Page 1 of 1

REFERENCE: SO123-VI-1.0
SO123-VI-1.1

ENCODE: AC10AC
SO ______
(When form filled out)

TEMPORARY CHANGE NOTICE

NOTE: Technical Specification Violation if not processed within the stated time limits.

Procedure No. SO23-II-3.2 Revision No. 1 TCN No. 10

Procedure Title PPS Response Time Testing for Channel B

Procedure Author ______ PAX ______ (If known, Writer) ______ PAX ______

1. The following change shall be in effect. Attach a copy of the effected page(s), if applicable on attachment 8.1 page 10 of 11 show the following at the bottom of the page

Containment Press High CCW Valves $\leq$ 21.0 sec (Unit 3), $\leq$ 20.9 sec (Unit 2) Note 4a

Containment Press High CCW Valves $\leq$ 23.0 sec* Units 2+3 - Note 4b

2. Reason.

Correct omission on TCN 9

SITE FILE COPY

RECEIVED
FEB 3 1983
CDM SITE

3. Date originated 1-27-83
4. Issuance Date JAN 28 1983 CDM (For CDM Use Only)
5. Does this change affect FSAR or Tech. Spec. commitments? Yes ___ No ✓
6. Does this change affect the nonradiological environment of any offsite area previously undisturbed during site preparation and plant construction? Yes ___ No ✓
7. Is the intent of the original document altered? Yes ___ No ✓
8. Is the document to be changed an Emergency and Abnormal Operating Instruction? Yes ___ No ✓
(If the answer to 5, 6, 7 or 8 is YES, a TCN is NOT Authorized.)
9. Does this change affect licensing commitment requirements as stated in the Reference Section? Yes ___ No ✓
10. Originator R. L. Clift 1-27-83 1540 (DATE / TIME)
11. Is the TCN to be incorporated into next permanent revision within 60 days of issuance date? Yes ✓ No* ___
** One time change only against Procedure/Station Order No. ______ Rev. No. ______*
12. Copy sent to the Nuclear Safety Group M. C[illegible] (CDM SIGNATURE) 2-3-83 (DATE)
13. Signatures Required. Approved by (at least one (1) SRO)
1) [signature]
2) [signature]
Final approval by [initials]
3) Brian Katz
COGNIZANT FUNCTIONAL STATION MANAGER
2-1-83
DATE — MUST BE WITHIN 14 DAYS

Approval must be by two members of the plant management staff at least one of whom holds an SRO license on the unit affected. (For TCN approval, members of the plant management staff are defined as any Station Supervisor, including the level of foreman, exercising responsibility in the specific area and unit addressed by the change.)

REFERENCE SO123-VI-1.0
SO123-VI-1.1

ENCODE: AC10AC
SO________
(When form filled out)

TEMPORARY CHANGE NOTICE

NOTE: Technical Specification Violation if not processed within the stated time limits.

Procedure No. SO23-II-3.2 Revision No. 1 TCN No. 9

Procedure Title PPS Response Time Test for Channel B

Procedure Author VM Rodriguez PAX 57-564 (If known, Writer) R. BIALECKI PAX 59276

1. The following change shall be in effect. Attach a copy of the effected page(s), if applicable
   see attached pages
2. Reason: Correct errors and add missing steps
3. Date originated 1-17-83
4. Issuance Date JAN 17 1983 CDM (For CDM Use Only)
5. Does this change affect FSAR or Tech. Spec. commitments? *Yes* ____ *No* ✓
6. Does this change affect the nonradiological environment of any offsite area previously undisturbed during site preparation and plant construction? *Yes* ____ *No* ✓
7. Is the intent of the original document altered? *Yes* ____ *No* ✓
8. Is the document to be changed an Emergency and Abnormal Operating Instruction? *Yes* ____ *No* ✓
   (If the answer to 5, 6, 7 or 8 is YES, a TCN is NOT Authorized.)
9. Does this change affect licensing commitment requirements as stated in the Reference Section? *Yes* ____ *No* ✓
10. Originator VM Rodriguez 1-17-83 / 0800 hrs
    DATE / TIME
11. Is the TCN to be incorporated into next permanent revision within 60 days of issuance date? *Yes* ✓ *No** ____
    ** One time change only against Procedure/Station Order No.* ________ *Rev. No.* ________
12. Copy sent to the Nuclear Safety Group Laura Granado 1-24-83
    CDM SIGNATURE DATE
13. Signatures Required:

SITE FILE COPY

SO1 **(Series)	SO2, SO3, or SO23 (Series)	SO123 **(Series)
Approved by two OSRC members: 1) ________ 2) ________ Reviewed by entire Committee on: ** ________ DATE — MUST BE WITHIN 7 DAYS RECEIVED JAN 24 1983 CORP. DOC. MGMT.	Approved by: *** (at least one (1) SRO) 1) G Wileigh 2) J Fitz Final approval by SNS 1) Brian Katz COGNIZANT FUNCTIONAL STATION MANAGER 1-19-83 DATE — MUST BE WITHIN 14 DAYS	Approved by two OSRC members: 1) ________ 2) ________ Reviewed by entire Committee on: ** ________ DATE — MUST BE WITHIN 7 DAYS Approved by: *** (at least one (1) SRO) 1) ________ 2) ________ Approved by: 1) ________ COGNIZANT FUNCTIONAL STATION MANAGER ________ DATE — MUST BE WITHIN 14 DAYS

** *SO1 and SO123 (series) TCNs will be routed to the OSRC with Routing Document SO(123) 109 which will be signed by the Station Manager.*

*** *Approval must be by two members of the plant management staff at least one of whom holds an SRO license on the unit affected. (For TCN approval, members of the plant management staff are defined as any Station Supervisor, including the level of foreman, exercising responsibility in the specific area and unit addressed by the change.)*

TCN9 [redacted]

procedure # SO23-II-3.2 C-1

[redacted]

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add following steps:

6.24.27 Disconnect the "Bistable test" leads and replace the input simulator leads on the terminals they were removed from in step 6.24.2

Date / Technician

6.24.28 Reset all bistables.

Date / Technician

6.24.29 Record the largest response time value of steps 6.24.22, 6.24.25 and 6.24.26 in the Data Collection table

Date / Technician

DATA COLLECTION TABLE

TCN 9
PG 3 OF 19 [redacted]

(1)

STEP NO.	DESCRIPTION	VALUE	UNITS
6.2.12	PT-0101-2 High Pzr Press		
~~6.3.12~~	~~PT-0102-2 Low Pzr Press~~		
~~6.4.12~~	~~PT-1013-2 Low SG-1 Press~~		
~~6.5.12~~	~~PT-1023-2 Low SG-2 Press~~		
6.6.12	LT-1113-2 Low SG-1 Level		
6.7.12	LT-1123-2 Low SG-2 Level		
6.8.12	PT-0351-2 High Cont. Press		
6.9.12	PT-0352-2 High High Cont. Press		
6.10.12	LT-0305-2 Low RWT Level		
6.11.12	PDT-0978-2 Low SG-1 Flow		
6.12.12	PDT-0979-2 Low SG-2 Flow		
6.14.16	TE-0112-2		
6.15.16	TE-9178-2		
6.16.16	TE-0122-2		
6.17.16	TE-9179-2		
6.18.4	RTSG Uncorrected		
6.19.35	High Linear Power to RTSG		
6.20.13	High Log Bistable to RTSG		
6.20.28	High Log Preamp		
6.23.20	Low Temperature ~~TI112CA~~ TT-9178-2		
6.23.40	Low Temperature ~~TI122CA~~ TT-9179-2		
6.23.60	High Temperature ~~TI112HA~~ TT-0112-2		
6.23.80	High Temperature ~~TI122HA~~ TT-0122-2		
6.23.83.21	Pzr Pressure		
6.23.84.28	Excore Power		
6.23.85.23	ST 113A W1 RCP Speed		
6.23.85.35	ST 123 W2 RCP Speed		
6.23.85.46	ST 133 W3 RCP Speed		
6.23.85.58	ST 143 W4 RCP Speed		
6.24.29	High Pzr Press to RTSG		
6.25.29	Low Pzr Press to RTSG		
6.26.28	Low Pzr Press to SIAS		
6.26.42	Low Pzr Press to CCAS		
6.27.29	Low SG-1 Level to RTSG		
6.28.29	Low SG-1 Level to EFAS-1		
6.29.29	Low SG-2 Level to RTSG		
6.30.29	Low SG-2 Level to EFAS-2		
6.31.29	Low SG-1 Press to RTSG		
6.32.29	Low SG-1 Press to MSIS		
6.33.29	Low SG-2 Press to RTSG		
6.34.29	Low SG-2 Press to MSIS		
6.35.29	High Cont. Press to RTSG		
6.36.28	High Cont. Press to CIAS		
6.36.41	High Cont. Press to CCAS		
6.36.55	High Cont. Press to SIAS		
6.37.29	Low SG-1 Flow to RTSG		
6.38.29	Low SG-2 Flow to RTSG		
.39.29	High-High Cont. Press to CSAS		
.40.29	Low RWT Level to RAS		
6.41.29	HighΔP SG-1 to EFAS-1		
6.42.29	HighΔP SG-2 to EFAS-2		

... Pressure - Low

=. SIAS (see Safety Injection)

2. Safety Injection

a. High Pressure Safety Injection

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
*P017 *P018 (If aligned) *HV-9324 *HV-9327 *HV-9330 *HV-9333					

b. Low Pressure Safety Injection

*P015 *HV-9325 *HV-9328					

c. Charging Pumps

P-190 P-191 (If Aligned)					

3. Containment Isolation
Emerg. Diesel Start Delay of 10 sec + instr. and Logic Response Only

4. Containment Spray Pumps

TCN-1

~~*P-102~~ P-012					

5. Containment Emergency Cooling

a. CCW Pumps

*P-024 *P-025 (If Aligned)					

TCN 9

C.C.W. Valves (Non Critical Loop Isolation)

R-1 [redacted]

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
HV-6212 HV-6218					

c. C.C.W. Valves (Emergency Cooler Isolation)

HV-6366 HV-6367 HV-6370 HV-6371					

d. Emergency Cooling Fans

*E-399 *E-401					

6. Containment Pressure High

a. SIAS (see Pressurizer Pressure Low)
b. CIAS

(1) Containment Isolation (See Items)

7. Containment Pressure High High

a. CSAS

(1) Containment Spray

*HV-9367 *HV-6501					

8. Steam Generator Pressure Low

a. MSIS

(1) Main Steam Isolation (MSIV)

HV-8204 HV-8205					

TCN 9

[redacted] R-1 [redacted]

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(2) Main Feedwater Isolation

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
HV-4048 HV-4052					

(3) Steam, Blowdown, Sample and Drain Isolation

HV-4054 HV-4058 HV-8203 HV-8248 TCN-1 ~~HV-8219~~ HV-8419					

(4) Auxiliary Feedwater Isolation

HV-4705 TCN-1 ~~HV-5713~~ HV-4713 HV-4730 HV-4731					

9. Refueling Water Storage Tank

a. RAS

(1) Containment Sump Valves Open

*HV-9303					

(2) ECCS Miniflow Valves Shut

*HV-9306 *HV-9307					

10. 4.16 KV. Emergency Bus Undervoltage

a. LOV (Loss of voltage and degraded voltage)

TCN 9

SUS-[illegible]

[redacted]

R-1

Pg 8 of 19

11. Steam Generator Level-Low With Either No Pressure-Low Trip or ΔP-High

a. EFAS

(1) Aux. F.W. (AC Train)

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
P-141 *HV-4713 *HV-4731 *HV-4054					

(2) Aux. F.W. (Steam/DC Train)

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
S/G #1 (E089) P-140 HV-4706 HV-4716 HV-4715 HV-4054 S/G #2 (E088) P-140 HV-4716 HV-4705 HV-4730 HV-4053					

TCN9

SOCS-II-3

[redacted]

R-1

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a. .AS (See Safety Injection)

2. Safety Injection

a. High Pressure Safety Injection

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
*P019 *P018 (If aligned) *HV-9323 *HV-9326 *HV-9329 *HV-9332					

b. Low Pressure Safety Injection

*P016 *HV-9322 *HV-9331					

c. Charging Pumps

P-192 P-191 (If Aligned)					

3. Containment Isolation
Emerg. Diesel Start Delay of 10 sec + instr. and Logic Response Only

4. Containment Spray Pumps

TCN-1

~~*P-103~~ P-013					

5. Containment Emergency Cooling

a. CCW Pumps

*P-026 *P-025 (If Aligned)					

TCN9

(Non Critical Loop Isolation)

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
HV-6213 HV-6219					

c. C.C.W. Valves Emergency Cooler Isolation

HV-6368 HV-6369 HV-6372 HV-6373					

d. Emergency Cooling Fans

TCN-

*E-400 ~~*E-401~~ E-402					

6. Containment Pressure High

a. SIAS (see Pressurizer Pressure Low)

b. CIAS

(1) Containment Isolation (See Items)

7. Containment Pressure High High

a. CSAS

(1) Containment Spray

*HV-9368 *HV-6500					

8. Steam Generator Pressure Low

a. MSIS

(1) Main Steam Isolation (MSIV)

HV-8204 HV-8205					

TCN9

(2) Main Feedwater Isolation

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
MV-4048 MV-4052					

(3) Steam, Blowdown, Sample and Drain Isolation

MV-4053 MV-4057 MV-8202 MV-8249 ~~MV-8221~~ HV-8421					

TCN-

(4) Auxiliary Feedwater Isolation

MV-4706 ~~MV-5712~~ HV-4712 MV-4714 MV-4715					

TCN-

9. Refueling Water Storage Tank

a. RAS

(1) Containment Sump Valves Open

*MV-9302					

(2) ECCS Miniflow Valves Shut

*MV-9347 *MV-9348					

10. 4.16 KV. Emergency Bus Undervoltage

a. LOV (Loss of voltage and degraded voltage)

TCN9

R-1

11. Steam Generator Level-Low (With Either No Pressure-Low Trip or ΔP-High)

a. EFAS

(1) Aux. F.W. AC Train

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
*P-504 *HV-4712 *HV-4714 *HV-4053					

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TCN 9

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TCN 9

RESPONSE TIME TABLE

Reactor Trips

Function	Sensor	Trip Unit to RISG	RISG (Corrected)	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
TCN Linear Power High	*				≤ .40 sec*	
Log Pwr High					≤ .45 sec*	
PZR Press High					≤ .90 sec	
PZR Press Low					≤ .90 sec	
Cntmt. Press High					≤ .90 sec	
SG-1 Press Low					≤ .90 sec	
SG-2 Press Low					≤ .90 sec	
SG-1 LVL Low					≤ .90 sec	
SG-2 LVL Low					≤ .90 sec	
SG-1 Low Flow					≤ .90 sec	
SG-2 Low Flow					≤ .90 sec	

FOOTNOTES:

*Neutron detectors are exempt from response time testing. Response time of the neutron flux signal portion of the channel shall be measured from detector output or input of first electronic component in channel.

Response time shall be measured from the onset of a single CEA drop.

Response time shall be measured from the onset of a 2 out of 4 Reactor Coolant Pump coastdown.

Response time shall be measured from the output of the sensor. RTD response time shall be measured at least once per 18 months by means of the Loop Current Step Response (LCSR) method. The measured R_T of the slowest RTD shall be less than or equal to 6.0 seconds.

Response time shall be measured from the output of the pressure transmitter. The transmitter response time constant shall be less than or equal to 0.7 seconds where the pressure transmitter response time is equivalent to the time interval required for the transmitter to achieve 63.2% of its total change when subjected to a step change in pressure transmitter pressure.

RESPONSE TIME TABLE (Continued)

Reactor Trips

Function	CPC Signal Processing	RTSG (Corrected)	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
Local Power Density HI					
1. Ex-Core Detectors				.68 sec*	
TCN- 2. CEA Positions				~~.53~~ .68 sec**	
3. CEA Positions-Penalty Factor				.53 Sec	
DNBR Low					
1. Ex-Core Detectors				.68 sec*	
2. CEA Position				.68 sec**	
3. Cold Leg Temp.				.68 sec##	
4. Hot Leg Temp.				.68 sec##	
5. RC Pump Shaft Speed				.68 sec#	
TCN- 6. PRSZR Pressure				.68 sec###	
7. CEA Position-Penalty Factor				.53 Sec	

NOTE: Cold and Hot Leg Temperature sensors are response time tested on a stand alone basis. Record the time constants separately.

1. Cold Leg Temp. Sensors ________ value/units Acceptance Criteria 5.4 sec Verified ________ Initial/date

2. Hot Leg Temp. Sensors ________ value units 5.4 sec ________ Initial/date

NOTES:

Neutron detectors are exempt from response time testing. Response time of the neutron flux signal portion of the channel shall be measured from detector output or input of first electronic component in channel.

Response time shall be measured from the onset of a single CEA drop.

Response time shall be measured from the onset of a 2 out of 4 Reactor Coolant Pump coastdown.

Response time shall be measured from the output of the sensor. RTD response time shall be measured at least once per 18 months by means of the Loop Current Step Response (LCSR) method. The measured R of the slowest RTD shall be less than or equal to 6.0 seconds. (5.4 sec. makes allowance for a +/- accuracy of the test equipment)

Response time shall be measured from the output of the pressure transmitter. The transmitter response time constant shall be less than or equal to 0.7 seconds where the pressure transmitter response time is equivalent to the time interval required for the transmitter to achieve 63.2% of its total change when subjected to a step change in pressure transmitter pressure.

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TCN9

RESPONSE TIME TABLE

ESFAS

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.		Verified Initial/Date
PZR Press Low HPSI					≤ 31.2 sec*		
PZR Press Low LPSI					≤ 41.2 sec*		
PZR Press Low Cntmt. Isol.					≤ 11.2 sec*	Note 2 and 3	
PZR Press Low Cntmt. Spray Pumps					≤ 25.6 sec*		
PZR Press Low CCW Pumps					≤ 31.2 sec*		
PZR Press Low CCW Valves					≤ ~~3~~ 21.2 sec	Note 4a	
PZR press low CCW valves					≤ 23.2 sec	Note 4b *	TCN
PZR Press Low Emer. Clg. Fans					≤ 21.2 sec*		
Cntmt. Press High HPSI					≤ 41.0 sec*		
Cntmt. Press High LPSI					≤ 41.0 sec*		
Cntmt. Press High Cntmt. Spray Pumps					≤ 25.4 sec*		
Cntmt. Press High CCW Pumps					≤ 31.0 sec*		

FOOTNOTES:

*1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

2. Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

3. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment pump valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

4. All CIAS-Actuated valves except MSIVs and MFIVs.

4a. CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219 are closed

5. Response time includes instrumentation, logic, and isolation damper closure times only.

4b. Containment emergency cooler CCW isolation valves HV-6366, HV-6367, HV-6368, HV-6369 HV-6370, HV-6371, HV-6372 and HV-6373 are open

[redacted]

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TCN 9

RESPONSE TIME TABLE

ESFAS

(Continued)

Function	Sensor	Trip Unit to ESIAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
~~Cntmt. Press High CCW Valves~~					~~≤ 11.0 sec Note 3~~	
Cntmt. Press High Emer. Clg. Fans					≤ 21.0 sec*	
Cntmt. Press High Cntmt. Isol.					≤ 10.9 sec* Note 2	
Cntmt. Press High-High Cntmt. Spray					≤ 21.0 sec*	
SG-1 Press Low MSIV					≤ 20.9 sec	
SG-1 Press Low MFW Isol.					≤ 10.9 sec	
SG-2 Press Low MSIV					≤ 20.9 sec	
TCN / Cntmt Press High CCW Valves					≤ 21.0 sec Note 4	
TCN / Cntmt Press High - CCW Valves					≤ 23.0 sec* Note 3	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.
- Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.
2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.
3. All CIAS-Actuated valves except MSIVs and MFIVs.
~~4.~~ 2. CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219 are closed.
~~5.~~ 3. Response time includes instrumentation, logic and isolation damper closure times only.
~~6.~~ 4. Containment emergency cooler CCW isolation valves HV-6366, HV-6367, HV-6368, HV-6369 HV-6370, HV6371, HV6372 and HV-6373 are open

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TCN 9

RESPONSE TIME TABLE

ESFAS

(Continued)

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
BD-2 Press Low MFW Isol.					~~≤ 10.9 sec~~	
Low RWT LVL Cntmt. Sump VLVs Open					≤ 50.7 sec*	
Low RWT LVL ECCS Miniflow VLVs Shut					≤ 40.7 sec* (unit 2) ≤ 60.7 sec* (unit 3)	
BD-1 LVL Low Aux. FW AC Trains					≤ 40.9 sec*	
BD-1 LVL Low Aux. FW Stm./DC Train					≤ 30.9 sec	
BD-2 LVL Low Aux. FW AC Trains					≤ 40.9 sec*	
BD-2 LVL Low Aux. FW Stm./DC Train					≤ 30.9 sec	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

- Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

3. All CIAS-Actuated valves except MSIVs and MFIVs.

4a. CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219 are closed.

5. Response time includes instrumentation, logic, and isolation damper closure times only.

1969b

4b. containment emergency cooler CCW isolation valves HV-6366, HV-6367, HV-6368, HV-6369, HV-6370, HV-6371, HV-6372 and HV 6373 are open.

TRAIN B

3.2

RESPONSE TIME TABLE

ESFAS

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
PZR Press Low HPSI					≤ 31.2 sec*	
PZR Press Low LPSI					≤ 41.2 sec*	
PZR Press Low Cntmt. Isol.					≤ 11.2 sec* Note 2 and 3	
PZR Press Low Cntmt. Spray Pumps					≤ 25.6 sec*	
PZR Press Low CCW Pumps					≤ 31.2 sec*	
PZR Press Low CCW Valves					≤ 21.2 sec Note 4a	
PZR Press Low CCW Valves					≤ 23.2 sec note 4b	
PZR Press Low Emer. Clg. Fans					≤ 21.2 sec*	
Cntmt. Press High HPSI					≤ 41.0 sec*	
Cntmt. Press High LPSI					≤ 41.0 sec*	
Cntmt. Press High Cntmt. Spray Pumps					≤ 25.4 sec*	
Cntmt. Press High CCW Pumps					≤ 31.0 sec*	

TCN

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

* Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

3. All CIAS-Actuated valves except MSIVs and MFIVs.

4a. CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219 are closed.

5. Response time includes instrumentation, logic, and isolation damper closure times only.

4b. Containment emergency cooler CCW isolation valves HV-6366, HV-6367, HV-6368, HV-6369, HV-6370, HV-6371, HV-6372, and HV6373 are open.

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TCN9

TRAIN B

RESPONSE TIME TABLE

ESFAS

(Continued)

Function	Sensor	Trip Unit to ESIAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
~~Cntmt Press High CCW Valves~~					~~≤ 11.0 sec Note 4~~	
Cntmt. Press High Emer. Clg. Fans					≤ 21.0 sec*	
Cntmt. Press High Cntmt. Isol.					≤ 10.9 sec* Note 2	
Cntmt. Press High-High Cntmt. Spray					≤ 21.0 sec*	
SG-1 Press Low MSIV					≤ 20.9 sec	
SG-1 Press Low MFW Isol.					≤ 10.9 sec	
SG-2 Press Low MSIV					≤ 20.9 sec	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.
* Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.
2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.
3. All CIAS-Actuated valves except MSIVs and MFIVs.
4a. CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219 are closed.
5. Response time includes instrumentation, logic and isolation damper closure times only.
4b. Containment emergency cooler ccw isolation valves HV-6366, HV-6367, HV-6368, HV-6369 HV-6370, HV6371, HV6372 and HV-6373 are open

TCN / Cntmt Press High CCW Valves	~~≤ 21.0 sec Note 4a~~
TCN / Cntmt Press High - CCW Valves	≤ 31.0 sec* Note 4b

Ntes 3.2

RESPONSE TIME TABLE

ESFAS

(Continued)

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
SG-2 Press Low MFW Isol.					~~≤ 10.9 sec~~	
Low RWT LVL Cntmt. Sump VLVs Open					≤ 50.7 sec*	
Low RWT LVL ECCS Miniflow VLVs Shut					≤ 40.7 sec* (unit 2) ≤ 50.7 sec* (unit 3)	
SG-1 LVL Low Aux. FW AC Trains					≤ 40.9 sec*	
SG-1 LVL Low Aux. FW Stm./DC Train					≤ 30.9 sec	
SG-2 LVL Low Aux. FW AC Trains					≤ 40.9 sec*	
SG-2 LVL Low Aux. FW Stm./DC Train					≤ 30.9 sec	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

* Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

3. All CIAS-Actuated valves except MSIVs and MFIVs.

4a CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219 are closed.

