the ROD STOP (406B) bistable proving lamp is OFF. _____

Table 6-76

Overpower Rod Stop				TC-406B	4857107
TSP2				Accuracy: ± 2.0 mvdc	
SETPOINT	DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
Set (mvdc) ↓	396.7		394.7 to 398.7		
Reset (mvdc)	400.7		398.7 to 402.7		
M&TE ID	DESCRIPTION				
	Fluke 45 precision voltmeter*				
	Precision voltmeter				

*1000 mvdc slow resolution

6.9.26 Using Table 6-77, perform a calibration test by raising the current calibrator output at F(TAVG) until the OVER POWER TRIP (406A) bistable proving lamp is OFF. _____

Table 6-77

Overpower Trip				TC-406A	4857107
TSP2				Accuracy: ± 2.0 mvdc	
SETPOINT	DESIRED	AS FOUND	ACCEPTANCE RANGE		FINAL
Set (mvdc) ↓	388.7		386.7 to 390.7		
Reset (mvdc)	392.7		390.7 to 394.7		
M&TE ID	DESCRIPTION				
	Fluke 45 precision voltmeter*				
	Precision voltmeter				

*1000 mvdc slow resolution

6.9.27 Place the F(TAVG) signal injection switch to NORMAL (down). _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.9.28 At the F(TAVG) signal injection test jacks, remove the current calibrator. _____

6.9.29 At F(TAVG), test point jacks, remove the precision voltmeter. _____

6.9.30 At TSP2 test point jacks, remove the precision voltmeter. _____

6.10 Restoration

6.10.1 Place the following signal injection switches to NORMAL (down):

6.10.1.1 QU _____

6.10.1.2 QL _____

6.10.2 At TT-402A, remove the voltage source. _____

6.10.3 At TT-402A, connect the signal cord set. _____

6.10.4 Restore power to TT-402A by plugging in the power cord AND record the time. _____ time _____

6.10.5 At TT-402B, remove the voltage source. _____

6.10.6 At TT-402B, connect the signal cord set. _____

6.10.7 Restore power to TT-402B by plugging in the power cord AND record the time. _____ time _____

6.10.8 At the following signal injection test jacks, remove the voltage test sources:

6.10.8.1 QU _____

6.10.8.2 QL _____

6.10.9 At the following test point jacks, remove the precision voltmeter:

6.10.9.1 QU _____

6.10.9.2 QL _____

6.10.9.3 ΔQ _____

6.10.9.4 ΔT LAG _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.10.10 Close states block terminals 3, 6, 9, 12. _____

Independent Verification _____

6.10.11 Close the states block cover. _____

6.10.12 In Relay Rack RR-114, close the signal injection test panel cover AND check the following:

6.10.12.1 Annunciator (47035K) "PROCESS PROTECT RACK 2 CHANNEL TEST" is OFF. _____

6.10.12.2 SER (1680) "PROCESS PROTECT RACK 2 CHANNEL TEST" is NORMAL. _____

6.10.13 Using the time recorded in Step 6.10.4, verify TT-402A power has been restored for one hour. _____

6.10.14 Using the time recorded in Step 6.10.7, verify TT-402B power has been restored for one hour. _____

6.10.15 Have a Control Room Operator verify the following SER points are ENABLED:

6.10.15.1 RCS LOOP A CHANNEL 2 TAVG DEVIATION (974) _____ (Operator)

6.10.15.2 RCS LOOP A CHANNEL 2 DELTA TEMP DEVIATION (978) _____ (Operator)

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.10.16 In Relay Rack RR-114, place the following bistable output switches to NORMAL (down):