5. Response time includes instrumentation, logic, and isolation damper closure times only.

1969b

4b Containment emergency cooler CCW isolation valves HV-6366, HV-6367, HV-6368, HV-6369 HV-6370, HV-6371, HV-6372, and HV6373 are open.

Pg 19 OF 19

TCN9

REFERENCE: SO123-VI-1.0
SO123-VI-1.1

ENCODE: AC10AC
SO________
(When form filled out)

TEMPORARY CHANGE NOTICE

NOTE: Technical Specification Violation if not processed within the stated time limits.

Procedure No. SO23-II-3.2 Revision No. 1 TCN No. 8

Procedure Title PPS Response Time Test for Channel B

Procedure Author ________ PAX ________ (If known, Writer) ________ PAX ________

1. The following change shall be in effect: Attach a copy of the effected page(s), if applicable
   see attached page
2. Reason: added devices, missing procedural steps and revised attachment 6.1 for clarity
3. Date originated 12-10-82 4. Issuance Date 12-11-82 (For CDM Use Only)
5. Does this change affect FSAR or Tech. Spec. commitments? Yes ____ No X
6. Does this change affect the nonradiological environment of any offsite area previously undisturbed during site preparation and plant construction? Yes ____ No X
7. Is the intent of the original document altered? Yes ____ No X
8. Is the document to be changed an Emergency and Abnormal Operating Instruction? Yes ____ No X
   (If the answer to 5, 6, 7 or 8 is YES, a TCN is NOT Authorized.)
9. Does this change affect licensing commitment requirements as stated in the Reference Section? Yes ____ No X
10. Originator [signature] ________ DATE / TIME
11. Is the TCN to be incorporated into next permanent revision within 60 days of issuance date? Yes X No* ____
    ** One time change only against Procedure/Station Order No. ________ Rev. No. ________*
12. Copy sent to the Nuclear Safety Group Laura Granados (CDM SIGNATURE) 12-21-82 (DATE)
13. Signatures Required:

SO1 **(Series)	SO2, SO3, or SO23 (Series)	SO123 **(Series)
Approved by two OSRC members: 1) ________ 2) ________ Reviewed by entire Committee on: ** ________ DATE — MUST BE WITHIN 7 DAYS	Approved by: *** (at least one (1) SRO) 1) [signature] 2) [signature] Final approval by: SRO 3) Brian Katz COGNIZANT FUNCTIONAL STATION MANAGER 12-15-82 DATE — MUST BE WITHIN 14 DAYS	Approved by two OSRC members: 1) ________ 2) ________ Reviewed by entire Committee on: ** ________ DATE — MUST BE WITHIN 7 DAYS Approved by: *** (at least one (1) SRO) 3) ________ 4) ________ Approved by: 5) ________ COGNIZANT FUNCTIONAL STATION MANAGER ________ DATE — MUST BE WITHIN 14 DAYS

** *SO1 and SO123 (series) TCNs will be routed to the OSRC with Routing Document SO(123) 109 which will be signed by the Station Manager.*

*** *Approval must be by two members of the plant management staff at least one of whom holds an SRO license on the unit affected. (For TCN approval, members of the plant management staff are defined as any Station Supervisor, including the level of foreman, exercising responsibility in the specific area and unit addressed by the change.)*

SITE FILE COPY

DEC 21 1982 CDM

add following steps:

6.24.27 Disconnect the "Bistable test" leads and replace the input simulator leads on the terminals they were removed from in step 6.24.2

_____________ / _____________
Date / Technician

6.24.28 Reset all bistables.

_____________ / _____________
Date / Technician

6.24.29 Record the largest response time value of steps 6.24.22, 6.24.25 and 6.24.26 in the Data Collection table

_____________ / _____________
Date / Technician

TCN # 8
page 3 of 16

DATA COLLECTION TABLE

(1)

STEP NO.	DESCRIPTION	VALUE	UNITS
6.2.12	PT-0101-2 High Pzr Press		
6.3.12	PT-0102-2 Low Pzr Press		
6.4.12	PT-1013-2 Low SG-1 Press		
6.5.12	PT-1023-2 Low SG-2 Press		
6.6.12	LT-1113-2 Low SG-1 Level		
6.7.12	LT-1123-2 Low SG-2 Level		
6.8.12	PT-0351-2 High Cont. Press		
6.9.12	PT-0352-2 High High Cont. Press		
6.10.12	LT-0305-2 Low RWT Level		
6.11.12	PDT-0978-2 Low SG-1 Flow		
6.12.12	PDT-0979-2 Low SG-2 Flow		
6.14.16	TE-0112-2		
6.15.16	TE-9178-2		
6.16.16	TE-0122-2		
6.17.16	TE-9179-2		
6.18.4	RTSG Uncorrected		
6.19.35	High Linear Power to RTSG		
6.20.13	High Log Bistable to RTSG		
6.20.28	High Log Preamp		
6.23.20	Low Temperature ~~TI112CA~~ TT-9178-2		
6.23.40	Low Temperature ~~TI122CA~~ TT-9179-2		
6.23.60	High Temperature ~~TI112HA~~ TT-0112-2		
6.23.80	High Temperature ~~TI122HA~~ TT-0122-2		
6.23.83.21	Pzr Pressure		
6.23.84.28	Excore Power		
6.23.85.23	ST 113A W1 RCP Speed		
6.23.85.35	ST 123 W2 RCP Speed		
6.23.85.46	ST 133 W3 RCP Speed		
6.23.85.58	ST 143 W4 RCP Speed		
6.24.29	High Pzr Press to RTSG		
6.25.29	Low Pzr Press to RTSG		
6.26.28	Low Pzr Press to SIAS		
6.26.42	Low Pzr Press to CCAS		
6.27.29	Low SG-1 Level to RTSG		
6.28.29	Low SG-1 Level to EFAS-1		
6.29.29	Low SG-2 Level to RTSG		
6.30.29	Low SG-2 Level to EFAS-2		
6.31.29	Low SG-1 Press to RTSG		
6.32.29	Low SG-1 Press to MSIS		
6.33.29	Low SG-2 Press to RTSG		
6.34.29	Low SG-2 Press to MSIS		
6.35.29	High Cont. Press to RTSG		
6.36.28	High Cont. Press to CIAS		
6.36.41	High Cont. Press to CCAS		
6.36.55	High Cont. Press to SIAS		
6.37.29	Low SG-1 Flow to RTSG		
6.38.29	Low SG-2 Flow to RTSG		
6.39.29	High-High Cont. Press to CSAS		
6.40.29	Low RWT Level to RAS		
6.41.29	HighΔP SG-1 to EFAS-1		
6.42.29	HighΔP SG-2 to EFAS-2		

TRAIN A

1. Pressurizer Pressure - Low
   a. SIAS (see Safety Injection)
2. Safety Injection
   a. High Pressure Safety Injection

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
*P017 *P018 (If aligned) *HV-9324 *HV-9327 *HV-9330 *HV-9333					

   b. Low Pressure Safety Injection

*P015 *HV-9325 *HV-9328					

   c. Charging Pumps

P-190 P-191 (If Aligned)					

3. Containment Isolation
   Emerg. Diesel Start Delay of 10 sec + instr. and Logic Response Only
4. Containment Spray Pumps

*P-102					

5. Containment Emergency Cooling
   a. CCW Pumps

*P-024 *P-025 (If Aligned)					

b. C.C.W. Valves (Non Critical Loop Isolation)

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
HV-6212 HV-6218					

c. C.C.W. Valves (Emergency Cooler Isolation)

HV-6366 HV-6367 HV-6370 HV-6371					

d. Emergency Cooling Fans

*E-399 *E-401					

6. Containment Pressure High

a. SIAS (see Pressurizer Pressure Low)
b. CIAS

(1) Containment Isolation (See Items)

7. Containment Pressure High High

a. CSAS

(1) Containment Spray

*HV-9367 *HV-6501					

8. Steam Generator Pressure Low

a. MSIS

(1) Main Steam Isolation (MSIV)

HV-8204 HV-8205					

(2) Main Feedwater Isolation

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
HV-4048 HV-4052					

(3) Steam, Blowdown, Sample and Drain Isolation

HV-4054 HV-4058 HV-8203 HV-8248 HV-8219					

(4) Auxiliary Feedwater Isolation

HV-4705 HV-5713 HV-4730 HV-4731					

9. Refueling Water Storage Tank

a. RAS

(1) Containment Sump Valves Open

*HV-9303					

(2) ECCS Miniflow Valves Shut

*HV-9306 *HV-9307					

10. 4.16 KV. Emergency Bus Undervoltage

a. LOV (Loss of voltage and degraded voltage)

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TCN#8 R-1

11. Steam Generator Level-Low With Either No Pressure-Low Trip or ΔP-High

a. EFAS

(1) Aux. F.W. (AC Train)

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
P-141 *HV-4713 *HV-4731 *HV-4054					

(2) Aux. F.W. (Steam/DC Train)

S/G #1 (E089) P-140 HV-4706 HV-4716 HV-4715 HV-4054 S/G #2 (E088) P-140 HV-4716 HV-4705 HV-4730 Hv-4053					

TRAIN B

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TCN# 8 R-1

1. Pressurizer Pressure - Low
   a. SIAS (See Safety Injection)
2. Safety Injection
   a. High Pressure Safety Injection

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
*P019 *P018 (If aligned) *HV-9323 *HV-9326 *HV-9329 *HV-9332					

   b. Low Pressure Safety Injection

*P016 *HV-9322 *HV-9331					

   c. Charging Pumps

P-192 P-191 (If Aligned)					

3. Containment Isolation
Emerg. Diesel Start Delay of 10 sec + Instr. and Logic Response Only

4. Containment Spray Pumps

*P-103					

5. Containment Emergency Cooling
   a. CCW Pumps

*P-026 *P-025 (If Aligned)					

b. C.C.W. Valves (Non Critical Loop Isolation)

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
HV-6213 HV-6219					

c. C.C.W. Valves Emergency Cooler Isolation

HV-6368 HV-6369 HV-6372 HV-6373					

d. Emergency Cooling Fans

*E-400 *E-401					

6. Containment Pressure High

a. SIAS (see Pressurizer Pressure Low)
b. CIAS

(1) Containment Isolation (See Items)

7. Containment Pressure High High

a. CSAS

(1) Containment Spray

*HV-9368 *HV-6500					

8. Steam Generator Pressure Low

a. MSIS

(1) Main Steam Isolation (MSIV)

HV-8204 HV-8205					

(2) Main Feedwater Isolation

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
HV-4048 HV-4052					

(3) Steam, Blowdown, Sample and Drain Isolation

HV-4053 HV-4057 HV-8202 HV-8249 HV-8221					

(4) Auxiliary Feedwater Isolation

HV-4706 HV-5712 HV-4714 HV-4715					

9. Refueling Water Storage Tank

a. RAS

(1) Containment Sump Valves Open

*HV-9302					

(2) ECCS Miniflow Valves Shut

*HV-9347 *HV-9348					

10. 4.16 KV. Emergency Bus Undervoltage

a. LOV (Loss of voltage and degraded voltage)

11. Steam Generator Level-Low (With Either No Pressure-Low Trip or ΔP-High)

a. EFAS

(1) Aux. F.W. AC Train

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
*P-504 *HV-4712 *HV-4714 *HV-4053					

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TCN # 8

RESPONSE TIME TABLE

Reactor Trips

Function	Sensor	Trip Unit to RISG	RISG (Corrected)	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
Linear Power High					≤ .40 sec*	
Log Pwr High					≤ .45 sec*	
PZR Press High					≤ .90 sec	
PZR Press Low					≤ .90 sec	
Cntmt. Press High					≤ .90 sec	
SG-1 Press Low					≤ .90 sec	
SG-2 Press Low					≤ .90 sec	
SG-1 LVL Low					≤ .90 sec	
SG-2 LVL Low					≤ .90 sec	
SG-1 Low Flow					≤ .90 sec	
SG-2 Low Flow					≤ .90 sec	

FOOTNOTES:

*Neutron detectors are exempt from response time testing. Response time of the neutron flux signal portion of the channel shall be measured from detector output or input of first electronic component in channel.

**Response time shall be measured from the onset of a single CEA drop.

#Response time shall be measured from the onset of a 2 out of 4 Reactor Coolant Pump coastdown.

##Response time shall be measured from the output of the sensor. RTD response time shall be measured at least once per 18 months by means of the Loop Current Step Response (LCSR) method. The measured R_T of the slowest RTD shall be less than or equal to 6.0 seconds.

###Response time shall be measured from the output of the pressure transmitter. The transmitter response time constant shall be less than or equal to 0.7 seconds where the pressure transmitter response time is equivalent to the time interval required for the transmitter to achieve 63.2% of its total change when subjected to a step change in pressure transmitter pressure.

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TCN # 8

RESPONSE TIME TABLE (Continued)

Reactor Trips

Function	CPC Signal Processing	RTSG (Corrected)	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
Local Power Density Hi					
1. Ex-Core Detectors					
2. CEA Positions				.68 sec*	
DNBR Low				~~.53~~ .68 sec**	
1. Ex-Core Detectors					
2. CEA Position				.68 sec*	
3. Cold Leg Temp.				.68 sec**	
4. Hot Leg Temp.				.68 sec##	
5. RC Pump Shaft Speed				.68 sec##	
6. PRSRZR Pressure				.68 sec#	
				.68 sec###	

NOTE: Cold and Hot Leg Temperature sensors are response time tested on a stand alone basis. Record the time constants separately.

	Value/units	Acceptance Criteria	Verified
1. Cold Leg Temp. Sensors	________ value/units	5.4 sec	________ initial/date
2. Hot Leg Temp. Sensors	________ value units	5.4 sec	________ initial/date

FOOTNOTES:

*Neutron detectors are exempt from response time testing. Response time of the neutron flux signal portion of the channel shall be measured from detector output or input of first electronic component in channel.

**Response time shall be measured from the onset of a single CEA drop.

#Response time shall be measured from the onset of a 2 out of 4 Reactor Coolant Pump coastdown.

##Response time shall be measured from the output of the sensor. RTD response time shall be measured at least once per 18 months by means of the Loop Current Step Response (LCSR) method. The measured R of the slowest RTD shall be less than or equal to 6.0 seconds. (5.4 sec. makes allowance for a +/- accuracy of the test equipment)

###Response time shall be measured from the output of the pressure transmitter. The transmitter response time constant shall be less than or equal to 0.7 seconds where the pressure transmitter response time is equivalent to the time interval required for the transmitter to achieve 63.2% of its total change when subjected to a step change in pressure transmitter pressure.

RESPONSE TIME TABLE

ESFAS

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
PZR Press Low HPSI					≤ 31.2 sec*	
PZR Press Low LPSI					≤ 41.2 sec*	
PZR Press Low Cntmt. Isol.					≤ 11.2 sec* Note 2 and 3	
PZR Press Low Cntmt. Spray Pumps					≤ 25.6 sec*	
PZR Press Low CCW Pumps					≤ 31.2 sec*	
PZR Press Low CCW Valves					≤ ~~1~~ 21.2 sec Note 4a	
PZR press low CCW valves					≤ 23.2 sec Note 4b	
PZR Press Low Emer. Clg. Fans					≤ 21.2 sec*	
Cntmt. Press High HPSI					≤ 41.0 sec*	
Cntmt. Press High LPSI					≤ 41.0 sec*	
Cntmt. Press High Cntmt. Spray Pumps					≤ 25.4 sec*	
Cntmt. Press High CCW Pumps					≤ 31.0 sec*	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

* Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

3. All CIAS-Actuated valves except MSIVs and MFIVs.

4a. CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219 are closed

5. Response time includes instrumentation, logic, and isolation damper closure times only.

4b. Containment emergency cooler CCW isolation valves HV-6366, HV-6367, HV-6368, HV-6369 HV-6370, HV-6371, HV-6372 and HV-6373 are open

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TCN# 8

RESPONSE TIME TABLE

ESFAS

(Continued)

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
~~Cntmt Press High CCW Valves~~					~~≤ 11.0 sec Note 4~~	
Cntmt. Press High Emer. Clg. Fans					≤ 21.0 sec*	
Cntmt. Press High Cntmt. Isol.					≤ 10.9 sec* Note 2	
Cntmt. Press High-High Cntmt. Spray					≤ 21.0 sec*	
SG-1 Press Low MSIV					≤ 20.9 sec	
SG-1 Press Low MFW Isol.					≤ 10.9 sec	
SG-2 Press Low MSIV					≤ 20.9 sec	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

* Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

3. All CIAS-Actuated valves except MSIVs and MFIVs.

4a CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219 are closed.

5. Response time includes instrumentation, logic and isolation damper closure times only.

4b. Containment emergency cooler CCW isolation valves HV-6366, HV-6367, HV-6368, HV-6369 HV-6370, HV-6371, HV-6372 and HV-6373 are open.

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TCN# 8

RESPONSE TIME TABLE

ESFAS

(Continued)

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
SG-2 Press Low MFW Isol.					≤ 10.9 sec	
Low RWT LVL Cntmt. Sump VLVs Open					≤ 50.7 sec*	
Low RWT LVL ECCS Miniflow VLVs Shut					≤ 40.7 sec* (unit 2) ≤ 50.7 sec* (unit 3)	
SG-1 LVL Low Aux. FW AC Trains					≤ 40.9 sec*	
SG-1 LVL Low Aux. FW Stm./DC Train					≤ 30.9 sec	
SG-2 LVL Low Aux. FW AC Trains					≤ 40.9 sec*	
SG-2 LVL Low Aux. FW Stm./DC Train					≤ 30.9 sec	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

* Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

3. All CIAS-Actuated valves except MSIVs and MFIVs.

4a CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219 are closed.

5. Response time includes instrumentation, logic, and isolation damper closure times only.

1965b

4b. containment emergency cooler CCW isolation valves HV-6366, HV 6367, HV-6368, HV6369 HV-6370, HV-6371, HV-6372 and HV 6373 are open.

TEMPORARY CHANGE NOTICE

NOTE: TECHNICAL SPECIFICATION VIOLATION IF NOT PROCESSED WITHIN THE STATED TIME LIMITS

Procedure No. SO23-II-3.2 Revision No. 1 TCN No. 7

Procedure Title Plant Protection System Response Time Test for Channel B

Procedure Author Dan Asay PAX 685 (If known, Writer) ________ PAX ________

1. The following change shall be in effect: Attach a copy of the effected page(s), if applicable

SEE Attached pages

2. Reason: Typographical errors, rewording, deletions
3. Date originated 10-20-82
4. Issuance date 10-20-82 (For CDM Use Only)
5. Does this change affect FSAR or Tech. Spec. commitments YES ___ NO X
6. Does this change affect the nonradiological environment of any offsite area previously undisturbed during site preparation and plant construction? YES ___ NO X
7. Is the intent of the original document altered? YES ___ NO X
8. Is the document to be changed an Emergency and Abnormal Operating Instruction? YES ___ NO X

(If the answer to 5, 6, 7 or 8 is YES, a TCN is NOT Authorized)

9. Does this change affect licensing commitment requirements as stated in the Reference Section? YES ___ NO ✓
10. Originator [signature] 10-20-82/1200 Date/Time
11. Is the TCN to be incorporated into next permanent revision within 60 days of date originated? YES ✓ NO* ___

*One time change only against Procedure/Station Order No. ________ Rev. No. ________

12. Copy sent to the Nuclear Safety Group M. Couch (CDM Signature) 11-1-82 (Date)
13. Signatures Required:

SO1** (Series)	SO23 (Series)	SO123** (Series)
Approved by two OSRC members: ________ ________	Approved by:*** (at least one (1) SRO) [signature] [signature]	Approved by two OSRC members: ________ ________
Reviewed by entire Committee on:**	Final approval by: [signature]	Reviewed by entire Committee on:**
Date (MUST BE WITHIN 7 DAYS)	Bruce Katz Cognizant Functional Station Manager 10-27-82 Date (MUST BE WITHIN 14 DAYS)	Date (MUST BE WITHIN 7 DAYS) Approved by:*** (at least one (1) SRO) ________ Approved by: ________ Cognizant Functional Station Manager Date (MUST BE WITHIN 14 DAYS)

** SO1 and SO123 (series) TCNs will be routed to the OSRC with Routing Document SO(123)-109 which will be signed by the Station Manager.

*** Approval must be by two members of the plant management staff at least one of whom holds an SRO license on the unit affected. (For TCN approval, members of the plant management staff are defined as any Station Supervisor who holds an SRO license including the level of foreman, exercising responsibility in the specific area and unit addressed by the change.)

6.0 PROCEDURE

6.13.1.4 "Voltage Adjustment" fully counterclockwise.

.5 Current selector switch in LOW position.

.6 ~~Range selector to "20" VDC.~~ POSITION GAIN TO "100".

.7 Voltmeter internal/external switch in "~~INT~~ EXT" position, And connect a DVM to "EXT DVM" Jack.

.8 Position [illegible] 10 ohms below the RTD resistance (at operating temperature (Approximately 420 ohms at 545 °F).

_____ / _____
Date Technician

6.13.2 Ensure ERT-1 power switch, located in back, is in the OFF position, then connect 115 VAC power to the ERT-1 and the ELC-1.

_____ / _____
Date Technician

NOTE: Refer to Figure A-5 for the following steps:

6.13.3 Connect a cable from the ERT-1 "OUTPUT" BNC connector to the ELC-1B "ANALOG IN" BNC connector.

_____ / _____
Date Technician

6.13.4 Connect a cable from ELC-1B "TRIGGER BNC" connector to the ERT-1 "CONTROL IN" BNC connector.

_____ / _____
Date Technician

6.13.5 Place ERT-1 power ON/OFF toggle switch to the "ON" position and verify "POWER" LED energized.

_____ / _____
Date Technician

6.13.6 Press ELC-1B "ON/OFF" pushbutton and verify that the light energizes. The "START" light, "TEST/DUMP" light, and "READY" LED should also energize.

_____ / _____
Date Technician

6.0 PROCEDURE

6.15 Loop Current Step Response Testing of Cold Leg Temperature Sensor TE-9178-2

NOTE: For most consistent results, the temperature of the reactor coolant should be approximately 540°F.

6.15.1 In Spec 200 cabinet L-125, remove the RTD leads from terminals 17 and 18 of TB-1 and connect them to the sensor connector strip on the ERT-1.

Date / Technician

6.15.2 Adjust the "TRIM" pot on ERT-1 until the amplifier offset voltage is ZERO. (Trim switch UP).

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed.

Date / Technician

6.15.3 Place the "TRIM" switch in the DOWN position.

Date / Technician

* 6.15.5
~~6.15.4~~ Place current selector switch in the "HIGH" position.

Date / Technician

* 6.15.4
~~6.15.5~~ Balance the Wheatstone bridge by adjusting the coarse resistor network switches and the fine decade resistors until the bridge output reads ZERO.

* reverse the order of 6.15.4, 6.15.5

Date / Technician

NOTE: Bridge output is only indicated on the voltmeter when the voltmeter selector switch is in the "D" position. Allow at least three minutes for the reading to stabilize.

6.0 PROCEDURE

6.15.6 Move the voltmeter selector switch on ERT-1 to the "B" ~~or "C"~~ position and adjust the supply voltage to approximately ~~60~~ 12.0 Vdc. This provides ~~60~~ 12.0 madc through the RTD assuming the bridge is still balanced. Allow three minutes for stabilization time.

Date / Technician

~~6.15.7 Repeat steps 6.15.5 and 6.15.6 until no further adjustments are necessary. Allow at least three minutes for the readings to stabilize.~~

Date / Technician

6.15.~~8~~ 7 Move the current selector switch to the "LOW" position and rebalance the bridge. Allow three minutes for stabilization time.

Date / Technician

6.15.~~9~~ 8 Place the current selector switch to "HIGH". Allow reading to stabilize. Do NOT rebalance the bridge.