6.10.16.1 HI TAVG (402A) _____

6.10.16.2 LO/LO TAVG (402D) _____

6.10.16.3 F.W. VALVE OVERRIDE (402F) _____

6.10.16.4 OVER POWER TRIP (406A) _____

6.10.16.5 ROD STOP (directly below OVER POWER TRIP) (406B) _____

6.10.16.6 OVER TEMP. TRIP (406C) _____

6.10.16.7 ROD STOP (directly below OVER TEMP. TRIP) (406D) _____

6.10.16.8 HI PRESS. TRIP (430A) _____

6.10.16.9 LO PRESS. TRIP (430H) _____

6.10.16.10 UNBLOCK S.I. (430F) _____

Independent Verification _____

6.10.16.11 S.I. (430E) _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.10.17 IF reactor trip breakers are open AND auto SI is disabled, THEN N/A Steps 6.10.18 through 6.10.22. _____

6.10.18 Check the following annunciators are OFF:

6.10.18.1 OTΔT HIGH (47033C) _____

6.10.18.2 OPΔT HIGH (47033D) _____

6.10.18.3 PRESSURIZER PRESSURE 2385 (47041C) _____

6.10.18.4 PRZR PRESS SI CHANNEL ALERT (47041D) _____

6.10.18.5 OPΔT CHANNEL RNBACK/RDSTP ALERT (47041Q) _____

6.10.18.6 OTΔT CHANNEL RNBACK/RDSTP ALERT (47041R) _____

6.10.18.7 PRESSURIZER PRESSURE < 1900 (47042D) _____

6.10.18.8 RCS TAVG HIGH (47042H) _____

6.10.18.9 RCS LOOP A TAVG LOW LOW (47043H) _____

6.10.19 Check the following SER points are NORMAL:

6.10.19.1 REACTOR COOLANT SYSTEM LOOP A CHANNEL 2 TAVG HIGH (944) _____

6.10.19.2 OVERTEMPERATURE DELTA TEMP HIGH (1070) _____

6.10.19.3 PRESSURIZER PRESSURE < 1900 (1071) _____

6.10.19.4 OVERPOWER DELTA TEMP HIGH (1076) _____

6.10.19.5 PRESSURIZER PRESSURE 2385 (1080) _____

6.10.19.6 PRESSURIZER LOW PRESSURE SI CHANNEL ALERT (1173) _____

6.10.19.7 REACTOR COOLANT SYSTEM LOOP A TAVG LO-LO (1583) _____

6.10.19.8 OVERPOWER DELTA TEMP RUNBACK/RODSTOP ALERT (1685) _____

6.10.19.9 OVERTEMPERATURE DELTA TEMP RUNBACK/RODSTOP ALERT (1686) _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.10.20 Check the following status lamps are DIM:

6.10.20.1 LOOP A CHAN 2 OTΔT (44904-0101) _____

6.10.20.2 LOOP A CHAN 2 OPΔT (44904-0401) _____

6.10.20.3 PRESSURIZER 1900 PSIG (44907-0206) _____

6.10.20.4 PRESSURIZER 2385 PSIG (44907-0306) _____

6.10.20.5 LOOP A OTΔT (44907-0506) _____

6.10.20.6 LOOP A OPΔT (44907-0606) _____

6.10.20.7 PRESSURIZER 1815 PSIG (44908-0202) _____

6.10.20.8 LOOP A LOW TAVE (44908-0302) _____

6.10.20.9 LOOP A LOW-LOW TAVE (44908-0402) _____

6.10.21 Check status lamp (44908-0102) "PRESSURIZER > 2000 PSIG" is BRIGHT. _____

6.10.22 Check the following computer points are NOT TR:

6.10.22.1 RCLA OVERPOWER DT CHAN 2 (T0400D) _____

6.10.22.2 RCLA OVERTEMP DT CHAN 2 (T0403D) _____

6.10.22.3 PRESSURIZER HI P CH 2 (P0481D) _____

6.10.22.4 PRESSURIZER LOW P CH 2 (P0485D) _____

6.10.22.5 PRESSURIZER LO P CH 2 SI (P0490D) _____

6.10.22.6 SAFETY INJECTION CHAN 2 UNBLK (P0493D) _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.10.23 At Mechanical Control Console C, have a Control Room Operator place "DELTA TEMPERATURE RX PROTECTION CHANNEL DEFEAT" switch (ES-46374) to OFF.

OFF _____
(Operator)

Concurrent Verification _____
(Operator)

6.10.24 At Mechanical Control Console C, have a Control Room Operator place "TAVE RX PROTECTION CHANNEL DEFEAT" switch (ES-46375) to OFF.

OFF _____
(Operator)

Concurrent Verification _____
(Operator)

6.10.25 At Recorder 42301, select "CAL STOP" message. _____

6.10.26 Verify Recorder 42301 is displaying normal. _____

6.10.27 At Recorder 42553, select "CAL STOP" message. _____

6.10.28 Verify Recorder 42553 is displaying normal. _____

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.10.29 IF the "PRZR PRESSURE CONTROL CHANNEL SELECTOR" switch (ES-46324) is in the desired position, THEN N/A Step 6.10.30.

_____ (Operator)

6.10.30 Notify the Control Room Operator, IF desired, operate Pressurizer Pressure controls in MANUAL using Operations procedure N-RC-36C, "Pressurizer Pressure Control" before transferring the "PRZR PRESSURE CONTROL CHANNEL SELECTOR" switch (Step 6.10.31).

_____ (Operator)

6.10.31 At Mechanical Control Console C, have a Control Room Operator verify "PRZR PRESSURE CONTROL CHANNEL SELECTOR" switch (ES-46324) to the desired position AND circle that position.

4-3 / 2-3 / 2-1 _____ (Operator)

Concurrent Verification _____ (Operator)

6.10.32 Notify the Control Room Operator, IF desired, the controllers may be placed to AUTO.

_____ (Operator)

Concurrent Verification _____ (Operator)

6.10.33 At Mechanical Control Console C, have a Control Room Operator verify "PRZR PRESSURE RECORDER INPUT SELECTOR" switch (ES-46325) to the desired position AND circle that position.

1 / 2 / 3 / 4 _____ (Operator)

Concurrent Verification _____ (Operator)

SUPERSEDED

DATE PERFORMED _____ INITIALS

6.10.34 At Mechanical Vertical Panel A, have a Control Room Operator verify "TR-405 RX CLNT DELTA-TEMP RECORDER SELECTOR" switch (ES-46551) to the desired position AND circle that position.

1 / 2 / 3 / 4 _____
(Operator)

Concurrent Verification _____
(Operator)

6.10.35 Notify the Control Room Operators of your completing this procedure. _____
(Operator)

SUPERSEDED

7.0 Acceptance Criteria

Reactor Condition (power level):		
Channels Satisfactorily Tested		
	Yes	No
Channel 2 (White)		

M&TE ID	DESCRIPTION	CAL DUE
	Fluke 45 precision voltmeter	
	Fluke 45 precision voltmeter	
	Decade resistance box	
	Decade resistance box	
	Precision voltmeter	
	Precision voltmeter	
	Precision test resistor	
	Plotter	

SUPERSEDED

7.1 This test is complete and acceptable once the following items have been completed and signed.

7.1.1 Section 6.0 has been completed.

7.1.2 Concurrent and Independent Verifications have been completed.

7.1.3 All problems encountered during the test have been properly resolved and signed, except as noted by a Condition Report (CR).

7.2 Were all As Found data entries within the acceptance range?

☐ Yes ☐ No Initials: _____ ☐ N/A

7.3 Are all Final data entries within the acceptance range?

☐ Yes ☐ No Initials: _____ ☐ N/A

7.4 Were any problems or discrepancies noted while performing this procedure?

☐ Yes CR No. _____ ☐ No

8.0 Review

8.1 Performed by: _____ Initials: _____ Date: _____
(Print / Sign)

_____ Initials: _____ Date: _____
(Print / Sign)

Group Supervisor: _____ Date: _____
(Print / Sign)

SUPERSEDED

9.0 Records

9.1 The following QA records and non-QA records are identified in this directive/procedure and are listed on the KPS Records Retention Schedule. These records shall be maintained according to the KPS Records Management Program.

9.1.1 QA Records

- Completed procedure

9.1.2 Non-QA Records

None

SUPERSEDED