Date / Technician

6.15.~~10~~ 9 ~~Adjust the amplifier gain of ERT-1 to obtain as close as possible to 5.0 Vdc on the voltmeter with the voltmeter selector switch in position "D". With this 5.0 Vdc to the analog input BNC of the ELC-1B, the ELC-1B digital indicator should read approximately 4095 when ELC-1B is in "READY" mode with "Test/Dump" pushbutton pressed.~~ Position Gain selector switch at the lowest value to provide ≥9.90 VDC. Turn voltage adjust "ccw" to obtain 9.90 VDC

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed. Trim switch must be up to adjust the offset and down at all other times.

Date / Technician

PAGE 5 of 6
TCN 9

6.0 PROCEDURE

6.15.~~11~~ 10 Place current selector switch in "LOW" position and ensure bridge returns to a balanced condition. A slight adjustment of the decade resistors may be necessary.

Date / Technician

6.15.~~12~~ 11 Ensure the "AVERAGE/SINGLE SHOT" selector switch on the ELC-1B is in the "AVERAGE" position.

Date / Technician

6.15.~~13~~ 12 With the ELC-1B in the "READY" mode, press the "START" pushbutton. The ELC-1B should go the "SAMPLE" mode for 20 seconds during which time the analog output of the ERT-1 should rise. Then the ELC-1B should return to the "READY" mode.

Date / Technician

6.15.~~14~~ 13 Allow the bridge to return to a balanced condition, and rebalance if required.

Date / Technician

6.15.~~15~~ 14 Repeat steps 6.15.~~13~~ 12 and 6.15.~~14~~ 13 nine additional times. On the tenth sample the ELC-1B should go to the "SAMPLE" mode for 20 seconds, then "ANALYZE" mode until the calculations are complete. Then the ELC-1B will go the "DISPLAY" mode.

Date / Technician

6.15.~~16~~ 15 With the ELC-1B selector switch in position "D", the digital indicator should read the average total time constant for all ten samples.

NOTE: This value represents the amount of time, in seconds, that it takes for the RTD to reach 63.2% of the step change. Record this response time in the "DATA COLLECTION TABLE" at the back of this procedure.

Date / Technician

PAGE 6 of 6
TCN 7

6.0 PROCEDURE

6.15.~~17~~ 16 In Spec 200 cabinet L-125, replace the RTD leads on terminals 17 and 18 of TB-1.

_______ / _______
Date Technician

6.15.~~18~~ 17 Turn the "VOLTAGE ADJUSTMENT" on the ERT-1 fully counterclockwise.

_______ / _______
Date Technician

6.15.~~19~~ 18 Press the "RESET" pushbutton on the ELC-1B and verify that the analyzer returns to the "READY" mode.

_______ / _______
Date Technician

6.16 Loop Current Step Response Testing of Hot Leg Temperature Sensor TE-0122-2

NOTE: For most consistent results, the temperature of the reactor coolant should be approximately 540°F.

6.16.1 In Spec 200 cabinet L-125, remove the RTD leads from terminals 2 and 3 of TB-1 and connect them to the sensor connector strip on the ERT-1.

_______ / _______
Date Technician

6.16.2 Adjust the "TRIM" pot on ERT-1 until the amplifier offset voltage is zero. (Trim switch up).

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed.

_______ / _______
Date Technician

PLANT PROTECTION SYSTEM
RESPONSE TIME TEST FOR CHANNEL B
(Eighteen Month Interval)

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PLANT PROTECTION SYSTEM
RESPONSE TIME TEST FOR CHANNEL B
(Eighteen Month Interval)

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PLANT PROTECTION SYSTEM
RESPONSE TIME TEST FOR CHANNEL B
(Eighteen Month Interval)

1.0 OBJECTIVES

1.1 To verify that the PPS trip paths response times are in accordance with Technical Specifications 4.3.1.3 and 4.3.2.3 and tables 3.3-2 and 3.3-5

2.0 REFERENCES

2.1 San Onofre Units 2&3 Final Safety Analysis Report, Amendment 24, dated April 1981.

2.2 Applicable Logic, Functional, P&ID Elementary, and Interconnection diagrams.

2.3 Applicable Manufacturers technical manuals.

2.4 Calibration procedures are specified in this instruction.

3.0 PREREQUISITES

3.1 The Watch Engineer's approval is required prior to the beginning of the work.

3.2 Equipment clearance(s) or permission, as applicable, must be obtained from the Control Operator Before beginning work.

3.3 An approved equipment outage request (OD-16) if required, is on file in the Control Room.

3.4 Check the applicable radiation and contamination survey information BEFORE entering the job area. Use this survey information to assist in maintaining your exposure ALARA.

3.5 Measuring and test equipment to be used for this calibration shall have an accuracy at least four times the allowable accuracy of the device to be calibrated.

3.0 PREREQUISITE (Continued)

3.5.1 Measuring and Test Equipment

.1 Test gauges (.5% accuracy or better)

.1.1 Two 0-3000 psig

.1.2 Two 0-1000 psig

.1.3 Two 0-200 psig

.1.4 One 0-1500 psig

.1.5 One 0-950 inch H_2O

.2 Pressure Transmitter Validyne DP15TL or equivalent

.3 Recorder dual trace (frequency response 100 Hz)

.4 DVM Fluke 9600A or equivalent

3.5.2 Special Measuring and Test Equipment

.1 C-E procured test box, Electro Mechanics Model 39300

.2 EPRI designed pressure sensor test box Industrial Design and Engineering Association Model ID-100

.3 LCSR test equipment - Analysis and measurement services ERT-1 and ELC-1B

3.5.3 Noncalibrated Test Equipment

.1 Four 6 Vdc power supplies

.2 250 ohm test resistor

.3 PPS response time test panel L151

.4 Four PPS input simulator boxes

.5 Eight LED's (6.0 Volt, 20 ma)

.6 Assorted test leads, coaxial cables

3.6 Record the description, model and serial number, calibration due date for each measuring and test instrument used for this calibration at Step 7.3, Records section.

4.0 PRECAUTIONS

4.1 Observe proper electrical precautions when working on energized equipment.

4.2 Follow proper procedures when connecting and disconnecting the pressure test rig to ensure that no damage occurs to the pressure and level (differential pressure) transmitters.

4.3 Use only grade A demineralized water in the pressure test rig.

4.4 Nuclear instrument cable connectors must be kept clean during safety channel testing.

4.5 Advise operations of the status of all signal outputs from a transmitter prior to tagging the transmitter out of service and isolate the signal outputs as necessary to maintain the plant in a safe condition.

4.6 Do not open the ID-100 "sight gauge/fill" valve when the unit is pressurized.

4.7 The rated pressures and currents of the transmitters and components being tested should not be exceeded.

4.8 In the event any unanticipated conditions occur during calibration, the Technician shall immediately notify the Control Operator.

4.9 Receiving approval to begin work does not in any way obviate the responsibility of the Technician to determine for himself that it is prudent and safe to begin work.

4.10 If the calibration data do not meet the acceptance criteria, the device shall be identified as "nonconforming" and the responsible Instrument Foreman shall be notified immediately. Under no circumstances shall a nonconforming device be returned to service.

5.0 CHECK-OFF LIST

5.1 Assure the following calibrations and/or tests have been satisfactorily completed on the appropriate channel. Sign and date.

5.1.1 Excore safety channnel B calibration SO23-II-5.1

_______________ / _______________
Date Technician

5.0 CHECK-OFF LIST

5.1.2 Pressurizer pressure wide range channel 0102-2 calibration S023-II-9.503

_____ / _____
Date Technician

5.1.3 Pressurizer pressure wide range channel 0102-2 calibration S023-II-9.504

_____ / _____
Date Technician

5.1.4 S/G pressure (PPS and ESFAS) calibration S023-II-9.512

_____ / _____
Date Technician

5.1.5 S/G level (PPS and ESFAS) calibration S023-II-9.513

_____ / _____
Date Technician

5.1.6 RWT level (ESFAS) calibration S023-II-9.515

_____ / _____
Date Technician

5.1.7 Containment press (PPS and ESFAS) calibration S023-II-9.511

_____ / _____
Date Technician

5.1.8 S/G differential pressure calibration S023-II-9.581

_____ / _____
Date Technician

5.1.9 Reactor coolant system differential pressure calibration S023-II-9.540

_____ / _____
Date Technician

5.1.10 Reactor coolant system hot leg temperature to CPCS calibration S023-II-9.509

_____ / _____
Date Technician

5.0 CHECK-OFF LIST

5.1.11 Reactor coolant system cold leg temperature to CPCS calibration S023-II-9.508

_______ / _______
Date Technician

5.1.12 CPC calibration S023-II-6.2.2

_______ / _______
Date Technician

5.1.13 CEAC calibration S023-II-6.2.4

_______ / _______
Date Technician

6.0 PROCEDURE

6.1 Equipment Setup

6.1.1 Disconnect transmitter wiring at the Foxboro cabinets and connect PPS input simulator leads to the following T.B. locations and adjust for the listed input values as read on the PPS panel meters. The adjusted tolerance is +0.1 VDC. Connect jumpers to the contact input terminals with the normal input leads lifted.

CHANNEL A

Transmitter	PPS Parameter	Terminal Board Location	Initial Signal Value/Status	
PT-0101-1	High Pzr. Press.	L-121 TB 1-39/40	4.00 VDC	/ Date Tech
PT-0102-1	Low Pzr. Press. Pzr. Press. Bypass	L-121 TB 1-36/37	4.00 VDC	/ Date Tech
LT-1113-1	Low SG-1 Level High SG-1 Level	L-121 TB 1-24/25	3.50 VDC	/ Date Tech
LT-1123-1	Low SG-2 Level High SG-2 Level	L-121 TB 1-21/22	3.50 VDC	/ Date Tech
PT-1013-1	Low SG-1 Press. SG-1 P	L-121 TB 1-33/34	3.50 VDC	/ Date Tech
PDT-0978-1	SG-1 Low Flow	L-121 TB 3-13/14	5.00 VDC	/ Date Tech
PDT-0979-1	SG-2 Low Flow	L-121 TB 3-19/20	5.00 VDC	/ Date Tech

6.0 PROCEDURE

6.1.1 (Continued)

CHANNEL A (Continued)

Transmitter	PPS Parameter	Terminal Board Location	Initial Signal Value/Status	
Contact	DNBR Trip	TBA2-52/53	CLOSED	/ Date Tech
Contact	DNBR Pretrip	TBA2-64/65	CLOSED	/ Date Tech
Contact	LPD Trip	TBA2-65/67	CLOSED	/ Date Tech
Contact	LPD Pretrip	TBA2-68/69	CLOSED	/ Date Tech
Contact	CWP	TBA2-70/71	CLOSED	/ Date Tech
Contract	Turbine Trip	TBA2-123/124	CLOSED	/ Date Tech
Contact	55% Power	TBA7-24/25	CLOSED	/ Date Tech
Contact	10^{-4}% CPC Bypass	TBA7-42/43	CLOSED	/ Date Tech
PT-1023-1	Low SG-2 Press. SG-2 P	L-121 TB 1-30/31	3.70 VDC	/ Date Tech
PT-0351-1	High Cont. Press. RPS High Cont. Press. ESF	L-121 TB 1-43/44	1.00 VDC	/ Date Tech
PT-0352-1	Hi-Hi Cont. Press.	L-121 TB 1-46/47	1.00 VDC	/ Date Tech
LT-0305-1	Low RWT Level	L-121 TB 1-27/28	2.50 VDC	/ Date Tech

CHANNEL B

...itter	PPS Parameter	Terminal Board Location	Initial Signal Value/Status	
...1-2	High Pzr. Press.	L-125 TB 1-39/40	4.00 VDC	/ Date Tech

6.0 PROCEDURE

6.1.1 (Continued)

CHANNEL B (Continued)

Transmitter	PPS Parameter	Terminal Board Location	Initial Signal Value/Status	
PT-0102-2	Low Pzr. Press. Pzr. Press. Bypass	L-125 TB 1-33/34	4.00 VDC	/ Date Tech
LT-1113-2	Low SG-1 Level High SG-1 Level	L-125 TB 1-24/25	3.50 VDC	/ Date Tech
LT-1123-2	Low SG-2 Level High SG-2 Level	L-125 TB 1-21/22	3.50 VDC	/ Date Tech
PT-1013-2	Low SG-1 Press. SG-1 P	L-125 TB 1-30/31	3.70 VDC	/ Date Tech
PT-1023-2	Low SG-2 Press. SG-2 P	L-125 TB 1-27/28	3.70 VDC	/ Date Tech
PT-0351-2	High Cont. Press. RPS High Cont. Press. ESF	L-125 TB 1-43/44	1.00 VDC	/ Date Tech
PT-0352-2	Hi-Hi Cont. Press.	L-125 TB 1-46/47	1.00 VDC	/ Date Tech
LT-0305-2	Low RWT Level	L-125 TB 1-36/37	2.50 VDC	/ Date Tech
PDT-0978-2	SG-1 Low Flow	L-125 TB 3-13/14	5.00 VDC	/ Date Tech
PDT-0979-2	SG-2 Low Flow	L-125 TB 3-19/20	5.00 VDC	/ Date Tech
Contact	DNBR Trip	TBB2-62/63	CLOSED	/ Date Tech
Contact	DNBR Pretrip	TBB2-64/65	CLOSED	/ Date Tech
Contact	LPD Trip	TBB2-66/67	CLOSED	/ Date Tech
Contact	LPD Pretrip	TBB2-68/69	CLOSED	/ Date Tech

6.0 PROCEDURE

6.1.1 (Continued)

CHANNEL B (Continued)

Transmitter	PPS Parameter	Terminal Board Location	Initial Signal Value/Status	
Contact	CWP	TBB2-70/71	CLOSED	/ Date Tech
Contact	Turbine Trip	TBB2-123/124	CLOSED	/ Date Tech
Contact	55% Power	TBB7-24/25	CLOSED	/ Date Tech
Contact	10^{-4}% CPC Bypass	TBB7-42/43	CLOSED	/ Date Tech

CHANNEL C

Transmitter	PPS Parameter	Terminal Board Location	Initial Signal Value/Status	
PT-0101-3	High Pzr. Press.	L-129 TB 1-42/43	4.00 VDC	/ Date Tech
PT-0102-3	Low Pzr. Press. Pzr. Press. Bypass	L-129 TB 1-39/40	4.00 VDC	/ Date Tech
LT-1113-3	Low SG-1 Level High SG-1 Level	L-129 TB 1-24/25	3.50 VDC	/ Date Tech
LT-1123-3	Low SG-2 Level High SG-2 Level	L-129 TB 1-21/22	3.50 VDC	/ Date Tech
PT-1013-3	Low SG-1 Press. SG-1 P	L-129 TB 1-36/37	3.70 VDC	/ Date Tech
PT-1023-3	Low SG-2 Press. SG-2 P	L-129 TB 1-33/34	3.70	/ Date Tech

6.0 PROCEDURE

6.1.1 (Continued)

CHANNEL C (Continued)

Transmitter	PPS Parameter	Terminal Board Location	Initial Signal Value/Status	
PT-0351-3	High Cont. Press. RPS High Cont. Press. ESF	L-129 TB 1-46/47	1.00 VDC	/ Date Tech
PT-0352-3	Hi-Hi Cont. Press.	L-129 TB 1-49/50	1.00 VDC	/ Date Tech
LT-0305-3	Low RWT Level	L-129 TB 1-30/31	2.50 VDC	/ Date Tech
PDT-0978-3	SG-1 Low Flow	L-129 TB 3-13/14	5.00 VDC	/ Date Tech
PDT-0979-3	SG-2 Low Flow	L-129 TB 3-19/20	5.00 VDC	/ Date Tech
Contact	DNBR Trip	TBC2-62/63	CLOSED	/ Date Tech
Contact	DNBR Pre-trip	TBC2-64/65	CLOSED	/ Date Tech
Contact	LPD Trip	TBC2-66/67	CLOSED	/ Date Tech
Contact	LPD Pre-trip	TBC2-68/69	CLOSED	/ Date Tech
Contact	CWP	TBC2-70/71	CLOSED	/ Date Tech
Contact	Turbine Trip	TBC2-123/124	CLOSED	/ Date Tech
Contact	55% Power	TBC7-24/25	CLOSED	/ Date Tech
Contact	10^{-4}% CPC Bypass	TBC7-42/43	CLOSED	/ Date Tech

6.0 PROCEDURE

6.1.1 (Continued)

CHANNEL D

Transmitter	PPS Parameter	Terminal Board Location	Initial Signal Value/Status	
PT-0101-4	High Pzr. Press.	L-133 TB 1- 7/8	4.00 VDC	/ Date Tech
PT-0102-4	Low Pzr. Press. Pzr. Press. Bypass	L-133 TB 1- 1/2	4.00 VDC	/ Date Tech
LT-1113-4	Low SG-1 Level High SG-1 Level	L-133 TB 1-33/34	3.50 VDC	/ Date Tech
LT-1123-4	Low SG-2 Level High SG-2 Level	L-133 TB 1-30/31	3.50 VDC	/ Date Tech
PT-1013-4	Low SG-1 Press. SG-1 P	L-133 TB 1-39/40	3.70 VDC	/ Date Tech
PT-1023-4	Low SG-2 Press. SG-2 P	L-133 TB 1-36/37	3.70	/ Date Tech
PT-0351-4	High Cont. Press. RPS High Cont. Press. ESF	L-133 TB 1-43/44	1.00 VDC	/ Date Tech
PT-0352-4	Hi-Hi Cont. Press.	L-133 TB 1-46/47	1.00 VDC	/ Date Tech
LT-0305-4	Low RWT Level	L-133 TB 1- 4/5	2.50 VDC	/ Date Tech
PDT-0978-4	SG-1 Low Flow	L-133 TB 3-13/14	5.00 VDC	/ Date Tech
PDT-0979-4	SG-2 Low Flow	L-133 TB 3-19/20	5.00 VDC	/ Date Tech
Contact	DNBR Trip	TBD2-62/63	CLOSED	/ Date Tech
Contact	DNBR Pre-trip	TBD2-64/65	CLOSED	/ Date Tech

6.0 PROCEDURE

6.1.1 (Continued)

CHANNEL D (Continued)

Transmitter	PPS Parameter	Terminal Board Location	Initial Signal Value/Status	
Contact	LPD Trip	TBD2-66/67	CLOSED	_____/_____ Date Tech
Contact	LPD Pre-trip	TBD2-68/69	CLOSED	_____/_____ Date Tech
Contact	CWP	TBD2-70/71	CLOSED	_____/_____ Date Tech
Contact	Turbine Trip	TBD2-123/124	CLOSED	_____/_____ Date Tech
Contact	55% Power	TBD7-24/25	CLOSED	_____/_____ Date Tech
Contact	10^{-4}% CPC Bypass	TBD7-42/43	CLOSED	_____/_____ Date Tech

6.1.2 Verify all pre-trip (P) and trip (T) lights are deenergized on all four bistable control panels.

_____/_____
Date Technician

NOTE: If any unexpected trips occur during this test and cannot be reset, the cause should be investigated prior to continuing.

6.1.3 Verify core protection calculators (CPC's) are energized and operational to the extent required to perform this test.

_____/_____
Date Technician

6.0 PROCEDURE

6.1.4 Install jumpers in 2L034 and 2L035 on TB-55, TB-65, TB-75, and TB-85 between the following terminals: 25 and 27, 28 and 30, 31 and 33, 34 and 36, 37 and 39, 40 and 42, 43 and 45, 46 and 48. (64 jumpers total) and isolate the field wiring. This is to prevent inadvertent ESF actuations during the performance of response time testing.

Date / Technician

CAUTION
=======
Do not work on more than one bay in 2L034 and one bay in 2L035 at one time.

6.1.5 Perform the following steps on the ID-100 hydraulic signal generator to prepare it for response time testing: Refer to Figure A-1, A-2, and A-4.

.1 Connect a regulated supply of pressurized gas to the GAS inlet connection on the rear panel of the TIME RESPONSE TEST SET. The pressure and capacity of the source should be adequate to provide the pressures required by the pressure sensor to be tested. Do not pressurize unit.

Date / Technician

.2 Connect a pressure gauge of the appropriate range to the GAUGE connection on the rear panel.

Date / Technician

.3 Ensure the transmitter to be tested is tagged out of service observing the precautions of Section 4.

Date / Technician

6.0 PROCEDURE

6.1.5.4 Open the process transmitter bypass valve (if applicable) and connect the hydraulic signal generator to the process transmitter using 1/4" OD stainless tubing.

_______ / _______
Date Technician

NOTE: The length of the signal tubing is not critical, but it should be as short and straight as practical. The tubing is connected to the "SIGNAL OUTPUT" fitting on the rear panel of the unit.

.5 Filling

Observe the following sequence to fill the hydraulic accumulator and output signal lines. Line up the valves as shown below. Add water through the sight gauge until a level of 9 is indicated.

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize INITIAL

Signal Isolation OPEN

Pressure Bleed OPEN

Vent/Drain CLOSED

Sight Gauge/Fill OPEN

Drain CLOSED

NOTE: Overfilling will not damage the unit but may cause water to enter the pneumatic lines momentarily affecting the signal waveshape.

_______ / _______
Date Technician

6.0 PROCEDURE

6.1.5.6 Once the water has stabilized at the 9 level, close the SIGHT GAUGE/FILL valve.

______/______
Date Technician

.7 Bleeding

Observe the following sequence to bleed the signal output lines, the reference transducer, and process sensor. Line up the valves as follows:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize INITIAL

Signal Isolation OPEN

Pressure Bleed CLOSED

Vent/Drain CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

______/______
Date Technician

.8 Partially open the GAS ISOLATION valve and pressurize the unit to 5-10 psig. Carefully bleed air from the following points:

- o Drain valve
- o Process sensor vent
- o Reference Transducer bleed port (use allen wrench supplied with the unit)
- o Close the process transmitter bypass valve (if applicable)

______/______
Date Technician

6.0 PROCEDURE

6.1.5.9 After all air has been bled from the system, open the PRESSURE BLEED valve and bleed off any remaining pressure. The hydraulic accumulator can now be filled or drained to the level required for the current test sequence.

To fill-open the PRESSURE BLEED and SIGHT GAUGE/FILL valves, add water through the sight gauge until desired level is reached.

To drain-open the PRESSURE BLEED and SIGHT GAUGE/FILL valves, slowly open the DRAIN valve to adjust the level in the hydraulic accumulator.

______________/______________
Date Technician

NOTE: The following valves must always be closed prior to pressurizing the unit.
- Pressure Bleed
- Vent/Drain
- Sight Gauge/Fill
- Drain

.10 Pressure Stability Check

The test for pressure stability is basically a check for leaks in the system.

Connect a 0.5% accuracy, 3000 psig range, pressure gauge to the TEST SET and install a 3000 psid diaphragm in the Reference Transducer. Align the valves as shown below:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	DRIVE
Signal Isolation	CLOSED
Pressure Bleed	CLOSED

6.0 PROCEDURE

6.1.5.10 Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

_______ / _______
Date Technician

.11 Connect the unit to a 3000 psig source of gas. A lower pressure source may be used, but it should not be less than 2000 psig. Open the GAS ISOLATION valve and pressurize the unit to 3000 psig. Allow several minutes and repeat until the pressure is stable at 3000 psig. Monitor the pressure for 5 minutes. A drop in pressure indicates leakage. The unit should be depressurized and all valve packings tightened. Repeat the pressurization procedure and verify pressure stability. If the pressure is still not stable, depressurize the unit, remove the back, and check for water leaks. Gas leaks may be detected by applying leak detecting fluids to the joints.

_______ / _______
Date Technician

.12 Reference Stability Check

Connect test equipment as follows referring to Figure A-4 of Appendix A. Connect one pair of leads to the REF. SENSOR OUT terminals on the side of the TIME RESPONSE TEST SET and to one channel of the recorder. Connect another pair of leads to the PROCESS SENSOR OUT terminals and to the second recorder channel. Connect a DVM to the DIGITAL VOLTMETER terminals. Connect 115 VAC power to the test equipment.

_______ / _______
Date Technician

6.0 PROCEDURE

6.1.5.13 Open the pressure transmitter current loop and connect the transmitter current signal to the TIME RESPONSE TEST SET. It is important that the polarity of the signal is correct. This can be verified by setting the SIGNAL CONDITIONING switch to the correct loop current and placing the DVM MONITOR switch in the PROCESS SENSOR position. With no pressure applied to the transmitter, the DVM should read approximately +1 VDC.

_______ / _______
Date Technician

.14 Install a 5 psid diaphragm and 0.5% accuracy pressure gauge and pressurize the unit to 5 psig. Close the GAS ISOLATION valve. Place the DVM MONITOR in the REFERENCE XMTR position and adjust the SPAN control for 10 VDC. After allowing several minutes for warmup, monitor the reference transducer output for 5 minutes, periodically verifying that the pressure has remained constant. Random drift in excess of $\pm$5 millivolts indicates a need to replace the reference demodulator.

_______ / _______
Date Technician

NOTE: The following major procedure subsections may be performed in any order at the discretion of the technician.

6.2 Response Time Testing of High Pressurizer Pressure Sensor PT-0101-2

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.0 PROCEDURE

6.2.1 Line up valves as shown below on the ID-100.

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	INITIAL
Signal Isolation	OPEN
Pressure Bleed	CLOSED
Vent/Drain	CLOSED
Sight Gauge/Fill	CLOSED
Drain	CLOSED

/
Date Technician

6.2.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

/
Date Technician

6.2.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.2.2 and with the same polarity (e.g., if the voltage in 6.2.2 was -15MV, adjust the ZERO control for a reading of -15MV).

/
Date Technician

CAUTION
======= Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

6.0 PROCEDURE

6.2.3 (Continued)

NOTE: Use the definitions and equations below to help perform the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05$ span

$P_{DRIVE} = P_{INITIAL} + .5$ span

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor.

DOWN-RAMP

$P_{INITIAL} = P_{SETPT} + .05$ span

$P_{DRIVE} = P_{INITIAL} - .5$ span

6.2.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table 1 of Appendix C lists the specific values for each transmitter.

_______________ / _______________
Date Technician

6.0 PROCEDURE

6.2.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

_____/_____
Date   Technician

6.2.6 Pressurize the unit to $P_{INITIAL}$.

_____/_____
Date   Technician

6.2.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

_____/_____
Date   Technician

6.2.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

_____/_____
Date   Technician

6.2.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_____/_____
Date   Technician

6.0 PROCEDURE

6.2.9 (Continued)

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-6 shows how signal rate is determined from sample trace.

6.2.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	DRIVE
Signal Isolation	CLOSED
Pressure Bleed	CLOSED

6.0 PROCEDURE

6.2.10.1 Vent/Drain CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

_______/_______
Date Technician

6.2.11 Up Ramp Generation

.1 Determine the initial, driving, and set point pressure from Table 1 of Appendix C.

_______/_______
Date Technician

.2 Slowly open the "signal isolation" valve.

_______/_______
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

_______/_______
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

_______/_______
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

_______/_______
Date Technician

6.0 PROCEDURE

6.2.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_______ / _______
Date Technician

.7 The unit is ready to generate the appropriate up-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

_______ / _______
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{Initial}$, P_{Drive}, P_{Setpt}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_______ / _______
Date Technician

6.0 PROCEDURE

6.2.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

_____ / _____
Date Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from P to P_{SETPT}.

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

_____ / _____
Date Technician

6.2.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.2.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-5 shows calculation method for time delay (response time). Also record on the chart "High Pressurizer Pressure Sensor," "PT-0101-1"

_____ / _____
Date Technician

6.2.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

_____ / _____
Date Technician

6.0 PROCEDURE

6.2.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_______ / _______
Date Technician

6.2.15 Following appropriate procedures, return process transmitter to service.

_______ / _______
Date Technician

6.3 Response Time Testing of Low Pressurizer Pressure Sensor PT-0102-2

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.3.1 Line up valves as shown below on ID-100:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	INITIAL
Signal Isolation	OPEN
Pressure Bleed	CLOSED
Vent/Drain	CLOSED
Sight Gauge/Fill	CLOSED

Drain CLOSED

6.3.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

_______ / _______
Date Technician

6.0 PROCEDURE

6.3.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.3.2 and with the same polarity (e.g., if the voltage on 6.3.2 was -15MV, adjust the ZERO control for a reading of -15MV).

_______ / _______
Date Technician

CAUTION Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform the following steps.

Definitions:

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span- The absolute range of the pressure sensor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05\ \text{span}$

$P_{DRIVE} = P_{INITIAL} + .5\ \text{span}$

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor.

6.0 PROCEDURE

6.3.3 (Continued)

DOWN-RAMP

$P_{INITIAL} = P_{SETPT} + .05$ span

$P_{DRIVE} = P_{INITIAL} - .5$ span

6.3.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table I of Appendix C lists the specific values for each transmitter.

_______ / _______
Date Technician

6.3.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

_______ / _______
Date Technician

6.3.6 Pressurize the unit to $P_{INITIAL}$.

_______ / _______
Date Technician

6.3.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

_______ / _______
Date Technician

6.3.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

_______ / _______
Date Technician

6.0 PROCEDURE

6.3.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_______________ / _______________
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-5 shows how signal rate is determined from sample trace.

6.3.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	DRIVE
Signal Isolation	CLOSED
Pressure Bleed	CLOSED

6.0 PROCEDURE

6.3.10.1 Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

_____/_____
Date Technician

6.3.11 Down-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

_____/_____
Date Technician

.2 Slowly open the "signal isolation" valve.

_____/_____
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

_____/_____
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

_____/_____
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

_____/_____
Date Technician

6.0 PROCEDURE

6.3.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_______ / _______
Date Technician

.7 The unit is ready to generate the appropriate downramp. Check the recorder to make sure the proper chart drive speed has been selected.

_______ / _______
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be s lowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{Initial}$, P_{Drive}, P_{Setpt}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_______ / _______
Date Technician

6.0 PROCEDURE

6.3.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

_______ / _______
Date Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from P to P_{SETPT}.

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

_______ / _______
Date Technician

6.3.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.3.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-6 shows calculation method for time delay (response time). Also record on the chart "Low Pressurizer Pressure Sensor," "PT-0102-2"

_______ / _______
Date Technician

6.3.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

_______ / _______
Date Technician

6.0 PROCEDURE

6.3.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_____ / _____
Date Technician

6.3.15 Following appropriate procedures, return process transmitter to service.

_____ / _____
Date Technician

6.4 Response Time Testing of Low SG-1 Pressure Sensor PT-1013-2

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.4.1 Line up valves as shown below on ID-100:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	INITIAL
Signal Isolation	OPEN
Pressure Bleed	CLOSED
Vent/Drain	CLOSED
Sight Gauge/Fill	CLOSED
Drain	CLOSED

6.4.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

_____ / _____
Date Technician

6.0 PROCEDURE

6.4.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.4.2 and with the same polarity (e.g., if the voltage in 6.4.2 was -15MV, adjust the ZERO control for a reading of -15MV).

______ / ______
Date Technician

CAUTION
======= Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05 \text{ span}$

$P_{DRIVE} = P_{INITIAL} + .5 \text{ span}$

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor

6.0 PROCEDURE

6.4.3 DOWN-RAMP

$P_{INITIAL} = P_{SETPT} + .05$ span

$P_{DRIVE} = P_{INITIAL} - .5$ span

6.4.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table I of Appendix C lists the specific values for each transmitter.

______ / ______
Date Technician

6.4.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

______ / ______
Date Technician

6.4.6 Pressurize the unit to $P_{INITIAL}$.

______ / ______
Date Technician

6.4.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

______ / ______
Date Technician

6.4.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

______ / ______
Date Technician

6.0 PROCEDURE

6.4.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_______ / _______
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-6 shows how signal rate is determined from sample trace.

6.4.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize DRIVE

Signal Isolation CLOSED

6.0 PROCEDURE

6.4.10.1.1 Pressure Bleed CLOSED

Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

_____ / _____
Date Technician

6.4.11 Down-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

_____ / _____
Date Technician

.2 Slowly open the "signal isolation" valve.

_____ / _____
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

_____ / _____
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

_____ / _____
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

_____ / _____
Date Technician

6.0 PROCEDURE

6.4.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

______ / ______
Date   Technician

.7 The unit is ready to generate the appropriate down-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

______ / ______
Date   Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{Initial}$, P_{Drive}, P_{Setpt}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

______ / ______
Date   Technician

6.0 PROCEDURE

6.4.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

/
Date Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from P to P_{SETPT}.

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

/
Date Technician

6.4.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.4.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-6 shows calculation method for time delay (response time). Also record on the chart "Lo SG-1 Pressure Sensor," "PT-1013-2"

/
Date Technician

6.4.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

/
Date Technician

6.0 PROCEDURE

6.4.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_____/_____
Date Technician

6.4.15 Following appropriate procedures, return process transmitter to service.

_____/_____
Date Technician

6.5 Response Time Testing of Low SG-2 Pressure Sensor PT-1023-2

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.5.1 Line up valves as shown below on ID-100:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	INITIAL
Signal Isolation	OPEN
Pressure Bleed	CLOSED
Vent/Drain	CLOSED
Sight Gauge/Fill	CLOSED
Drain	CLOSED

6.5.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

_____/_____
Date Technician

6.0 PROCEDURE

6.5.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.5.2 and with the same polarity (e.g., if the voltage in 6.5.2 was -15MV, adjust the ZERO control for a reading of -15MV).

_______________ / _______________
Date Technician

CAUTION
======= Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform
the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05$ span

$P_{DRIVE} = P_{INITIAL} + .5$ span

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor.

6.0 PROCEDURE

6.5.3 DOWN-RAMP

$P_{INITIAL} = P_{SETPT} + .05$ span

$P_{DRIVE} = P_{INITIAL} - .5$ span

6.5.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table 1 of Appendix C lists the specific values for each transmitter.

_____________/_____________
Date Technician

6.5.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

_____________/_____________
Date Technician

6.5.6 Pressurize the unit to $P_{INITIAL}$.

_____________/_____________
Date Technician

6.5.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

_____________/_____________
Date Technician

6.5.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

_____________/_____________
Date Technician

6.0 PROCEDURE

6.5.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_______ / _______
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-5 shows how signal rate is determined from sample trace.

6.5.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize DRIVE

Signal Isolation CLOSED

6.0 PROCEDURE

6.5.10.1

Pressure Bleed	CLOSED
Drain/Vent	CLOSED
Sight Gauge/Fill	CLOSED
Drain	CLOSED

_______ / _______
Date Technician

6.5.11 Down-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

_______ / _______
Date Technician

.2 Slowly open the "signal isolation" valve.

_______ / _______
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

_______ / _______
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

_______ / _______
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

_______ / _______
Date Technician

6.0 PROCEDURE

6.5.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_____/_____
Date Technician

.7 The unit is ready to generate the appropriate down-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

_____/_____
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{Initial}$, P_{Drive}, P_{Setpt}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_____/_____
Date Technician

6.0 PROCEDURE

6.5.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

Date / Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from P to P_{SETPT}.

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

Date / Technician

6.5.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.5.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-6 shows calculation method for time delay (response time). Also record on the chart "Low SG-2 Pressure Sensor," "PT-1023-2"

Date / Technician

6.5.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

Date / Technician

6.0 PROCEDURE

6.5.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_______ / _______
Date Technician

6.5.15 Following appropriate procedures, return process transmitter to service.

_______ / _______
Date Technician

6.6 Response Time Testing of Low SG-1 Level Sensor LT-1113-2

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.6.1 Line up valves as shown below on ID-100:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	INITIAL
Signal Isolation	OPEN
Pressure Bleed	CLOSED
Vent/Drain	CLOSED
Sight Gauge/Fill	CLOSED
Drain	CLOSED

6.6.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

_______ / _______
Date Technician

6.0 PROCEDURE

6.6.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.6.2 and with the same polarity (e.g., if the voltage in 6.6.2 was -15MV, adjust the ZERO control for a reading of -15MV).

_____ / _____
Date Technician

CAUTION Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05 \text{ span}$

$P_{DRIVE} = P_{INITIAL} + .5 \text{ span}$

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor.

6.0 PROCEDURE

6.6.3 DOWN-RAMP

$P_{INITIAL} = P_{SETPT} + .05$ span

$P_{DRIVE} = P_{INITIAL} - .5$ span

6.6.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table 1 of Appendix C lists the specific values for each transmitter.

_______ / _______
Date Technician

6.6.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

_______ / _______
Date Technician

6.6.6 Pressurize the unit to $P_{INITIAL}$.

_______ / _______
Date Technician

6.6.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

_______ / _______
Date Technician

6.6.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

_______ / _______
Date Technician

6.0 PROCEDURE

6.6.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_______________/_______________
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-5 shows how signal rate is determined from sample trace.

6.6.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	DRIVE
Signal Isolation	CLOSED

6.0 PROCEDURE

6.6.10.1 Pressure Bleed CLOSED

Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

Date / Technician

6.6.11 Down-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

Date / Technician

.2 Slowly open the "signal isolation" valve.

Date / Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

Date / Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

Date / Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

Date / Technician

6.0 PROCEDURE

6.6.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_______________/_______________
Date Technician

.7 The unit is ready to generate the appropriate down-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

_______________/_______________
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{INITIAL}$, P_{DRIVE}, P_{SETPT}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_______________/_______________
Date Technician

6.0 PROCEDURE

6.6.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

_______/_______
Date Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from $P_{INITIAL}$ to P_{SETPT}.

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

_______/_______
Date Technician

6.6.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.6.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-6 shows calculation method for time delay (response time). Also record on the chart "Low SG-1 Level Sensor," "LT-1113-2"

_______/_______
Date Technician

6.6.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

_______/_______
Date Technician

6.0 PROCEDURE

6.6.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_______________/_______________
Date Technician

6.6.15 Following appropriate procedures, return process transmitter to service.

_______________/_______________
Date Technician

6.7 Response Time Testing of Low SG-2 Level Sensor LT-1123-2

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.7.1 Line up valves as shown below on ID-100:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize INITIAL

Signal Isolation OPEN

Pressure Bleed CLOSED

Vent/Drain CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

6.7.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

_______________/_______________
Date Technician

6.0 PROCEDURE

6.7.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.7.2 and with the same polarity (e.g., if the voltage in 6.7.2 was -15MV, adjust the ZERO control for a reading of -15MV).

______ / ______
Date Technician

CAUTION Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05$ span

$P_{DRIVE} = P_{INITIAL} + .5$ span

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor.

6.0 PROCEDURE

6.7.3 DOWN-RAMP

$P_{INITIAL} = P_{SETPT} + .05$ span

$P_{DRIVE} = P_{INITIAL} - .5$ span

6.7.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table 1 of Appendix C lists the specific values for each transmitter.

Date / Technician

6.7.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

Date / Technician

6.7.6 Pressurize the unit to $P_{INITIAL}$.

Date / Technician

6.7.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

Date / Technician

6.7.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

Date / Technician

6.0 PROCEDURE

6.7.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_______ / _______
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-6 shows how signal rate is determined from sample trace.

6.7.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	DRIVE
Signal Isolation	CLOSED

6.0 PROCEDURE

6.7.10.1 Pressure Bleed CLOSED

Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

_______ / _______
Date Technician

6.7.11 Down-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

_______ / _______
Date Technician

.2 Slowly open the "signal isolation" valve.

_______ / _______
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

_______ / _______
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

_______ / _______
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

_______ / _______
Date Technician

6.0 PROCEDURE

6.7.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_______________/_______________
Date Technician

.7 The unit is ready to generate the appropriate down-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

_______________/_______________
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{INITIAL}$, P_{DRIVE}, P_{SETPT}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_______________/_______________
Date Technician

6.0 PROCEDURE

6.7.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

Date / Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from $P_{INITIAL}$ to P_{SETPT}.

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

Date / Technician

6.7.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.7.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-6 shows calculation method for time delay (response time). Also record on the chart "Lo SG-2 Level Sensor," "PT-1123-2"

Date / Technician

6.7.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

Date / Technician

6.0 PROCEDURE

6.7.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_______/_______
Date Technician

6.7.15 Following appropriate procedures, return process transmitter to service.

_______/_______
Date Technician

6.8 Response Time Testing of Hi Containment Pressure Sensor PT-0351-2

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.8.1 Line up valves as shown below on ID-100:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize INITIAL

Signal Isolation OPEN

Pressure Bleed CLOSED

Vent/Drain CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

6.8.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

_______/_______
Date Technician

6.0 PROCEDURE

6.8.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.8.2 and with the same polarity (e.g., if the voltage in 6.8.2 was -15MV, adjust the ZERO control for a reading of -15MV).

__________/__________
Date Technician

CAUTION: Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05 \text{ span}$

$P_{DRIVE} = P_{INITIAL} + .5 \text{ span}$

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor.

6.0 PROCEDURE

6.8.3 DOWN-RAMP

$$P_{INITIAL} = P_{SETPT} + .05 \text{ span}$$

$$P_{DRIVE} = P_{INITIAL} - .5 \text{ span}$$

6.8.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table 1 of Appendix C lists the specific values for each transmitter.

Date / Technician

6.8.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

Date / Technician

6.8.6 Pressurize the unit to $P_{INITIAL}$.

Date / Technician

6.8.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

Date / Technician

6.8.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

Date / Technician

6.0 PROCEDURE

6.8.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_______________ / _______________
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-6 shows how signal rate is determined from sample trace.

6.8.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize DRIVE

Signal Isolation CLOSED

6.0 PROCEDURE

6.8.10.1 Pressure Bleed CLOSED

Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

________/________
Date Technician

6.8.11 Up-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

________/________
Date Technician

.2 Slowly open the "signal isolation" valve.

________/________
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

________/________
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

________/________
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

________/________
Date Technician

6.0 PROCEDURE

6.8.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_______ / _______
Date Technician

.7 The unit is ready to generate the appropriate up-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

_______ / _______
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

•

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{INITIAL}$, P_{DRIVE}, P_{SETPT}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_______ / _______
Date Technician

6.0 PROCEDURE

6.8.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

_____ / _____
Date Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from $P_{INITIAL}$ to P_{SETPT}

(b) Complete absence of high frequency components (noise)

(c) Sharp and clearly defined "knee" on leading edge of test signal

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

_____ / _____
Date Technician

6.8.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.8.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-6 shows calculation method for time delay (response time). Also record on the chart "Hi Containment Pressure Sensor," "PT-0351-1"

_____ / _____
Date Technician

6.8.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

_____ / _____
Date Technician

6.0 PROCEDURE

6.8.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_______ / _______
Date Technician

6.8.15 Following appropriate procedures, return process transmitter to service.

_______ / _______
Date Technician

6.9 Response Time Testing of Hi-Hi Containment Pressure Sensor PT-0352-1

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.9.1 Line up valves as shown below on ID-100:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize INITIAL

Signal Isolation OPEN

Pressure Bleed CLOSED

Vent/Drain CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

6.9.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

_______ / _______
Date Technician

6.0 PROCEDURE

6.9.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.9.2 and with the same polarity (e.g., if the voltage in 6.9.2 was -15MV, adjust the ZERO control for a reading of -15MV).

______ / ______
Date Technician

CAUTION: Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05$ span

$P_{DRIVE} = P_{INITIAL} + .5$ span

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor.

6.0 PROCEDURE

6.9.3 DOWN-RAMP

$P_{INITIAL} = P_{SETPT} + .05$ span

$P_{DRIVE} = P_{INITIAL} - .5$ span

6.9.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table 1 of Appendix C lists the specific values for each transmitter.

Date / Technician

6.9.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

Date / Technician

6.9.6 Pressurize the unit to $P_{INITIAL}$.

Date / Technician

6.9.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

Date / Technician

6.9.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

Date / Technician

6.0 PROCEDURE

6.9.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_______ / _______
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-5 shows how signal rate is determined from sample trace.

6.9.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation	CLOSED
Gauge Isolation	OPEN
Pressurize	DRIVE
Signal [illegible]ion	CLOSED

6.0 PROCEDURE

6.9.10.1 Pressure Bleed CLOSED

Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

_____ / _____
Date Technician

6.9.11 Up-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

_____ / _____
Date Technician

.2 Slowly open the "signal isolation" valve.

_____ / _____
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

_____ / _____
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

_____ / _____
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

_____ / _____
Date Technician

6.0 PROCEDURE

6.9.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_____ / _____
Date Technician

.7 The unit is ready to generate the appropriate up-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

_____ / _____
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{INITIAL}$, P_{DRIVE}, P_{SETPT}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_____ / _____
Date Technician

6.0 PROCEDURE

6.9.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

__________/__________
Date Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from $P_{INITIAL}$ to P_{SETPT}.

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

__________/__________
Date Technician

6.9.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.9.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-6 shows calculation method for time delay (response time). Also record on the chart "HI-HI Containment Sensor," "PT-0352-2"

__________/__________
Date Technician

6.9.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

__________/__________
Date Technician

6.0 PROCEDURE

6.9.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_______/_______
Date Technician

6.9.15 Following appropriate procedures, return process transmitter to service.

_______/_______
Date Technician

6.10 Response Time Testing of Low Refueling Water Tank Level Sensor LT-0305-2

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.10.1 Line up valves as shown below on ID-100:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize INITIAL

Signal Isolation OPEN

Pressure Bleed CLOSED

Vent/Drain CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

6.10.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

_______/_______
Date Technician

6.0 PROCEDURE

6.10.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.10.2 and with the same polarity (e.g., if the voltage in 6.10.2 was -15MV, adjust the ZERO control for a reading of -15MV).

_______ / _______
Date Technician

CAUTION: Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05$ span

$P_{DRIVE} = P_{INITIAL} + .5$ span

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor.

6.0 PROCEDURE

6.10.3 DOWN-RAMP

$$P_{INITIAL} = P_{SETPT} + .05 \text{ span}$$

$$P_{DRIVE} = P_{INITIAL} - .5 \text{ span}$$

6.10.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table 1 of Appendix C lists the specific values for each transmitter.

_______ / _______
Date Technician

6.10.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

_______ / _______
Date Technician

6.10.6 Pressurize the unit to $P_{INITIAL}$.

_______ / _______
Date Technician

6.10.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

_______ / _______
Date Technician

6.10.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

_______ / _______
Date Technician

6.0 PROCEDURE

6.10.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

______/______
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 3 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-6 shows how signal rate is determined from sample trace.

6.10.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize DRIVE

Signal Isolation CLOSED

6.0 PROCEDURE

6.10.10.1 Pressure Bleed CLOSED

Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

_______ / _______
Date Technician

6.10.11 Down-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

_______ / _______
Date Technician

.2 Slowly open the "signal isolation" valve.

_______ / _______
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

_______ / _______
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

_______ / _______
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

_______ / _______
Date Technician

6.0 PROCEDURE

6.10.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_____ / _____
Date Technician

.7 The unit is ready to generate the appropriate down-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

_____ / _____
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{INITIAL}$, P_{DRIVE}, P_{SETPT}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_____ / _____
Date Technician

6.0 PROCEDURE

6.10.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

_____/_____
Date Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from $P_{INITIAL}$ to P_{SETPT}

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

_____/_____
Date Technician

6.10.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.10.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-5 shows calculation method for time delay (response time). Also record on the chart "Low RWT Level Sensor," "LT-0305-2"

_____/_____
Date Technician

6.10.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

_____/_____
Date Technician

6.0 PROCEDURE

6.10.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_______ / _______
Date Technician

6.10.15 Following appropriate procedures, return process transmitter to service.

_______ / _______
Date Technician

6.11 Response Time Testing of LOW SG-1 Flow Sensor PDT-0978-2

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.11.1 Line up valves as shown below on ID-100:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize INITIAL

Signal Isolation OPEN

Pressure Bleed CLOSED

Vent/Drain CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

6.11.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

_______ / _______
Date Technician

6.0 PROCEDURE

6.11.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.11.2 and with the same polarity (e.g., if the voltage in 6.11.2 was -15MV, adjust the ZERO control for a reading of -15MV).

_______________/_______________
Date   Technician

CAUTION: Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05$ span

$P_{DRIVE} = P_{INITIAL} + .5$ span

NOTE: Should the set point be close to the upper limit of the sensor ra[illegible], the value for P_{DRIVE} should be ke[illegible] e limits of a safe overran[illegible].

6.0 PROCEDURE

6.11.3 DOWN-RAMP

$P_{INITIAL} = P_{SETPT} + .05$ span

$P_{DRIVE} = P_{INITIAL} - .5$ span

6.11.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table 1 of Appendix C lists the specific values for each transmitter.

/
Date Technician

6.11.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

/
Date Technician

6.11.6 Pressurize the unit to $P_{INITIAL}$.

/
Date Technician

6.11.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

/
Date Technician

6.11.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

/
Date Technician

6.0 PROCEDURE

6.11.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_______________ / _______________
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-6 shows how signal rate is determined from sample trace.

6.11.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize DRIVE

Signal Isolation CLOSED

6.0 PROCEDURE

6.11.10.1 Pressure Bleed CLOSED

Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

_______________/_______________
Date Technician

6.11.11 Down-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

_______________/_______________
Date Technician

.2 Slowly open the "signal isolation" valve.

_______________/_______________
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

_______________/_______________
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

_______________/_______________
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

_______________/_______________
Date Technician

6.0 PROCEDURE

6.11.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_____________ / _____________
Date Technician

.7 The unit is ready to generate the appropriate down-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

_____________ / _____________
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include $P_{INITIAL}$, P_{DRIVE}, P_{SETPT}, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_____________ / _____________
Date Technician

6.0 PROCEDURE

6.11.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

_______ / _______
Date Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from $P_{INITIAL}$ to P_{SETPT}

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

_______ / _______
Date Technician

6.11.12 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.11.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-5 shows calculation method for time delay (response time). Also record on the chart "LOW SG-1 Flow Sensor 2PDT-0978-2"

_______ / _______
Date Technician

6.11.13 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

_______ / _______
Date Technician

6.0 PROCEDURE

6.11.14 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

______ / ______
Date Technician

6.11.15 Following appropriate procedures, return process transmitter to service.

______ / ______
Date Technician

6.12 Response Time Testing of LOW SG-2 Flow Sensor PDT-0979-1

NOTE: REFERENCE TRANSDUCER AND PROCESS TRANSMITTER OUTPUT ADJUSTMENT. The electrical outputs of the reference transducer and the process transmitter must be adjusted prior to any test sequence. The following steps provide a means of achieving maximum vertical deflection of the recorder within the required pressure range.

6.12.1 Line up valves as shown below on ID-100:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize INITIAL

Signal Isolation OPEN

Pressure Bleed CLOSED

Vent/Drain CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

6.12.2 Open the PRESSURE BLEED valve to ensure system pressure is at zero. Place DVM MONITOR switch in the REFERENCE XMTR position. Adjust the SPAN control to the fully counterclockwise position. Note the reading on the DVM.

______ / ______
Date Technician

6.0 PROCEDURE

6.12.3 Adjust the SPAN control to the fully clockwise position. Adjust the ZERO control until the DVM indicates the voltage noted in paragraph 6.12.2 and with the same polarity (e.g., if the voltage in 6.12.2 was -15MV, adjust the ZERO control for a reading of -15MV).

_______ / _______
Date Technician

CAUTION: Use EXTREME CARE IN PRESSURIZING THE UNIT to avoid exceeding the pressure range of the reference transducer diaphragm and causing possible damage. It is good practice to set the gas supply regulator to a pressure slightly above the highest to be used in the test.

NOTE: Use the definitions and equations below to help perform the following steps:

Definitions

P_{SETPT} - The pressure at which the response time is to be determined (usually the pressure at which the sensor output causes a specific action).

$P_{INITIAL}$ - The pressure on the hydraulic accumulator, reference transducer, and process sensor at the beginning of the test.

P_{DRIVE} - The pressure in the pneumatic accumulator at the beginning of the test.

Span - The absolute range of the pressure senor.

UP-RAMP

$P_{INITIAL} = P_{SETPT} - .05$ span

$P_{DRIVE} = P_{INITIAL} + .5$ span

NOTE: Should the set point be close to the upper limit of the sensor range, the value for P_{DRIVE} should be kept within the limits of a safe overrange for the sensor.

6.0 PROCEDURE

6.12.3 DOWN-RAMP

$P_{INITIAL} = P_{SETPT} + .05$ span

$P_{DRIVE} = P_{INITIAL} - .5$ span

6.12.4 Close the PRESSURE BLEED valve and pressurize the unit by slowly opening the GAS ISOLATION valve. Pressurize to P_{SETPT} or $P_{INITIAL}$, whichever is greater. Table I of Appendix C lists the specific values for each transmitter.

______ / ______
Date Technician

6.12.5 Adjust the SPAN control for maximum output or null point + 10 VDC, whichever is less.

______ / ______
Date Technician

6.12.6 Pressurize the unit to $P_{INITIAL}$.

______ / ______
Date Technician

6.12.7 Operate REFERENCE XMTR BIAS and PROCESS XMTR BIAS controls to place the recorder traces in an appropriate position on the recorder chart. For an up-ramp test, the traces should appear on the bottom quarter of the chart. For a down-ramp test, the traces should appear on the top quarter of the chart. The process trace should always be slightly below the reference trace.

______ / ______
Date Technician

6.12.8 Vary unit pressure between $P_{INITIAL}$ and P_{SETPT} while adjusting the recorder amplifier and TRTS BIAS controls to maintain the traces on the recorder chart and in the same relative position. Repeat until no further adjustments are necessary.

______ / ______
Date Technician

6.0 PROCEDURE

6.12.9 Adjust the signal rate to the value specified in Table 1 of Appendix C.

_______ / _______
Date Technician

NOTE: The signal rate is a function of four variables; pressure, differential pressure, fluid level in the hydraulic accumulator, and the setting on the SIGNAL RATE metering valve. The SIGNAL RATE valve has been sized to provide the range of signal rates most frequently required with the fluid level at 8 on the sight gauge (approximate hydraulic accumulator level). Turning the SIGNAL RATE control in a clockwise direction will decrease the rate, turning in a counterclockwise direction will increase the rate. If higher rates are desired, fully depressurize the unit and add fluid. In a similar manner, if slower signal rates are required, fully depressurize the unit and drain the appropriate amount of fluid by opening the DRAIN valve.

NOTE: Opening the PRESSURE BLEED valve provides a vent for filling or draining.

By adding or removing fluid from the unit, the range of signal rates may be varied from approximately one inch of water per second to over 1000 pounds per second without loss of signal linearity. Extremely high signal rates are attained at higher pressures. For those applications requiring high rates at low pressures, optional equipment is available from the manufacturer. Figure A-6 shows how signal rate is determined from sample trace.

6.12.10 Diagnostic Self-Test of ID-100

.1 Line up the valves on the hydraulic signal generator as follows:

Gas Isolation CLOSED

Gauge Isolation OPEN

Pressurize DRIVE

Signal Isolation CLOSED

6.0 PROCEDURE

6.12.10.1 Pressure Bleed CLOSED

Drain/Vent CLOSED

Sight Gauge/Fill CLOSED

Drain CLOSED

______ / ______
Date Technician

6.12.11 Down-Ramp Generation

.1 Determine the initial, driving, and set point pressures for the transmitter to be tested from Table 1 of Appendix C.

______ / ______
Date Technician

.2 Slowly open the "signal isolation" valve.

______ / ______
Date Technician

.3 Slowly open the GAS ISOLATION valve and pressurize the unit to the driving pressure (P_{DRIVE}). Close the GAS ISOLATION valve.

______ / ______
Date Technician

.4 Once the pressure has stabilized, turn the PRESSURIZE valve to the INITIAL position. Slowly open the GAS ISOLATION valve and bring the pressure up to P_{SETPT}.

______ / ______
Date Technician

.5 Run the recorder at a slow chart drive speed to record a short reference trace at this pressure. Be sure there is a separation between the reference trace and the process transmitter trace. Verify both traces are in appropriate relative positions.

______ / ______
Date Technician

6.0 PROCEDURE

6.12.11.6 Slowly open the GAS ISOLATION valve and pressurize the unit to the initial pressure ($P_{INITIAL}$).

NOTE: Make sure the SIGNAL INITIATE switch is off during the set up. Premature opening of this valve will invalidate the test. Verify both traces are in appropriate positions.

_____ / _____
Date Technician

.7 The unit is ready to generate the appropriate down-ramp. Check the recorder to make sure the proper chart drive speed has been selected.

_____ / _____
Date Technician

NOTE: The record chart drive speed selection has a strong bearing on how well the data can be evaluated. The chart drive speed should be slowest at which adequate resolution of desired timing marks is attained. The greater the angle the signal trace makes with the horizontal, the more clearly defined is the point of intersection with the reference trace. As a rough guide, the chart drive speed should be proportional to the ramp rate.

.8 To run the test, start the recorder chart drive then depress the signal initiate switch. Record the appropriate data on the recorder chart. Include Pinitial, Pdrive, Psetpt, signal rate setting, fluid level, timing mark interval, date, chart drive speed, and the words: "diagnostic self-test."

_____ / _____
Date Technician

6.0 PROCEDURE

6.12.11.9 Perform the diagnostic self-test twice and compare the results with the signal traces for the same tests supplied with the unit.

/
Date Technician

.10 Examine the trace of each signal for the following qualitative waveform characteristics. Verify the results are acceptable as follows:

(a) Linear within a visual "best fit" from P to P_{SETPT}

(b) Complete absence of high frequency components (noise).

(c) Sharp and clearly defined "knee" on leading edge of test signal.

(d) The signal ramp rate has not decreased more than 5% of the ramp rate of the original base line signal traces supplied with the unit.

/
Date Technician

.11 If diagnostic self-test is satisfactory, produce another dual trace as in step 6.12.11.8. Use this trace to compute the response time of the transmitter. Record this response time in the data collection table at the back of this procedure. Figure A-6 shows calculation method for time delay (response time). Also record on the chart "LOW SG-2 Flow Sensor 2PDT-0979-2"

/
Date Technician

.12 Disconnect all test leads and reconnect the normal signal leads at the process transmitter.

/
Date Technician

6.0 PROCEDURE

6.12.11.13 Ensure the hydraulic signal generator is vented and disconnect it from the process transmitter.

_______ / _______
Date Technician

.14 Following appropriate procedures, return process transmitter to service.

_______ / _______
Date Technician

6.13 Test Equipment Set Up for Loop Current Step Response Testing of Resistance Temperature Detectors

NOTE: The LCSR Analyzer and Response Test Instrument which SCE has purchased from AMS will be used to perform this portion of the test. Some of the following steps will be performed using this equipment and the analyzer will produce the appropriate response times. Refer to AMS technical manuals if necessary.

NOTE: Each temperature element (RTD) channel will have five (5) connection points in the Spec. 200 cabinet. Two are the leads from the RTD resistance element, two are referred to as dummy leads and the fifth is a cable shield ground.

NOTE: For best results, this test should be performed only when the plant is at normal operating temperature and primary coolant flow rate.

6.13.1 Position the front controls on the ERT-1 as follows:

.1 Voltmeter selector switch to position "D".

.2 Trim switch in UP position.

.3 Power Supply internal-external switch in the "INT" position.

6.0 PROCEDURE

6.13.1.4 "Voltage Adjustment" fully counterclockwise.

.5 Current selector switch in LOW position.

.6 Range selector to "20" VDC.

.7 Voltmeter internal/external switch in "INT" position.

_______ / _______
Date Technician

6.13.2 Ensure ERT-1 power switch, located in back, is in the OFF position, then connect 115 VAC power to the ERT-1 and the ELC-1.

_______ / _______
Date Technician

NOTE: Refer to Figure A-5 for the following steps:

6.13.3 Connect a cable from the ERT-1 "OUTPUT" BNC connector to the ELC-1B "ANALOG IN" BNC connector.

_______ / _______
Date Technician

6.13.4 Connect a cable from ELC-1B "TRIGGER BNC" connector to the ERT-1 "CONTROL IN" BNC connector.

_______ / _______
Date Technician

6.13.5 Place ERT-1 power ON/OFF toggle switch to the "ON" position and verify "POWER" LED energized.

_______ / _______
Date Technician

6.13.6 Press ELC-1B "ON/OFF" pushbutton and verify that the light energizes. The "START" light, "TEST/DUMP" light, and "READY" LED should also energize.

_______ / _______
Date Technician

6.0 PROCEDURE

6.13.7 Allow 10 minutes for equipment to warm up.

_______/_______
Date Technician

6.14 Loop Current Step Response Testing of Hot Leg Temperature Sensor TE-0112-2

NOTE: For most consistent results, the temperature of the reactor coolant should be approximately 540°F.

6.14.1 In Spec. 200 cabinet L-125, remove the RTD leads from terminals 7 and 8 of TB-1 and connect them to the sensor connector strip on the ERT-1.

_______/_______
Date Technician

6.14.2 Adjust the "TRIM" pot on ERT-1 until the amplifier offset voltage is zero. (Trim switch UP).

NOTE: The amplifier offset voltage must be checked and set to zero whenever the gain is changed.

_______/_______
Date Technician

6.14.3 Place the "TRIM" switch in the DOWN position.

_______/_______
Date Technician

6.14.4 Place the current selector switch in the "HIGH" position.

_______/_______
Date Technician

6.0 PROCEDURE

6.14.5 Balance the wheatstone bridge by adjusting the coarse resistor network switches and the fine decade resistors until the bridge output reads zero.

_______ / _______
Date Technician

NOTE: Bridge output is only indicated on the voltmeter when the voltmeter selector switch is in the "D" position. Allow at least three minutes for the reading to stabilize.

6.14.6 Move the voltmeter selector switch on ERT-1 to the "B" or "C" position and adjust the supply voltage to approximately 60 VDC. This provides 60 madc through the RTD assuming the bridge is still balanced. Allow three minutes for stabilization time.

_______ / _______
Date Technician

6.14.7 Repeat steps 6.14.5 and 6.14.6 until no further adjustments are necessary. Allow at least three minutes for the readings to stabilize.

_______ / _______
Date Technician

6.14.8 Move the current selector switch to the "LOW" position and rebalance the bridge. Allow three minutes for stabilization time.

_______ / _______
Date Technician

6.14.9 Place the current selector switch to "HIGH." Allow reading to stabilize. Do not rebalance the bridge.

_______ / _______
Date Technician

6.0 PROCEDURE

5.14.10 Adjust the amplifier gain of ERT-1 to obtain as close as possible to 5.0 VDC on the voltmeter with the voltmeter selector switch in position "D." With this 5.0 VDC to the analog input BNC of the ELC-1B, the ELC-1B digital indicator should read approximately 4095 when ELC-1B is in "READY" mode with "TEST/PUMP" pushbutton pressed.

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed. Trim switch must be up to adjust the offset and down at all other times.

/
Date Technician

6.14.11 Place current selector switch in "LOW" position and ensure bridge returns to a balanced condition. A slight adjustment of the decade resistors may be necessary.

/
Date Technician

6.14.12 Ensure the "AVERAGE/SINGLE SHOT" selector switch on the ELC-1B is in the "AVERAGE" position.

/
Date Technician

6.14.13 With the ELC-1B in the "READY" mode, press the "START" pushbutton. The ELC-1B should go the "SAMPLE" mode for 20 seconds during which time the analog output of the ERT-1 should rise. Then the ELC-1B should return to the "READY" mode.

/
Date Technician

6.14.14 Allow the bridge to return to a balanced condition.

/
Date Technician

6.0 PROCEDURE

6.14.15 Repeat steps 6.14.13 and 6.14.14 nine additional times. On the tenth sample the ELC-1B should go to the "SAMPLE" mode for 20 seconds, then "ANALYZE" mode until the calculations are complete. Then the ELC-1B will go to the "DISPLAY" mode.

_______ / _______
Date Technician

6.14.16 With the ELC-1B selector switch in position "D", the digital indicator should read the average total time constant for all ten samples.

NOTE: This value represents the amount of time, in seconds, that it takes for the RTD resistance to reach 63.2% of the step change. Record this response time in the "DATA COLLECTION TABLE" at the back of this procedure.

_______ / _______
Date Technician

6.14.17 In Spec. 200 cabinet L-121, replace the RTD leads on terminals 18 and 17 of TB-1.

_______ / _______
Date Technician

6.14.18 Turn the "VOLTAGE ADJUSTMENT" on the ERT-1 fully counterclockwise.

_______ / _______
Date Technician

6.14.19 Press the "RESET" pushbutton on the ELC-1B and verify that the analyzer returns to the "READY" mode.

_______ / _______
Date Technician

6.0 PROCEDURE

6.15 Loop Current Step Response Testing of Cold Leg Temperature Sensor TE-9178-2

NOTE: For most consistent results, the temperature of the reactor coolant should be approximately 540°F.

6.15.1 In Spec 200 cabinet L-125, remove the RTD leads from terminals 17 and 18 of TB-1 and connect them to the sensor connector strip on the ERT-1.

_____________ / _____________
Date   Technician

6.15.2 Adjust the "TRIM" pot on ERT-1 until the amplifier offset voltage is ZERO. (Trim switch UP).

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed.

_____________ / _____________
Date   Technician

6.15.3 Place the "TRIM" switch in the DOWN position.

_____________ / _____________
Date   Technician

6.15.4 Place current selector switch in the "HIGH" position.

_____________ / _____________
Date   Technician

6.15.5 Balance the Wheatstone bridge by adjusting the coarse resistor network switches and the fine decade resistors until the bridge output reads ZERO.

_____________ / _____________
Date   Technician

NOTE: Bridge output is only indicated on the voltmeter when the voltmeter selector switch is in the "D" position. Allow at least three minutes for the reading to stabilize.

6.0 PROCEDURE

6.15.6 Move the voltmeter selector switch on ERT-1 to the "B" or "C" position and adjust the supply voltage to approximately 60 Vdc. This provides 60 madc through the RTD assuming the bridge is still balanced. Allow three minutes for stabilization time.

_______ / _______
Date Technician

6.15.7 Repeat steps 6.15.5 and 6.15.6 until no further adjustments are necessary. Allow at least three minutes for the readings to stabilize.

_______ / _______
Date Technician

6.15.8 Move the current selector switch to the "LOW" position and rebalance the bridge. Allow three minutes for stabilization time.

_______ / _______
Date Technician

6.15.9 Place the current selector switch to "HIGH". Allow reading to stabilize. Do NOT rebalance the bridge.

_______ / _______
Date Technician

6.15.10 Adjust the amplifier gain of ERT-1 to obtain as close as possible to 5.0 Vdc on the voltmeter with the voltmeter selector switch in position "D". With this 5.0 Vdc to the analog input BNC of the ELC-1B, the ELC-1B digital indicator should read approximately 4095 when ELC-1B is in "READY" mode with "Test/Dump" pushbutton pressed.

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed. Trim switch must be up to adjust the offset and down at all other times.

_______ / _______
Date Technician

6.0 PROCEDURE

6.15.11 Place current selector switch in "LOW" position and ensure bridge returns to a balanced condition. A slight adjustment of the decade resistors may be necessary.

_______________ / _______________
Date Technician

6.15.12 Ensure the "AVERAGE/SINGLE SHOT" selector switch on the ELC-1B is in the "AVERAGE" position.

_______________ / _______________
Date Technician

6.15.13 With the ELC-1B in the "READY" mode, press the "START" pushbutton. The ELC-1B should go the "SAMPLE" mode for 20 seconds during which time the analog output of the ERT-1 should rise. Then the ELC-1B should return to the "READY" mode.

_______________ / _______________
Date Technician

6.15.14 Allow the bridge to return to a balanced condition.

_______________ / _______________
Date Technician

6.15.15 Repeat steps 6.15.13 and 6.15.14 nine additional times. On the tenth sample the ELC-1B should go to the "SAMPLE" mode for 20 seconds, then "ANALYZE" mode until the calculations are complete. Then the ELC-1B will go the "DISPLAY" mode.

_______________ / _______________
Date Technician

6.15.16 With the ELC-1B selector switch in position "D", the digital indicator should read the average total time constant for all ten samples.

NOTE: This value represents the amount of time, in seconds, that it takes for the RTD to reach 63.2% of the step change. Record this response time in the "DATA COLLECTION TABLE" at the back of this procedure.

_______________ / _______________
Date Technician

6.0 PROCEDURE

6.15.17 In Spec 200 cabinet L-125, replace the RTD leads on terminals 17 and 18 of TB-1.

/
Date Technician

6.15.18 Turn the "VOLTAGE ADJUSTMENT" on the ERT-1 fully counterclockwise.

/
Date Technician

6.15.19 Press the "RESET" pushbutton on the ELC-1B and verify that the analyzer returns to the "READY" mode.

/
Date Technician

6.16 Loop Current Step Response Testing of Hot Leg Temperature Sensor TE-0122-2

NOTE: For most consistent results, the temperature of the reactor coolant should be approximately 540°F.

6.16.1 In Spec 200 cabinet L-125, remove the RTD leads from terminals 2 and 3 of TB-1 and connect them to the sensor connector strip on the ERT-1.

/
Date Technician

6.16.2 Adjust the "TRIM" pot on ERT-1 until the amplifier offset voltage is zero. (Trim switch up).

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed.

/
Date Technician

6.0 PROCEDURE

6.16.3 Place the "TRIM" switch in the DOWN position.

/
Date Technician

6.16.4 Place current selector switch in the "HIGH" position.

/
Date Technician

6.16.5 Balance the Wheatstone bridge by adjusting the coarse resistor network switches and the fine decade resistors until the bridge output reads zero.

/
Date Technician

NOTE: Bridge output is only indicated on the voltmeter when the voltmeter selector switch is in the "D" position. Allow at least three minutes for the reading to stabilize.

6.16.6 Move the voltmeter selector switch on ERT-1 to the "B" or "C" position and adjust the supply voltage to approximately 60 Vdc. This provides 60 madc through the RTD assuming the bridge is still balanced. Allow three minutes for stabilization time.

/
Date Technician

6.16.7 Repeat steps 6.18.6 and 6.18.7 until no further adjustments are necessary. Allow at least three minutes for the readings to stabilize.

/
Date Technician

6.16.8 Move the current selector switch to the "LOW" position and rebalance the bridge. Allow three minutes for stabilization time.

/
Date Technician

6.0 PROCEDURE

6.16.9 Place the current selector switch to "HIGH". Allow reading to stabilize. Do NOT rebalance the bridge.

_______ / _______
Date Technician

6.16.10 Adjust the amplifier gain of ERT-1 to obtain as close as possible to 5.0 Vdc on the voltmeter with the voltmeter selector switch in position "D". With this 5.0 Vdc to the analog input BNC of the ELC-1B, the ELC-1B digital indicator should read approximately 4095 when ELC-1B is in "READY" mode with "Test/Dump" pushbutton pressed.

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed. Trim switch must be up to adjust the offset and down at all other times.

_______ / _______
Date Technician

6.16.11 Place current selector switch in "LOW" position and ensure bridge returns to a balanced condition. A slight adjustment of the decade resistors may be necessary.

_______ / _______
Date Technician

6.16.12 Ensure the "AVERAGE/SINGLE SHOT" selector switch on the ELC-1B is in the "AVERAGE" position.

_______ / _______
Date Technician

6.16.13 With the ELC-1B in the "READY" mode, press the "START" pushbutton. The ELC-1B should go the "SAMPLE" mode for 20 seconds during which time the analog output of the ERT-1 should rise. Then the ELC-1B should return to the "READY" mode.

_______ / _______
Date Technician

6.0 PROCEDURE

6.16.14 Allow the bridge to return to a balanced condition.

/
Date Technician

6.16.15 Repeat steps 6.16.13 and 6.16.14 nine additional times. On the tenth sample the ELC-1B should go to the "SAMPLE" mode for 20 seconds, then "ANALYZE" mode until the calculations are complete. Then the ELC-1B will go the "DISPLAY" mode.

/
Date Technician

6.16.16 With the ELC-1B selector switch in position "D", the digital indicator should read the average total time constant for all ten samples.

NOTE: This value represents the amount of time, in seconds, that it takes for the RTD to reach 63.2% of the step change. Record this response time in the "DATA COLLECTION TABLE" at the back of this procedure.

/
Date Technician

6.16.17 In Spec 200 cabinet L-125, replace the RTD leads on terminals 2 and 3 of TB-1.

/
Date Technician

6.16.18 Turn the "VOLTAGE ADJUSTMENT" on the ERT-1 fully counterclockwise.

/
Date Technician

6.16.19 Press the "RESET" pushbutton on the ELC-1B and verify that the analyzer returns to the "READY" mode.

/
Date Technician

6.0 PROCEDURE

6.17 Loop Current Step Response Testing of Cold Leg Temperature Sensor 2TE-9179-2

NOTE: For most consistent results, the temperature of the reactor coolant should be approximately 540°F.

6.17.1 In Spec 200 cabinet L-125, remove the RTD leads from terminals 12 and 13 of TB-1 and connect them to the sensor connector strip on the ERT-1.

_______ / _______
Date Technician

6.17.2 Adjust the "TRIM" pot on ERT-1 until the amplifier offset voltage is zero. (Trim switch up).

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed.

_______ / _______
Date Technician

6.17.3 Place the "TRIM" switch in the DOWN position.

_______ / _______
Date Technician

6.17.4 Place current selector switch in the "HIGH" position.

_______ / _______
Date Technician

6.17.5 Balance the Wheatstone bridge by adjusting the coarse resistor network switches and the fine decade resistors until the bridge output reads zero.

_______ / _______
Date Technician

NOTE: Bridge output is only indicated on the voltmeter when the voltmeter selector switch is in the "D" position. Allow at least three minutes for the reading to stabilize.

6.0 PROCEDURE

6.17.6 Move the voltmeter selector switch on ERT-1 to the "B" or "C" position and adjust the supply voltage to approximately 50 Vdc. This provides 50 madc through the RTD assuming the bridge is still balanced. Allow three minutes for stabilization time.

_____ / _____
Date Technician

6.17.7 Repeat steps 6.17.6 and 6.17.7 until no further adjustments are necessary. Allow at least three minutes for the readings to stabilize.

_____ / _____
Date Technician

6.17.8 Move the current selector switch to the "LOW" position and rebalance the bridge. Allow three minutes for stabilization time.

_____ / _____
Date Technician

6.17.9 Place the current selector switch to "HIGH". Allow reading to stabilize. Do NOT rebalance the bridge.

_____ / _____
Date Technician

6.17.10 Adjust the amplifier gain of ERT-1 to obtain as close as possible to 5.0 Vdc on the voltmeter with the voltmeter selector switch in position "D". With this 5.0 Vdc to the analog input BNC of the ELC-1B, the ELC-1B digital indicator should read approximately 4095 when ELC-1B is in "READY" mode with "TEST/DUMP" pushbutton pressed.

NOTE: The amplifier offset voltage must be checked and set to zero whenever the GAIN is changed. Trim switch must be up to adjust the offset and down at all other times.

_____ / _____
Date Technician

6.0 PROCEDURE

6.17.11 Place current selector switch in "LOW" position and ensure bridge returns to a balanced condition. A slight adjustment of the decade resistors may be necessary.

______ / ______
Date Technician

6.17.12 Ensure the "AVERAGE/SINGLE SHOT" selector switch on the ELC-1B is in the "AVERAGE" position.

______ / ______
Date Technician

6.17.13 With the ELC-1B in the "READY" mode, press the "START" pushbutton. The ELC-1B should go the "SAMPLE" mode for 20 seconds during which time the analog output of the ERT-1 should rise. Then the ELC-1B should return to the "READY" mode.

______ / ______
Date Technician

6.17.14 Allow the bridge to return to a balanced condition.

______ / ______
Date Technician

6.17.15 Repeat steps 6.17.13 and 6.17.14 nine additional times. On the tenth sample the ELC-1B should go to the "SAMPLE" mode for 20 seconds, then "ANALYZE" mode until the calculations are complete. Then the ELC-1B will go the "DISPLAY" mode.

______ / ______
Date Technician

6.0 PROCEDURE

6.17.16 With the ELC-1B selector switch in position "D", the digital indicator should read the average total time constant for all ten samples.

NOTE: This value represents the amount of time, in seconds, that it takes for the RTD to reach 63.2% of the step change. Record this response time in the "DATA COLLECTION TABLE" at the back of this procedure.

_____ /_____
Date Technician

6.17.17 In Spec 200 cabinet L-125, replace the RTD leads on terminals 12 and 13 of TB-1.

_____ /_____
Date Technician

6.17.18 Turn the "VOLTAGE ADJUSTMENT" on the ERT-1 fully counterclockwise.

_____ /_____
Date Technician

6.17.19 Press the "RESET" pushbutton on the ELC-1B and verify that the analyzer returns to the "READY" mode.

_____ /_____
Date Technician

NOTE: While equipment is set up and access is being made to the Spec 200 cabinets, it would be convenient to do the CPC LPD/DNBR calculator tests which use temperature input.

NOTE: Position 1 High Linear Power, Position 3 High Local Power Density, and Position 4 Low Departure from Nucleate Boiling Ratio will use an external signal during the Response Time Test. Since the setup will be different for the performance of these sections, it is recommended that they be performed before the other sections of the Response Time Test.

6.0 PROCEDURE

CAUTION
=======
Detector power supply voltages up to 1000 volts are present within the safety channel. Use extreme caution when working beneath the chassis or near rear panel high voltage connectors. The 1000 volt power supply may be deenergized fc this portion of the test.

CAUTION
=======
Always discharge DC signal cables before connecting to the input jack. During reactor operation, normal chamber current can charge the distributed capacity of an unterminated coaxial cable to levels thay may destroy the input stages of this equipment. This charge buildup may be prevented by maintaining a short circuit across input signal cables when they are not attached to the input of the channel. Always switch the associated input rotary switch (S6) to the zero position before reconnecting the signal cables to J8, J9, or J10. DO NOT short circuit the log signal lead from the PA-501 preamplifier to J5 of the safety channel drawer.

6.18 Reactor Trip Switchgear Response Time Uncorrected

NOTE: This section of the Response Time Test measures the response time from the intitiation of a trip signal to the tripping of the RTSG breakers. The time measured for the tripping of the rotary relays will be subtracted from this value later to represent the response time of the RTSG alone. The trip function to be used for this measurement may be chosen at the discretion of the technician. However, it is recommended that "High Linear Power" be used since the equipment will be set up for section 6.21.

NOTE: Any trips initiated after this section will be performed with the RTSG breakers open to prevent unnecessary cycling of the RTSG breakers.

6.0 PROCEDURE

6.18.1 The following part of the test requires that an LED jumper wire (a length of wire with an LED in the middle) be connected across some terminals in the trip status panel. For convenience, eight LED jumper wires should be preconnected in accordance with the following table.

RTT Test	LED(+) Connection	Connection	
TCB-1 (GRN)	TB1301-6	TB1306-1	Date Completed/ Technician
TCB-2 (GRN)	TB1301-3	TB1306-1	Date Completed/ Technician
TCB-3 (GRN)	TB1302-13	TB1307-1	Date Completed/ Technician
TCB-4 (GRN)	TB1302-16	TB1307-1	Date Completed/ Technician
TCB-5 (GRN)	TB1302-3	TB1306-1	Date Completed/ Technician
TCB-6 (GRN)	TB1301-17	TB1306-1	Date Completed/ Technician
TCB-7 (GRN)	TB1303-10	TB1307-1	Date Completed/ Technician
TCB-8 (GRN)	TB1303-13	TB1307-1	Date Completed/ Technician

6.0 PROCEDURE

6.18.2 Perform any response time section between 6.19. and 6.39.29 (at the discretion of the technician) step by step as written with the following exception: Instead of connecting the "STOP" optical pickups to the temporary LED's across the contacts of the rotary relays, connect the "STOP" optical pickups over the LED's installed in step 6.18.1 for TCB 1, 2. The 3 and 4 RTSG breakers should be reset prior to tripping for response time measurement. Record the response time in this space.

______/______ Value Units

______/______ Date Technicial

6.18.3 Repeat step 6.18.2 substituting TCB 5, 6, 7 and 8.

______/______ Value Units

______/______ Date Technicial

6.18.4 Record the longest time measured in steps 5.18.2 and 6.18.3 in the data collection table at the back of this procedure.

______/______ Date Technician

6.18.5 Remove the temporary LED's that were installed in step 6.18.1.

______/______ Date Technician

6.19 High Linear Power to RTSG Response Time

NOTE: The following section of the test measures the response time from the initiation of a signal using the CE test box to the tripping of the rotary relays. The safety channel preamp should be available to be located near the rear of the PPS cabinet.

6.0 PROCEDURE

6.19.1 Isolate the RTSG leads from the following terminals located in the back of each PPS cabinet.

.1 Bay A: TBA2 terminals 20, 21 ______ / ______ Date Technican

.2 Bay B: TBB2 terminals 20, 21 ______ / ______ Date Technican

.3 Bay C: TBC2 terminals 20, 21 ______ / ______ Date Technican

.4 Bay D: TBD2 terminals 20, 21 ______ / ______ Date Technican

6.19.2 Connect an LED (5 volt, 20 ma) in series with a 5 Vdc power supply across the terminals listed in 6.19.1 for bay A on the cabinet side of the terminal board.

______ / ______ Date Technician

6.19.3 Repeat step 6.19.2 for bays B, C, and D.

______ / ______ Date Technician

6.19.4 In the channel to be tested, place the "AC POWER" switch of the safety channel drawer in the "OFF" position.

______ / ______ Date Technician

6.19.5 Verify the "POWER ON" Lamp DS-1 is extinguished on the channel to be tested.

______ / ______ Date Technician

6.0 PROCEDURE

6.19.6 At the rear of the safety channel, disconnect the high voltage cable from J-3 and connect this cable to the high voltage discharge J-4.

_____ / _____
Date Technician

6.19.7 Disconnect plug P-8 from J-8 and place a grouding cap on the plug.

_____ / _____
Date Technician

6.19.8 Connect one end plug of a coaxial cable to BNC number 1 in the "Function Signal Outputs" section of the C-E test box and the other end plug to the input jack J-8 of the safety channel drawer.

_____ / _____
Date Technician

6.19.9 Connect a ground wire at the chassis J-7 plug and the other end to the ground connection at the C-E test box.

_____ / _____
Date Technician

6.19.10 Disconnect plug P-9 from J-9 of the safety channel drawer and place a grounding cap on the plug.

_____ / _____
Date Technician

6.19.11 Connect one end plug of a coaxial cable to BNC jack number 2 in the "Function Signal Outputs" section of the C-E test box and the other end plug to the "signal in" jack (J8) of the PA5Q1 preamp.

_____ / _____
Date Technician

6.19.12 Connect another coaxial cable between the "DC return 2" jack (J7) of the preamp and J9 of the safety channel drawer.

_____ / _____
Date Technician

6.0 PROCEDURE

6.19.13 Connect a ground wire at the chassis J-9 plug and the other end to the ground connector at the C-E test box.

/
Date Technician

6.19.14 Disconnect plug P-10 from J-10 of the safety channel drawer and place a grounding cap on the plug.

/
Date Technician

6.19.15 Connect one end plug of a coaxial cable to BNC jack number 3 in the "Function Signal Outputs" section of the C-E test box and the other end plug to input jack J-10 on safety channel drawer.

/
Date Technician

6.19.16 Connect a ground wire at the chassis J-10 plug and the other end to the ground connector at the C-E test box

/
Date Technician

6.19.17 Place the linear calibrate switch of the safety drawer to the "operate" position.

/
Date Technician

6.19.18 Place the "AC POWER" switch of safety channel drawer to "ON" position.

/
Date Technician

6.19.19 Attach the optical detector pickups over the four temporary LED's installed in steps 6.19.2 and 6.19.3.

/
Date Technician

6.0 PROCEDURE

6.19.20 Connect the double banana plug end of the LED pickup leads to L1, L2, L3 and L4 on the "STOP LAMPS" section of the C-E test box.

_____ / _____
Date Technician

6.19.21 Position the stop lamp toggle switches of the C-E test box as follows:

.1 "L1" - "ON" _____ / _____ Date Technician

.2 "L2" - "ON" _____ / _____ Date Technician

.3 "L3" - "ON" _____ / _____ Date Technician

.4 "L4" - "ON" _____ / _____ Date Technician

.5 "L5" - "OFF" _____ / _____ Date Technician

.6 "L6" - "OFF" _____ / _____ Date Technician

NOTE: The source current has been preadjusted in the C-E test box to provide a trip. Adjust if necessary.

6.19.22 On channel 'B' SAFETY CHANNEL DRAWER, place the "LINEAR CALIBRATE" switch in the "200%" position. This should cause the "High Linear Power" trip light to energize on channel 'B' bistable control panel.

_____ / _____
Date Technician

6.0 PROCEDURE

6.19.23 Energize the test equipment and allow it to stabilize.

_______ / _______
Date Technician

6.19.24 Ensure the start and stop "TIMER MODES" switches are selected to the step up (increasing) position.

_______ / _______
Date Technician

6.19.25 Ensure timer on the C-E test box is reset.

_______ / _______
Date Technician

6.19.26 Push the "STEP" toggle switch to the "START" position, then release the switch. The start LED should energize.

_______ / _______
Date Technician

6.19.27 Record the elapsed time as indicated on the C-E test box timer digital indicator.

_______ value / units _______ / _______
Date Technician

6.19.28 Push the "STEP" toggle switch to the "RESET" position, then release the switch. The RESET LED should energize.

_______ / _______
Date Technician

6.19.29 On channel 'B' SAFETY CHANNEL DRAWER, place the "LINEAR CALIBRATE" switch in the "OPERATE" POSITION AND RESET THE "HIGH LINEAR POWER" bistable in Channel 'B'.

_______ / _______
Date Technician

6.0 PROCEDURE

6.19.30 On channel 'C' SAFETY CHANNEL DRAWER, place the "LINEAR CALIBRATE" switch in the "200%" position. Verify channel 'C' "HIGH LINEAR POWER" trip light is energized on the bistable control panel.

______ / ______
Date Technician

6.19.31 Repeat steps 6.19.24 through 6.19.27.

______ / ______ ______ / ______
Value Units Date Technicial

6.19.32 On channel 'C' SAFETY CHANNEL DRAWER, place the "LINEAR CALIBRATE" switch in the "OPERATE" position and reset the "HIGH LINEAR POWER" bistable in Channel 'C'.

______ / ______
Date Technician

6.19.33 On channel 'D' SAFETY CHANNEL DRAWER, place the "LINEAR CALIBRATE" switch in the "200%" position. Verify channel 'D' "HIGH LINEAR POWER" trip light is energized on the bistable control panel.

______ / ______
Date Technician

6.19.34 Repeat steps 6.19.24 through 6.19.27.

______ / ______ ______ / ______
Value Units Date Technicial

6.19.35 Record the largest value of steps 6.19.27, 6.19.31, 6.19.34 in the "DATA COLLECTION TABLE".

______ / ______
Date Technician

6.19.36 Disconnect the preamp from the (safety channel drawer) and replace the preamp in its normal location.

______ / ______
Date Technician

6.0 PROCEDURE

6.19.37 Disconnect the C-E test box from the safety channel drawer and return all four safety channel drawers to normal operation.

_______ / _______
Date Technician

6.19.38 Reset all bistables from the bistable control panels.

_______ / _______
Date Technician

6.20 High Log PWR Level to RTSG Response Time Test

NOTE: The following section of the test measures the response time from the depression of the bistable pushbutton (S603) on the bistable control panel through the tripping of the rotary relays.

6.20.1 On the bistable control panel being tested, rotate the bistable selector switch to position number 2.

_______ / _______
Date Technician

6.20.2 Rotate the meter input selector switch to "TRIP SP" position and record the indicated SP voltage.

_______ / Volts _______ / _______
Value Units Date Technicial

6.20.3 Remove plug P-13 from J-13 at rear of the safety channel drawer being tested.

_______ / _______
Date Technician

6.20.4 Rotate the Meter Input Selector switch to the "Input" position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.20.5 Rotate the coarse potentiometer (R601) on the bistable control panel while holding down the bistable pushbutton until the digital voltage indicator reads approximately .1V on the tripped side of the setpoint recorded in step 6.22.2. Then release the bistable pushbutton and record the adjusted voltage.

_____ / Volts _____ /_____
Value Units Date Technicial

6.20.6 Turn on the power to the C-E test box and line up the switches as follows:

_____ /_____
Date Technician

.1 L1 "STOP LAMPS" toggle switch "ON" _____ /_____
Date Technician

.2 L2 "STOP LAMPS" toggle switch "ON" _____ /_____
Date Technician

.3 L3 "STOP LAMPS" toggle switch "ON" _____ /_____
Date Technician

.4 L4 "STOP LAMPS" toggle switch "ON" _____ /_____
Date Technician

.5 L5 "STOP LAMPS" toggle switch "OFF" _____ /_____
Date Technician

.6 L6 "STOP LAMPS" toggle switch "OFF" _____ /_____
Date Technician

6.20.7 Connect the four optical detector pickup cables to the "STOP LAMPS" section at "L1, L2, L3 and L4".

_____ /_____
Date Technician

6.0 PROCEDURE

6.20.8 Attach these four optical pickups over the temporary LED's installed in steps 6.21.1 through 6.21.3.

_____ / _____
Date Technician

6.20.9 Ensure the START and STOP "TIMER MODE" switches are in the step up or increasing mode.

_____ / _____
Date Technician

6.20.10 Insert an extender card into the Test and Calibration card slot and place a hook probe from pin 61 of the Test and Calibration connector to the red (+) jack of the "EXT 10V START" in the "TIMER INPUTS" section of the C-E test box. Place another hook probe from pin 59 to the black (-) jack of the same section.

_____ / _____
Date Technician

6.20.11 Ensure the timer is reset on the C-E test box.

_____ / _____
Date Technician

6.20.12 Depress the bistable pushbutton until the timer stops incrementing.

_____ / _____
Date Technician

6.20.13 Record the response time (as indicated on the timer digital indicator or the C-E test box) in the DATA COLLECTION TABLE.

_____ / _____
Date Technician

6.0 PROCEDURE

6.20.14 Reset the bistable.

_______ / _______
Date Technician

6.20.15 Reconnect the plug P-13 to J-13 at the rear of the safety channel drawer.

_______ / _______
Date Technician

NOTE: The remainder of this section of the test may be conducted any time it is convenient to setup the required equipment. The Nuclear Instrumentation CPC-LPD/DNBR calculators response time test (sections 6.23 and 6.24) may be conducted while the test equipment is set up at the nuclear instrumentation drawer.

CAUTION DETECTOR POWER SUPPLY VOLTAGES UP TO 1000 V ARE PRESENT WITHIN THIS UNIT. USE EXTREME CAUTION WHEN WORKING BENEATH THE CHASSIS OR NEAR REAR PANEL HIGH VOLTAGE CONNECTORS.

CAUTION THIS TEST DOES NOT REQUIRE DISCONNECTING INPUT SIGNAL CABLES. HOWEVER, THIS CAUTION IS RESTATED HERE SO THAT PERSONS ARE AWARE OF DAMAGE THAT COULD RESULT FROM IMPROPER PROCEDURES. ALWAYS DISCHARGE DC SIGNAL CABLES BEFORE CONNECTING TO THE INPUT JACK. DURING REACTOR OPERATION, NORMAL CHAMBER CURRENT CAN CHARGE THE DISTRIBUTED CAPACITY OF AN UNTERMINATED COAXIAL CABLE TO LEVELS THAT MAY DESTROY THE INPUT STAGES OF THIS EQUIPMENT. THIS CHARGE BUILDUP MAY BE PREVENTED BY MAINTAINING A SHORT CIRCUIT ACROSS INPUT SIGNAL CABLES WHEN THEY ARE NOT ATTACHED TO THE INPUT OF THE CHANNEL. ALWAYS SWITCH THE ASSOCIATED INPUT ROTARY SWITCH (S6) TO THE ZERO POSITION BEFORE RECONNECTING THE SIGNAL CABLES TO JACKS J8, J9, or J10. DO NOT SHORT CIRCUIT THE LOG SIGNAL LEAD FROM THE PA-5Q1 PREAMPLIFIER TO J5.

CAUTION Make certain to use a variable attenuator network to interface between the PPS and the high speed recorder. Failure to attenuate the test inputs to the high speed recorder [illegible] damage the unit.

6.0 PROCEDURE

6.20.16 In the channel to be tested, place the "AC POWER" switch of the safety channel drawer in the OFF position.

_______ / _______
Date Technician

6.20.17 Verify the "POWER ON" lamp DS-1 is extinguished.

_______ / _______
Date Technician

6.20.18 Connect a test jumper from the "Log Calibrate" switch S1M-1 to S1M-5 per Appendix A, Figure A-3.

_______ / _______
Date Technician

6.20.19 Connect pen 1 of the recorder to S1M-C and chassis ground.

_______ / _______
Date Technician

6.20.20 Turn the linear calibrate switch to "ZERO" position.

_______ / _______
Date Technician

6.20.21 Place the "AC POWER" switch of the safety channel drawer to the "ON" position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.20.22 Attach a second channel of the high speed recorder to terminals 1 and 2 of terminal strip TBA2 in L032B. This is a signal that is sent to the log power meter. Adjust this pen for 0.10 Vdc full scale. Adjust pen 1 for a resonable trace when the "LOG CALIBRATE" switch is transferred from position 5 to position 6. (approximately 10 Vdc change)

/
Date Technician

6.20.23 On the safety channel drawer front, turn the "LOG CALIBRATE" switch to position number 5. This position should produce a 5 microsecond square wave pulse with an amplitude of 0.9 volts for a frequency of 10 KHz.

/
Date Technician

NOTE: This will produce a trip signal. When the switch is moved from operate, an 8.2 volt signal is sent to the trip circuit.

6.20.24 Set the high speed recorder chart speed at approximately 20 inches per second (IPS) or more as required to provide an analyzable chart trace.

/
Date Technician

6.20.25 Start the high speed recorder and quickly turn the log calibrate switch from position 5 to position 6. Position 6 should produce a 5 microsecond square wave pulse with an amplitude of 10 volts for a frequency of 10 KHz.

/
Date Technician

6.0 PROCEDURE

NOTE: The pulse change is sent to the preamplifier and returned to the processing drawer where it is sent through a buffer to the connector J-13 and then to the terminal strip.

6.20.26 After the high speed recorder trace indicates that the new pulse has been received, turn off the high speed recorder.

_______ / _______
Date Technician

6.20.27 Record the following data on the high speed recorder strip chart:

.1 Procedure number

.2 Step number

.3 Date, initials

.4 Pen numbers

.5 Pen range

.6 Input parameter

.7 Recorder no.

.8 Chart speed

_______ / _______
Date Technician

6.20.28 Record the response time in the DATA COLLECTION TABLE.

_______ / _______
Date Technician

NOTE: The response time is the time necessary for the signal initiated at the PPS cabinet terminal strip to go through 63.2% of its total increase after moving the switch from position 5 to position 6.

6.0 PROCEDURE

6.20.29 Return all connections and switches to the normal operate position. Place the channel into normal operating mode. Leave the bistables of Ch "A" bypassed. Do not disconnect the PPS input simulator box.

_______ / _______
Date Technician

6.21 Positions 3 and 4 High LPD and Low DNBR

NOTE: The High Local Power Density and Low Departure from Nucleate Boiling Ratio functions are contact inputs from the core protection calculators (CPC) and do not include a bistable card. These functions shall be tested in section 6.22.

6.22 CPC/CEAC Response Time Testing

NOTE: This section checks the response time of the CPC/CEAC System from the time that it receives an input signal until the time the system outputs a trip signal. This portion of the test requires that special test software be loaded into the computer system. External signals are provided by the CE RTT Test Equipment box.

6.22.1 Initialization of CPC/CEAC for Testing

.1 Set the CALCULATOR SELECT switch on the operator's module to load the CPC (CEAC) calculator.

_______ / _______
Date Technician

NOTE: When one calculator is selected, in channels B and C, the other calculator is memory protected. No changes can be made to the protected calculator.

6.0 PROCEDURE

6.22.2 Set up the AED 2500 Floppy Disk Drive, as follows:

.1 Turn ON the AED Floppy Disk Drive.

_______ / _______
Date Technician

.2 Set the drive select switches so that drive A is unit 0, drive B is unit 1 and drive C is unit 2.

_______ / _______
Date Technician

CAUTION NEVER TURN THE AED 2500 POWER ON OR OFF WITH A
======= DISK IN THE DRIVE.

.3 Place the floppy disk containing the test software into the AED 2500 Floppy Disk Drive.

_______ / _______
Date Technician

.4 Set the INIT and WP switches UP.

_______ / _______
Date Technician

.5 Lift the IPL switch.

_______ / _______
Date Technician

6.22.3 Place the CPC Coldstart Loader paper tape into the teletypewriter (TTY) paper tape reader and connect the TTY to the CPC calculator A cable connector.

_______ / _______
Date Technician

6.0 PROCEDURE

6.22.4 Hit the "FUNCTION" button, then hit the "LOCATION" button to stop the calculator.

_____/_____
Date Technician

6.22.5 Set up the following memory locations via the Interdata Hexidecimal Panel.

Location	Contents
30	0000
32	0000
34	0000
36	0050
50	D500
52	00CF
54	4300
56	0080
78	0294

_____/_____
Date Technician

6.22.6 Read through these same locations to verify the correct contents.

_____/_____
Date Technician

6.22.7 Start the processor at location 30.

_____/_____
Date Technician

6.22.8 Start the teletype paper tape reader by setting the READER/PUNCH switch to the "MANUAL START" position.

_____/_____
Date Technician

6.22.9 Respond to the TEST TRACK prompt with 55.

_____/_____
Date Technician

6.0 PROCEDURE

6.22.10 Turn the MEMORY PROTECT key switch on the operators module to "OFF". The MEMORY PROTECT switch must remain in OFF during the part 1 Interactive I/O System Test. Other switches will protect memory when appropriate.

Date / Technician

6.22.11 Respond to the calculator request prompt with CPCC or CEAC depending upon the calculator to be loaded.

Date / Technician

6.22.12 Verify that the TRIP BYPASS switch is OFF.

Date / Technician

6.22.13 Remove the disk from the AED 2500 disk drive to prevent damage to the disk.

Date / Technician

6.22.14 Display the LOWTOD Point ID on the operators module. The point ID is 40.

Date / Technician

6.22.15 While synchronizing with the second hand of a watch press the "INIT" button on the hexadecimal display panel of the processor to be checked.

Date / Technician

NOTE: This results in a system auto-restart which resets LOWTOD to zero.

6.0 PROCEDURE

6.22.16 Press the "FN" button on the hexadecimal display panel.

_______ / _______
Date Technician

6.22.17 Press the "LOC" button on the hexadecimal display panel in synchronization with the ending of a five (5) minute interval on the watch.

_______ / _______
Date Technician

NOTE: This halts the processor which in turn stops the LOWTOD.

6.22.18 Read LOWTOD from the operator's module. The display should read 6000 $\pm$ 40.

_______ / _______
Date Technician

NOTE: The following steps will be used to load the Interactive I/O System CPC/CEAC System Response Time Test software. The disk will be referred to as the Part 1 disk.

6.22.19 Set the CALCULATOR SELECT rotary switch on the OPERATOR's MODULE to load the CPC (CEAC) calculator. The calculator not selected is memory protected.

_______ / _______
Date Technician

6.22.20 Set up the AED 2500 Floppy Disk Drive as follows:

.1 Turn ON the AED Floppy Disk Drive.

_______ / _______
Date Technician

6.0 PROCEDURE

6.22.20.2 Set the drive select switches so that drive A is unit 0, drive B is unit 1 and drive C is unit 2.

_____ / _____
Date Technician

.3 Place the floppy disk containing the Part 1 RTT software into the AED 2500 Floppy Disk Drive.

_____ / _____
Date Technician

.4 Set the INIT and WP switches UP.

_____ / _____
Date Technician

.5 Lift the IPL switch.

_____ / _____
Date Technician

6.22.21 Place the CPC Coldstart Leader paper tape into the teletypewriter (TTY) paper tape reader and connect the TTY to the CPC calculator A cable connection point indicated.

_____ / _____
Date Technician

6.22.22 Hit the "FUNCTION" button, then hit the "LOCATION" button.

_____ / _____
Date Technician

6.0 PROCEDURE

6.22.23 Set up the following memory locations via the Interdata Hexidecimal Panel.

Location	Contents
30	0000
32	0000
34	0000
36	0050
50	D500
52	00CF
54	4300
56	0080
78	0294

Date / Technician

6.22.24 Read through these same locations to verify the correct contents.

Date / Technician

6.22.25 Start the processor at location 30.

Date / Technician

6.22.26 Start the teletype paper tape reader by setting the READER/PUNCH switch to the "MANUAL START" position.

Date / Technician

6.22.27 Respond to the TEST TRACT prompt with 55.

Date / Technician

6.0 PROCEDURE

6.22.28 Verify that the MEMORY PROTECT keyswitch is OFF

_____ / _____
Date Technician

6.22.29 Respond to the calculator request prompt with CPCC (CEAC).

_____ / _____
Date Technician

6.22.30 Remove the disk from the AED 2500 disk drive.

_____ / _____
Date Technician

6.23 RTD-CPC I/O RTT

6.23.1 Reset the CPC calculator by pushing the white (SPARE) pushbutton on the Operator's Module.

_____ / _____
Date Technician

6.23.2 Enter the following on the TTY keyboard to check the operation of the TTY-CPCP interface:

*EX TC1

*EX TC2

*EX TH1

*EX TH2

The resultant printout is as indicated in Table F1 of Appendix F.

_____ / _____
Date Technician

NOTE: For convenience, the following tests should be run concurrently with or immediately after the Loop Current Step Response (LCSR) test of the RTD's.

6.0 PROCEDURE

6.23.3 On the C-E test box, set the "FUNCTION SELECT" switch to RESISTANCE to prepare to run the response time test for loop 1 cold leg temperature (TC1).

_______ / _______
Date Technician

6.23.4 On the C-E test box, plug the meter into the "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" jacks in the "FUNCTION SIGNAL OUTPUT" section.

_______ / _______
Date Technician

NOTE: In the following steps, whenever it is required that an initial value or a final value be set using the DVM, this value as read on the DVM should be recorded below the applicable step.

6.23.5 Using the potentiometers under "RESISTANCE" in the "STEPPED FUNCTIONS" section, adjust the initial resistance in the C-E test box so that the resistance value is 420 ohms as read on the DVM when the STEPPED FUNCTIONS STEP toggle switch is in the RESET position. Note the value.

_______ / Volts _______ / _______
Value Units Date Technicial

6.23.6 Adjust the final resistance in the C-E test box so that the value is 432 ohms as read on the DVM when the STEPPED FUNCTIONS STEP toggle switch is in the START position. Note the value.

_______ / Volts _______ / _______
Value Units Date Technicial

6.23.7 Disconnect the meter and return the STEPPED FUNCTIONS STEP toggle switch to the RESET position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.23.8 At the Foxboro Spec. 200 cabinet L-121, remove the leads that go to the temperature transmitter from terminals 17 and 18 on terminal strip TB-1.

Date / Technician

NOTE: These are the leads on the other side of the terminal strip that were removed for the LCSR test. A check should be made to ascertain whether the correct two leads to the temperature transmitter are being used. If leads other than those specified are used, note the appropriate numbers here.

6.23.9 Connect the resistance test leads from the C-E RTT test box to the leads removed in the step above.

Date / Technician

6.23.10 Place three optical pickups over the three LED's in column 3 and three optical pickups over the three LED's in column 4 (Hi Local Power and Low DNBR respectively) on the Bistable Control Panel. Leave in place for the remainder of the channel test.

Date / Technician

6.23.11 Place the other end of the optical pickups cables to all six STOP LAMP jacks on the C-E RTT test box.

Date / Technician

6.23.12 Turn the switches next to these lamp jacks to ON.

Date / Technician

NOTE: If the base line data is desired, turn three switches to OFF and run the test twice.

6.0 PROCEDURE

6.23.13 Ensure that the STOP TIMER MODE switch is in the increasing or low to high mode.

_______ / _______
Date Technician

NOTE: The following section of the test measures the response time from an externally produced signal in the Spec. 200 cabinets through the tripping of the bistable relays by a signal produced in the CPC calculators.

CAUTION THIS TEST, IF NOT PROPERLY CONDUCTED, MAY CAUSE A TRIP OF THE RPS REACTOR TRIP SWITCHGEAR. FOR THIS PREOPERATIONAL TEST, WITH THE CEA M-G SETS NOT RUNNING, THE ONLY PORTION OF THE PPS THAT NEED BE ENERGIZED IS THAT PART BEING TESTED.

6.23.14 At the CPC/CEAC TTY, enter the command LI TC1,568, IN, BOTH CR to make the parameter TC1 (Loop 1 Cold Leg Temperature) live input.

_______ / _______
Date Technician

6.23.15 At the CPC/CEAC TTY, enter the live input status command ST CR . The TTY should respond with the data entered in the step above (the setpoint number may be rounded off).

_______ / _______
Date Technician

6.23.16 On the C-E RTT Test Box, reset the timer to ZERO.

_______ / _______
Date Technician

6.0 PROCEDURE

6.23.17 At the CPC/CEAC TTY, enter the command GO CR . Verify that the point I.D. displayed is 043 and the valve is +33.000.

_____/_____
Date Technician

6.23.18 On the RPS section of the PPS, clear any LPD or DNR trip conditions.

_____/_____
Date Technician

6.23.19 Move the STEPPED FUNCTIONS STEP toggle switch to START.

_____/_____
Date Technician

6.23.20 When the timer stops incrementing, note the value in the "DATA COLLECTION TABLE."

_____/_____
Date Technician

6.23.21 Return the STEPPED FUNCTIONS STEP toggle switch to the RESET position.

_____/_____
Date Technician

NOTE: Leave the test setup unchanged except as follows:

6.23.22 Reconnect all the leads in the Spec. 200 cabinets that were removed for the above test.

_____/_____
Date Technician

6.23.23 On the C-E test box, verify that the "FUNCTION SELECT" switch is set to RESISTANCE.

_____/_____
Date Technician

6.0 PROCEDURE

6.23.24 On the C-E test box, plug the meter into the "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" jacks in the "FUNCTION SIGNAL OUTPUT" section.

_______ / _______
Date Technician

6.23.25 Using the potentiometers under "RESISTANCE" in the "STEPPED FUNCTIONS" section, adjust the initial resistance in the C-E test box so that the resistance value is 420 ohms as read on the DVM when the STEPPED FUNCTION toggle switch is in the RESET position. Note the value.

_______ / Volts
Value Units

_______ / _______
Date Technicial

6.23.26 Adjust the final resistance in the C-E test box so that the value is 432 ohms as read on the DVM when the START switch is actuated. Note the value.

_______ / Volts
Value Units

_______ / _______
Date Technicial

6.23.27 Disconnect the meter and return the STEPPED FUNCTIONS STEP toggle switch to the RESET position.

_______ / _______
Date Technician

6.23.28 At the Foxboro Spec. 200 cabinet L-125, remove the leads that go to the temperature transmitter from terminals 12 and 13 on terminal strip TB-1.

_______ / _______
Date Technician

NOTE: These are the leads on the other side of the terminal strip that were removed for the LCSR test. A check should be made to ascertain whether the correct two leads to the temperature transmitter are being used. If leads other than those specified are used, note the appropriate numbers here.

6.0 PROCEDURE

6.23.29 Connect the resistance test leads from the C-E RTT test box to the leads removed in the step above.

/
Date Technician

6.23.30 Place three optical pickups over the three LED's in column 3 and three optical pickups over the three LED's in column 4 (Hi Local Power and Low DNBR respectively) on the Bistable Control Panel.

/
Date Technician

6.23.31 Verify that the switches next to the six step lamp jacks are ON.

/
Date Technician

6.23.32 Ensure that the STOP TIMER MODE switch is in the increasing or low to high mode.

/
Date Technician

NOTE: The following section of the test measures the response time from an externally produced signal in the Spec. 200 cabinets through the tripping of the bistable relays by a signal produced in the CPC calculators.

CAUTION
=======
THIS TEST, IF NOT PROPERLY CONDUCTED, MAY CAUSE A TRIP OF THE RPS REACTOR TRIP SWITCHGEAR. FOR THIS TEST, WITH THE CEA M-G SETS NOT RUNNING, THE ONLY PORTION OF THE PPS THAT NEED BE ENERGIZES IS THAT PART BEING TESTED.

6.0 PROCEDURE

6.23.33 Reset the CPC calculator trip by pushing the white (SPARE) pushbutton on the Operator's Module and entering an R (for Restart) when prompted by the TTY.

______/______
Date Technician

6.23.34 At the CPC/CEAC TTY, enter the command LI TC2,568, IN, BOTH CR to make the parameter TC2 (Loop 2 Cold Leg Temperature) a live input.

______/______
Date Technician

6.23.35 At the CPC/CEAC TTY, enter the command NOP TC1 to revert the live input to a constant input.

______/______
Date Technician

6.23.35 At the CPC/CEAC TTY, enter the command ST CR . Only TC2 should be a live input.

______/______
Date Technician

6.23.37 Reset the C-E RTT test box timer to zero.

______/______
Date Technician

6.23.38 At the CPC/CEAC TTY, enter the command "GO" to start the program. Verify that the point ID displayed is 043 and the value is +33.000.

______/______
Date Technician

6.23.39 Reset all DNBR/LPD trip conditions on the Bistable Control Panel of the PPS.

______/______
Date Technician

6.0 PROCEDURE

6.23.40 Toggle the "STEP" switch to "START." When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

_______ / _______
Date Technician

6.23.41 Return the STEPPED FUNCTIONS STEP toggle switch to the RESET position.

_______ / _______
Date Technician

NOTE: Leave the test setup unchanged except as follows:

6.23.42 Reconnect all the leads in the Spec. 200 cabinets that were removed for the above test.

_______ / _______
Date Technician

6.23.43 On the C-E test box, verify that the "FUNCTION SELECT" switch is set to RESISTANCE.

_______ / _______
Date Technician

6.23.44 On the C-E test box, plug the meter into the "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" jacks in the "FUNCTION SIGNAL OUTPUT" section.

_______ / _______
Date Technician

6.23.45 Using the potentiometers under "RESISTANCE" in the "STEPPED FUNCTIONS" section, adjust the initial resistance in the C-E test box so that the resistance value is 440 ohms as read on the DVM when the STEP switch is in the RESET position. Note the value.

_______ / Volts
Value Units

_______ / _______
Date Technicial

6.0 PROCEDURE

6.23.46 Adjust the final resistance in the C-E test box so that the value is 452 ohms as read on the DVM when the START switch is actuated. Note the value.

_____ / Volts _____ / _____
Value Units Date Technician

6.23.47 Disconnect the meter and return the STEPPED FUNCTIONS STEP toggle switch to the RESET position.

_____ / _____
Date Technician

6.23.48 At the Foxboro Spec. 200 cabinet L-125, remove the leads that go to the temperature transmitter from terminals 7 and 8 on terminal strip TB-1.

_____ / _____
Date Technician

NOTE: These are the leads on the other side of the terminal strip that were removed for the LCSR test. A check should be made to ascertain whether the correct two leads to the temperature transmitter are being used. If leads other than those specified are used, note the appropriate numbers here.

6.23.49 Connect the resistance test leads from the C-E RTT test box to the leads removed in the step above.

_____ / _____
Date Technician

6.23.50 Place three optical pickups over the three LED's in column 3 and three optical pickups over the three LED's in column 4 (Hi Local Power and Low DNBR respectively) on the Bistable Control Panel.

_____ / _____
Date Technician

6.0 PROCEDURE

6.23.51 Verify that the switches next to the six step lamp jacks are ON.

_____/_____
Date Technician

6.23.52 Ensure that the STOP TIMER MODE switch is in the increasing or low to high mode.

_____/_____
Date Technician

NOTE: The following section of the test measures the response time from an externally produced signal in the Spec. 200 cabinets through the tripping of the bistable relays by a signal produced in the CPC calculators.

CAUTION THIS TEST, IF NOT PROPERLY CONDUCTED, MAY CAUSE A TRIP OF THE RPS REACTOR TRIP SWITCHGEAR. FOR THIS TEST, WITH THE CEA M-G SETS NOT RUNNING, THE ONLY PORTION OF THE PPS THAT NEED BE ENERGIZED IS THAT PART BEING TESTED.

6.23.53 Reset the CPC calculator trip by pushing the white (SPARE) pushbutton on the Operator's Module and entering an "R" (for Restart) when prompted by the TTY.

_____/_____
Date Technician

6.23.54 At the CPC/CEAC TTY, enter the command LI TH1,618, IN, BOTH CR to make the parameter TH1 (Loop 1 Hot Leg Temperature) a live input.

_____/_____
Date Technician

6.0 PROCEDURE

6.23.55 At the CPC/CEAC TTY, enter the command NOP TC2 to revert the live input to a constant input.

_____/_____
Date Technician

6.23.56 At the CPC/CEAC TTY, enter the command ST CR . Only TH1 should be a live input.

_____/_____
Date Technician

6.23.57 Reset the C-E RTT test box timer.

_____/_____
Date Technician

6.23.58 At the CPC/CEAC TTY, type in the command GO to start the program. Verify that the point I.D. displayed is 043 and the value is +33.000.

_____/_____
Date Technician

6.23.59 Reset all DNBR/LPD trip conditions on the Bistable Control Panel of the PPS.

_____/_____
Date Technician

6.23.60 Toggle the "STEP" switch to "START." When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

_____/_____
Date Technician

6.23.61 Return the STEPPED FUNCTIONS STEP toggle switch to the RESET position.

_____/_____
Date Technician

NOTE: Leave the test setup unchanged except as follows:

6.0 PROCEDURE

6.23.62 Reconnect all the leads in the Spec. 200 cabinets that were removed for the above test.

_____ / _____
Date Technician

6.23.63 On the C-E test box, verify that the "FUNCTION SELECT" switch is set to RESISTANCE.

_____ / _____
Date Technician

6.23.64 On the C-E test box, plug the meter into the "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" jacks in the "FUNCTION SIGNAL OUTPUT" section.

_____ / _____
Date Technician

6.23.65 Using the potentiometers under "RESISTANCE" in the "STEPPED FUNCTIONS" section, adjust the initial resistance in the C-E test box so that the resistance value is 440 ohms as read on the DVM when the STEP switch is in the RESET position. Note the value.

_____ / Volts _____ / _____
Value Units Date Technicial

6.23.66 Adjust the final resistance in the C-E test box so that the value is 452 ohms as read on the DVM when the START switch is actuated. Note the value.

_____ / Volts _____ / _____
Value Units Date Technicial

6.23.67 Disconnect the meter and return the STEPPED FUNCTIONS STEP toggle switch to the RESET position.

_____ / _____
Date Technician

6.23.68 At the Foxboro Spec. 200 cabinet L-125, remove the leads that go to the temperature transmitter from terminals 2 and 3 on terminal strip TB-1.

_____ / _____
Date Technician

6.0 PROCEDURE

6.23.68

NOTE: These are the leads on the other side of the terminal strip that were removed for the LCSR test. A check should be made to ascertain whether the correct two leads to the temperature transmitter are being used. If leads other than those specified are used, note the appropriate numbers here.

6.23.69 Connect the resistance test leads from the C-E RTT test box to the leads removed in the step above.

/
Date Technician

6.23.70 Place three optical pickups over the three LED's in column 3 and three optical pickups over the three LED's in column 4 (Hi Local Power and Low DNBR respectively) on the Bistable Control Panel.

/
Date Technician

6.23.71 Verify that the switches next to the six step lamp jacks are ON.

/
Date Technician

6.23.72 Ensure that the STOP TIMER MODE switch is in the increasing or low to high move.

/
Date Technician

NOTE: The following section of the test measures the response time from the externally produced signal in the Spec. 200 cabinets through the tripping of the bistable relays by a signal produced in the CPC calculators.

6.0 PROCEDURE

6.23.72

CAUTION THIS TEST, IF NOT PROPERLY CONDUCTED, MAY CAUSE A TRIP OF THE RPS REACTOR TRIP SWITCHGEAR. FOR THIS TEST, WITH THE CEA M-G SETS NOT RUNNING, THE ONLY PORTION OF THE PPS THAT NEED BE ENERGIZED IS THAT PART BEING TESTED.

6.23.73 Reset the CPC calculator trip by pushing the white (SPARE) pushbutton on the Operator's Module and entering an R (for Restart) when prompted by the TTY.

Date / Technician

6.23.74 At the CPC/CEAC TTY, enter the command LI TH2,618, IN, BOTH CR to make the parameter TH2 (Loop 2 Hot Leg Temperature) a live input.

Date / Technician

6.23.75 At the CPC/CEAC TTY, enter the command NOP TH1 to revert the live input to a constant input.

Date / Technician

6.23.76 At the CPC/CEAC TTY, enter the command ST CR . Only TH2 should be a live input.

Date / Technician

6.23.77 Reset the C-E RTT test box timer to zero.

Date / Technician

6.23.78 At the CPC/CEAC TTY, enter the command GO to start the program. Verify that the point I.D. displayed is 043 and the value is +33.00.

Date / Technician

6.0 PROCEDURE

6.23.79 Reset all DNBR/LPD trip conditions on the Bistable Control Panel of the PPS.

_______ / _______
Date Technician

6.23.80 Toggle the "STEP" switch to "START." When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

_______ / _______
Date Technician

6.23.81 Return the STEPPED FUNCTIONS STEP toggle switch to the RESET position.

_______ / _______
Date Technician

NOTE: Leave the test setup unchanged except as follows:

6.23.82 Reconnect all the leads in the Spec. 200 cabinets that were removed for the above test.

_______ / _______
Date Technician

6.23.83 Pressurizer Pressure - CPC I/O RTT

6.23.83.1 On the C-E RTT box, rotate the function select switch to the HIGH CURRENT position. Output from the box will now be at the "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" banana jacks in the FUNCTION SIGNAL OUTPUTS section.

_______ / _______
Date Technician

.2 Short circuit the output at the jacks.

_______ / _______
Date Technician

6.0 PROCEDURE

6.23.83.3 Connect the ma meter (DC range) to the HIGH CURRENT jacks in the CALIBRATION section and move the calibration switch to C (calibrate). The meter should indicate current.

/
Date Technician

.4 Move the momentary contact STEP switch in the STEPPED FUNCTIONS section to RESET and release. The RESET light should turn ON.

/
Date Technician

.5 Set the initial high current value to a current of 16 milliamperes. Note the value.

/ Volts
Value Units

/
Date Technicial

.6 Move the momentary contact STEP switch to START and release. The START light should illuminate and the timer should start incrementing. Stop the timer.

/
Date Technician

.7 Set the final high current value to a current of 12 milliamperes. Note the value.

/ Volts •
Value Units

/
Date Technicial

.8 Move the momentary contact STEP toggle switch to RESET and release.

.9 Repeat above steps as necessary, then disconnect the meter and turn the HIGH CURRENT switch to N (normal).

/
Date Technician

6.0 PROCEDURE

6.23.83.10 At the Foxboro Spec. 200 cabinet L-125, remove the leads that go to the pressurizer pressure I/E converter (PY-0101-B2) input terminals nest 3, slot 3A (+ and -).

/
Date Technician

.11 Connect the high current test output jacks to the I/E terminals (+ and -).

/
Date Technician

.12 Place three optical pickups from the first three STOP LAMPS jacks on the C-E RTT box over the three LED's in column 4 (low DNBR) on the bistable control panel.

/
Date Technician

NOTE: The following section of the test measures the response time from an externally produced signal in the Spec. 200 cabinets through the tripping of the bistable relays by a signal produced in the CPC calculators.

CAUTION THIS TEST, IF NOT PROPERLY CONDUCTED, MAY CAUSE A TRIP AT THE RPS REACTOR TRIP SWITCHGEAR. FOR THIS TEST, WITH THE CEA M-G SETS NOT RUNNING, THE ONLY PORTION OF THE PPS THAT NEED BE ENERGIZED IS THAT PART BEING TESTED.

6.0 PROCEDURE

6.23.83.13 Arrange the test equipment so that a signal will not be produced until the three LED's are illuminated. Turn the switches to OFF at the unused STOP LAMPS terminal jacks L4, L5, and L6.

_______/_______
Date Technician

.14 Reset the CPC calculator trip by puhing the white (SPARE) pushbutton on the Operator's Module and entering an R (for Restart) when prompted by the TTY.

_______/_______
Date Technician

.15 At the CPC/CEAC TTY, enter the command LI PR,2100, DE, DNBR CR to make the parameter PR (pressurizer pressure) a live input.

_______/_______
Date Technician

.16 At the CPC/CEAC TTY, enter the command NOP TH2 to revert the live input to a constant input.

_______/_______
Date Technician

.17 At the CPC/CEAC TTY, enter the command ST CR . Only the parameter PR should be a live input.

_______/_______
Date Technician

.18 Reset the C-E RTT box timer to zero.

_______/_______
Date Technician

.19 At the CPC/CEAC TTY, enter the command GO to start the test. Verify that the POINT I.D. displayed is 043 and the value is +33.000.

_______/_______
Date Technician

6.0 PROCEDURE

6.23.83.20 Reset all low DNBR trip conditions on the Bistable Control Panel at the PPS.

______ / ______
Date Technician

.21 Toggle the "STEP" switch to "START." When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

______ / ______
Date Technician

.22 Move the momentary contact STEP switch to RESET and release. The RESET light should turn ON.

______ / ______
Date Technician

6.23.84 Ex-Core Power - CPC I/O RTT

.1 Verify that the "CPC TEST" indicator lamp on the Operator's Module is illuminated.

______ / ______
Date Technician

.2 On the C-E RTT box, rotate the function select switch to the LOW CURRENT position. Output from the box will now be at the "LOW CURRENT" BNC jacks in the FUNCTION SIGNAL OUTPUTS section.

______ / ______
Date Technician

.3 Short circuit the output at jack number 1.

______ / ______
Date Technician

.4 Connect the mA meter (DC range) to LOW CURRENT banana jack number 1 in the CALIBRATION section.

______ / ______
Date Technician

6.0 PROCEDURE

6.24.84.5 Turn the switch at jack number 1 to "C" (calibrate). The meter should indicate current.

_______ / _______
Date Technician

.6 Move the momentary contact STEP switch in the STEPPED FUNCTIONS section to RESET and release. The RESET light should turn ON.

_______ / _______
Date Technician

.7 Set the initial current value to 0.65 milliamperes by adjusting the VOLTAGE CURRENT, FREQUENCY "INITIAL" potentiometer until the mA meter reads the desired value. Note the value.

_______ / Volts _______ / _______
Value Units Date Technicial

.8 Move the momentary contact STEP switch to START and release. The START light should illuminate and the timer should start incrementing. Stop the timer.

_______ / _______
Date Technician

.9 Set the final current value to 0.91 milliamperes by adjusting the VOLTAGE, CURRENT, FREQUENCY "FINAL" potentiometer until the mA meter reads the desired value. Note the value.

_______ / Volts _______ / _______
Value Units Date Technicial

.10 Move the momentary contact STEP toggle switch to RESET and release.

_______ / _______
Date Technician

6.0 PROCEDURE

6.23.84.11 Repeat the above steps as necessary for jack number 1, then return the LOW CURRENT switch for the position to N (normal).

_____ / _____
Date Technician

.12 Remove the short circuit plugs from jack number 1 and insert in jack number 2.

_____ / _____
Date Technician

.13 Repeat all steps from 6.23.4.4 through 6.23.4.11 inclusive for jack number 2.

The initial value is _________ amperes.

The final value is _________ amperes.

_____ / _____
Date Technician

.14 Remove the short circuit plugs from jack number 2 and insert in jack number 3.

_____ / _____
Date Technician

.15 Repeat all steps from 6.23.4.4 through 6.23.4.11 inclusive for jack number 3.

The initial value is _________ amperes.

The final value is _________ amperes.

_____ / _____
Date Technician

NOTE: The following section of the test measures the response time from three externally produced current signals in the C-E test box through connections in the rear of the nuclear instrumentation safety drawer, through the CPC to the PPS bistable trip units. It is recommended that this test be performed immediately after the RPS High linear Power response time test to reduce set up time.

6.0 PROCEDURE

6.23.84.15

CAUTION THIS TEST, IF NOT PROPERLY CONDUCTED, MAY CAUSE A TRIP OF THE RPS REACTOR TRIP SWITCHGEAR. FOR THIS TEST, WITH THE CEA M-G SETS NOT RUNNING, THE ONLY PORTION OF THE PPS THAT NEED BE ENERGIZED IS THAT PART BEING TESTS.

.16 Place the optical pickups from the six STOP LAMPS jacks on the C-E RTT box over the three LED's in column 3 and the three LED's in column 4 (Hi Local Power and Low DNBR respectively) on the bistable control panel.

/
Date Technician

.17 Arrange the test equipment so that a signal will not be produced until all six LED's are illuminated. All switches at the jacks should be turned to ON.

/
Date Technician

.18 Reset the CPC calculator trip by pushing the white (SPARE) pushbutton on the Operator's Module and entering on R (for Restart) when prompted by the TTY.

/
Date Technician

.19 At the CPC/CEAC TTY enter the command LI D1,124,IN, BOTH CR to make the parameter D1 (Upper Excore Neutron Flux Detector) a live input.

/
Date Technician

.20 At the CPC/CEAC TTY enter the command LI D2,124,IN, BOTH CR to make the parameter D2 (Middle Excore Neutron Flux Detector) a live input.

/
Date Technician

6.0 PROCEDURE

6.23.84.21 At the CPC/CEAC TTY enter the command LI D3,124,IN, BOTH CR to make the parameter D3 (Lower Excore Neutron Flux Detector) a live input.

_______ / _______
Date Technician

NOTE: In the above three steps, all three simulated detector signals are made live. If it is required that only one signal at a time be made live, the test will have to be run three times. In addition the Hi Local Power and Low DNBR trip functions could be run as separate tests by turning only three STOP LAMPS switches on at one time.

.22 Enter the command NOP PR at the CPC/CEAC TTY to revert the live input to a constant input.

_______ / _______
Date Technician

.23 At the CPC/CEAC TTY, enter the command ST CR . The TTY should list out the three parameters with the data entered for each. Only these three parameters should be live.

_______ / _______
Date Technician

.24 Perform all steps of Appendix E Power Range Safety Channel Setup for Testing.

_______ / _______
Date Technician

.25 Reset the C-E RTT box timer to zero.

_______ / _______
Date Technician

6.0 PROCEDURE

6.23.84.26 At the CPC/CEAC TTY, enter the command GO to start the test. Verify that the point I.D. displayed is 043 and the value is +33.000.

_______/_______
Date Technician

.27 Reset all Low DNBR and Hi LPD trip conditions on the Bistable Control Panel of the PPS.

_______/_______
Date Technician

.28 Toggle the "STEP" switch to "START." When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

_______/_______
Date Technician

.29 Move the momentary contact STEP switch to RESET and release. The RESET light should turn ON.

_______/_______
Date Technician

.30 Place the "AC POWER" switch in the safety channel drawer in the OFF position.

_______/_______
Date Technician

.31 Verify that the "POWER ON" lamp DS-1 is extinguished.

_______/_______
Date Technician

.32 Disconnect the test cable from jack J-10 and reconnect the system cable.

_______/_______
Date Technician

6.0 PROCEDURE

6.23.84.33 Disconnect the test cable from jack J-8 and reconnect the system cable.

_____ / _____
Date Technician

.34 Disconnect the test cable from jack J-9 and reconnect the system cable.

_____ / _____
Date Technician

.35 Disconnect the high voltage cable from jack J-4 and reconnect to jack J-3.

_____ / _____
Date Technician

.36 Disconnect the ground wires from the chassis at the J-8, J-9 and J-10 plugs.

_____ / _____
Date Technician

.37 Return all caps and other equipment to the condition in which found before the start of the test.

_____ / _____
Date Technician

.38 Place the "AC POWER" switch in the safety channel drawer to the ON position.

_____ / _____
Date Technician

6.23.85 Reactor Coolant Pump Speed - CPC I/O RTT

.1 On the C-E RTT box, rotate the function select switch to the FREQUENCY position. Output from the C-E RTT box is now available at the F1 and F2 jacks in the CALIBRATION section and at the "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" banana jacks in the FUNCTION SIGNAL OUTPUTS section.

_____ / _____
Date Technician

6.0 PROCEDURE

6.23.85.1

NOTE: It is recommended that reference be made to the Operation and Maintenance Instructions for Response Time Test Equipment for a description of the arrangement for frequency outputs. Note that the output from the banana jack on the FUNCTION SIGNAL OUTPUTS section is tied directly to the F1 test jack when the FUNCTION SELECT switch is in the FREQUENCY position.

NOTE: Steps 6.23.5.2, 6.23.5.3, 6.23.5.4 and 6.23.5.10 need not be performed if the equipment has been recently calibrated. If skipping the steps sign below.

Date Calibrated ________ Signature ______________

.2 Place a 30K (or open circuit) local impedance across the "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" banana jacks in the FUNCTION SIGNAL OUTPUTS section.

______________/______________
Date Technician

.3 Connect an oscilloscope across the F2 test jacks and measure the pulse width. The pulse width shall be between 200 seconds and 550 seconds, but the width is not significant to the test.

______________/______________
Date Technician

.4 Check the pulse amplitude. It must be between 9 and 10 volts with the 30K local impedance connected. If it is not, refer to the technical manual for the C-E RTT box and correct.

______________/______________
Date Technician

.5 Move the momentary contact STEP switch in the STEPPED FUNCTIONS section to RESET and release. The RESET light should turn ON.

______________/______________
Date Technician

6.0 PROCEDURE

6.23.85.6 Using the FREQUENCY meter on the front panel, adjust the initial frequency by using the INITIAL potentiometer in the VOLTAGE, CURRENT, FREQUENCY section to a value of 869 Hz. Note the value.

______ / Volts ______ / ______
Value Units Date Technicial

.7 Move the STEP switch to START position and release. The START light should illuminate and the timer should start incrementing. Stop the timer.

______ / ______
Date Technician

.8 Using the FREQUENCY meter on the front panel, adjust the final frequency by using the FINAL potentiometer in the VOLTAGE, CURRENT, FREQUENCY section to a value of 782 Hz. Note the value.

______ / Volts ______ / ______
Value Units Date Technicial

.9 Verify that the TIMER MODE STOP switch is in the increasing or low to high move.

______ / ______
Date Technician

.10 Disconnect the dummy load and the oscilloscope.

______ / ______
Date Technician

.11 Insert the test cable plug for the "frequency test" in the "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" banana jack in the FUNCTION SIGNAL OUTPUTS section on the RTT.

NOTE: The stepped input signal will be connected inside the Reliance-Custom Controls Auxiliary Protective Cabinet L-91. The connection will be made to a terminal strip on the probe side of the pulse shaper. Since the pulse shaper will be utilized for this test, it will be necessary to maintain the +15 volt power supply to each pulse shaper unit.

6.0 PROCEDURE

6.23.85.12 In the Auxiliary Protective Cabinet (L-91) on terminal strip OT x 4, check the voltage between terminal 37 and ground using any portable voltmeter. The voltage should be +15 volts DC Record the voltage ________ Vdc.

_______ / _______
Date Technician

.13 In the cabinet L-91, remove transmitter cables on terminals 33 and 39 from terminal strip OT x 4. Connect the C-E RTT box cable signal lead to terminal 39 and the other cable to terminal 33.

_______ / _______
Date Technician

.14 Place three optical pickups from the first three STOP LAMPS jacks on the C-E RTT box over the three LED's in column 4 (Low DNBR) on the bistable control panel. Turn STOP LAMPS switches for L1, L2, and L3 ON and L4, L5, and L6 OFF. Leave this setup unchanged for the pump speed tests.

_______ / _______
Date Technician

CAUTION THIS TEST, IF NOT PROPERLY CONDUCTED, MAY CAUSE A TRIP OF THE RPS REACTOR TRIP SWITCHGEAR. FOR THIS PREOPERATIONAL TEST, WITH THE CEA M-G SETS NOT RUNNING, THE ONLY SECTION OF THE PPS THAT NEED BE ENERGIZED IS THAT PART BEING TESTED.

.15 Reset the CPC calculator trip by pushing the white (SPARE) pushbutton on the Operator's Module and entering an R (for Restart) when prompted by the TTY.

_______ / _______
Date Technician

6.0 PROCEDURE

6.23.85.16 At the CPC/CEAC TTY, enter the commands NOP D1, NOP D2 and NOP D3 to return these parameters to constant input.

_____ / _____
Date Technician

.17 At the CPC/CEAC TTY, enter the command LI W1, 2699,IN, DNBR CR to make the parameter W1, Reactor Coolant Pump 1 Speed (in counts per second) a live input. See Response Time Test Software User's Manual for explanation.

_____ / _____
Date Technician

.18 At the CPC/CEAC TTY enter the command ST CR . The only input that should be live is parameter W1.

_____ / _____
Date Technician

.19 Reset the FREQUENCY meter to zero.

_____ / _____
Date Technician

.20 Reset the C-E RTT box timer to zero. At the CPC/CEAC TTY, enter the command GO to start the test. Verify that the point I.D. displayed is 043 and the value is +33.000.

_____ / _____
Date Technician

.21 Reset all Low DNBR trip conditions on the Bistable Control Panel of the PPS.

_____ / _____
Date Technician

.22 Move the STEP toggle switch on the C-E RTT box to START, then release.

_____ / _____
Date Technician

6.0 PROCEDURE

6.23.85.23 When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

____________ / ____________
Date Technician

.24 Disconnect the test leads in cabinet L-91 and reconnect the normal system leads.

____________ / ____________
Date Technician

.25 Move the momentary contact STEPPED FUNCTIONS STEP switch to RESET and release. The RESET light should be turned ON.

____________ / ____________
Date Technician

.26 In the Auxiliary Protective Cabinet (L-91) on terminal strip OT x 4, check the voltage between terminal 41 and ground using any portable voltmeter. The voltage should be +15 volts DC. Record the voltage. __________ Vdc.

____________ / ____________
Date Technician

.27 In the cabinet L-91, remove the transmitter cables (but leave the pulse shaper cables) from terminal strip OT x 4. Connect the C-E RTT box cable signal lead to terminal 43 and the other cable to terminal 42.

____________ / ____________
Date Technician

.28 Reset the CPC calculator trip by pushing the white (SPARE) pushbutton on the Operator's Module and entering an R (for Restart) when prompted by the TTY.

____________ / ____________
Date Technician

.29 At the CPC/CEAC TTY enter the command NOP W1 to return that parameter to constant input.

____________ / ____________
Date Technician

6.0 PROCEDURE

6.23.85.30 At the CPC/CEAC TTY enter the command LI W2,2699, IN DNBR CR to make the parameter live.

/
Date Technician

.31 At the CPC/CEAC TTY, enter the command ST CR . The only input that should be live is parameter W2.

/
Date Technician

.32 Reset the FREQUENCY meter and the timer on the C-E RTT box to zero.

/
Date Technician

.33 At the CPC/CEAC TTY, enter the command GO to start the program. Verify that the point I.D. is 043 and the value is +33.000.

/
Date Technician

.34 Reset all Low DNBR trip conditions on the RPS.

/
Date Technician

.35 Toggle the "STEP" switch to "START." When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

/
Date Technician

.36 Disconnect the test leads in cabinet L-91 and reconnect the normal system leads.

/
Date Technician

6.0 PROCEDURE

6.23.85.37 In the Auxiliary Protective Cabinet (L-91) on terminal strip OT x 4, check the voltage between terminal 45 and ground using any portable voltmeter. The voltage should be +15 volts dc. Record the voltage. ________ Vdc

/
Date Technician

.38 In the cabinet L-91, remove the transmitter cables (but leave the pulse shaper cables) from terminal strip OT x 4. Connect the C-E RTT box cable signal lead to terminal 47 and the other cable to terminal 46.

/
Date Technician

.39 Reset the CPC calculator trip by pushing the white (SPARE) pushbutton on the Operator's Module and entering an R (for Restart) when prompted by the TTY.

/
Date Technician

.40 At the CPC/CEAC TTY enter the command NOP W2 to return that parameter to constant input.

/
Date Technician

.41 At the CPC/CEAC TTY enter the command LI W3,2699, IN, DNBR CR to make the parameter live.

/
Date Technician

.42 At the CPC/CEAC TTY, enter the COMMAND ST CR . The only input that should be live is parameter W3.

/
Date Technician

.43 Reset the FREQUENCY meter and the timer on the C-E RTT box to zero.

/
Date Technician

6.0 PROCEDURE

6.23.35.44 At the CPC/CEAC TTY, enter the command GO to start the program. Verify that the point I.D. is 043 and the value is +33.000.

_______/_______
Date Technician

.45 Reset all Low DNBR trip conditions on the RPS.

_______/_______
Date Technician

.46 Toggle the "STEP" switch to "START." When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

_______/_______
Date Technician

.47 Disconnect the test leads in cabinet L-91 and reconnect the normal system leads.

_______/_______
Date Technician

.48 Move the momentary contact STEPPED FUNCTIONS STEP switch to RESET and release. The RESET light should be turned ON.

_______/_______
Date Technician

.49 In the Auxiliary Protective Cabinet (L-91) on terminal strip OT x 4, check the voltage between terminal 49 and ground using any portable voltmeter. The voltage should be +15 volts DC. Record the voltage. ________ Vdc

_______/_______
Date Technician

.50 In the cabinet L-91, remove the transmitter cables (but leave the pulse shaper cables) from terminal strip OT x 4. Connect the C-E RTT box cable signal lead to terminal 51 and the other cable to terminal 50.

_______/_______
Date Technician

6.0 PROCEDURE

6.23.85.51 Reset the CPC calculator trip by pushing the white (SPARE) pushbutton on the Operator's Module and entering an R (for Restart) when prompted by the TTY.

/
Date Technician

.52 At the CPC/CEAC TTY enter the command NOP W3 to return that parameter to constant input.

/
Date Technician

.53 At the CPC/CEAC TTY enter the command LI W4,2699,IN DNBR CR to make the parameter live.

/
Date Technician

.54 At the CPC/CEAC TTY, enter the command ST CR . The only input that should be live is parameter W4.

/
Date Technician

.55 Reset the FREQUENCY meter and the timer on the C-E RTT box to zero.

/
Date Technician

.56 At the CPC/CEAC TTY, enter the command GO to start the program. Verify that the point I.D. is 043 and the value is +33.000.

/
Date Technician

.57 Reset all Low DNBR trip conditions on the RPS.

/
Date Technician

6.0 PROCEDURE

6.23.85.58 Toggle the step switch to "START." When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

_____ / _____
Date Technician

.59 Disconnect the test leads in cabinet L-91 and reconnect the normal system leads.

_____ / _____
Date Technician

.60 Do not break down test equipment if the next section is to follow immediately.

_____ / _____
Date Technician

6.23.85 Target CEA Positions - CPC I/O RTT

NOTE: In this part of the test, the C-E Response Time Test Equipment will produce a voltage step which will simulate a change in a CEA position. This change will be detected directly by the core protection calculator which will in turn produce a trip signal. For convenience and to perform the test expeditiously, it is recommended that two or more persons be assigned stations for the test.

.1 Move the momentary contact STEPPED FUNCTIONS STEP switch to RESET and release. The RESET light should be turned ON.

_____ / _____
Date Technician

.2 On the C-E RTT box, rotate the FUNCTION SELECT switch to the VOLTAGE position. Output will now be at the "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" banana jacks in the FUNCTION SIGNAL OUTPUTS section. The black terminal is reference.

_____ / _____
Date Technician

6.0 PROCEDURE

6.23.85.3 Connect the C-E RTT box digital voltmeter (DVM) across the output jacks.

_______ / _______
Date Technician

.4 Set the initial voltage value to a voltage of 10.0 volts by adjusting the "VOLTAGE, CURRENT, FREQUENCY" INITIAL potentiometer until the desired voltage is obtained. This value is equivalent to 150 inches withdrawn. Note the value.

_______ / Volts _______ / _______
Value Units Date Technicial

.5 Place the START switch in the TIMER MODE section in the low to high position.

_______ / _______
Date Technician

.6 Move the momentary contact STEP switch to START and release. The START light should illuminate and the timer should start incrementing. Stop the timer.

_______ / _______
Date Technician

.7 Set the final voltage value to a voltage of 8.333 volts by adjusting "VOLTAGE, CURRENT, FREQUENCY" FINAL potentiometer until the desired voltage is obtained. This value is equivalent to 100.0 inches withdrawn. Note the value.

_______ / Volts _______ / _______
Value Units Date Technicial

.8 Repeat the above steps as necessary to obtain the voltages desired, then disconnect the meter and remove the leads.

_______ / _______
Date Technician

6.0 PROCEDURE

6.23.86.9 Move the momentary contact STEP toggle switch to reset and release, and place STOP switch in the TIMER MODE section in the low to high position.

_______ / _______
Date Technician

NOTE: The simulated input signal will be connected to a terminal strip in the Auxiliary Protective Cabinet (L-91). For this CEA position test, it will not be necessary to disconnect the normally attached wires.

NOTE: In the following sections, it is assumed that the most expeditious way to perform the test is to leave the C-E RTT box set up in front of one calculator and move the input signal probes until all CEA's in that channel and calculator are tested. Actual field experience may determine a more expeditious method.

.10 Attach one end of the test probes to the "VOLTAGE, CURRENT, FREQUENCY, RESISTANCE" banana jacks in the FUNCTION SIGNAL OUTPUTS section of the C-E RTT box.

_______ / _______
Date Technician

.11 Use six optical pickups. Place the optical pickups ends over the LED's in Channel A column 3 (Hi Local Power) and column 4 (Low DNBR). Insert other ends in the six STOP LAMPS banana jacks and turn ON all stop lamp switches.

_______ / _______
Date Technician

.12 Reset the CPC calculator by pushing the white (SPARE) pushbutton on the Operator's Module and entering an R (for Restart) when prompted by the TTY.

_______ / _______
Date Technician

6.0 PROCEDURE

6.23.86.13 Connect a TTY to the channel B CPC calculator and enter the command ST CR . If there are any live inputs, made them constant by entering the command NOP x CR .

/
Date Technician

.14 Inside Channel B of cabinet L-91, the Auxiliary Protection cabinet, connect the signal lead to terminal 3 and the reference lead to terminal 4 on terminal strip OTA1.

/
Date Technician

.15 At the CPC/CEAC TTY type in the command LI SG01,120,DE, BOTH CR to make parameter SG01, CEA subgroup 1 position a live input.

/
Date Technician

.16 At the CPC/CEAC TTY, enter the command GO to start the program. Verify that the point I.D. is 043 and the value is +33.000.

/
Date Technician

.17 Reset the C-E RTT box digital timer to zero.

/
Date Technician

.18 Reset the low DNBR and Hi LPD trips on the Bistable Control Panel of the PPS.

/
Date Technician

.19 Toggle the "STEP" switch to "START." When the timer stops incrementing, note the value and enter in the "DATA COLLECTION TABLE."

/
Date Technician

6.0 PROCEDURE

6.23.86.20 Repeat steps 6.23.6.12 through 6.23.6.19 for the following parameters"

CHANNEL B

OTB1

Parameter Number XX	CEA Number	Signal X	Reference Y	Performed
SG01	3	3	4	
SG02	6	7	8	/ Date Technician
SG03	10	11	12	/ Date Technician
SG04	16	15	16	/ Date Technician
SG05	17	19	20	/ Date Technician
SG06	22	23	24	/ Date Technician
SG07	25	27	28	/ Date Technician
SG08	32	31	32	/ Date Technician
SG09	33	35	36	/ Date Technician
SG10	39	39	40	/ Date Technician
SG11	40	43	44	/ Date Technician
SG12	46	47	48	/ Date Technician
SG13	52	51	52	/ Date Technician

6.0 PROCEDURE

6.23.86.20

CHANNEL B (Continued)

OTB1

Parameter Number XX	CEA Number	Signal X	Reference Y	
SG14	53	55	56	/ Date Technician
SG15	58	59	60	/ Date Technician
SG16	63	63	64	/ Date Technician
SG17	64	67	68	/ Date Technician
SG18	73	71	72	/ Date Technician
SG19	74	75	76	/ Date Technician
SG20	75	79	80	/ Date Technician

OTA2

Parameter Number XX	CEA Number	Signal X	Reference Y	
SG21	84	3	4	/ Date Technician
SG22	85	7	8	/ Date Technician
SG23	90	11	12	/ Date Technician

6.0 PROCEDURE

6.23.86.21 RTT Part 2 - Processor Timing Test

.1 Set the Calculator Select rotary switch on the OPERATOR'S MODULE to load the CPC (CEAC) calculator. The calculator not selected is memory protected.

_______ / _______
Date Technician

.2 Set up the AED 2500 Floppy Disk Drive as follows:

2.1 Turn ON the AED Floppy Disk Drive.

_______ / _______
Date Technician

2.2 Set the drive select switches so that drive A is Unit 0, drive B is Unit 1 and drive C is Unit 2.

_______ / _______
Date Technician

2.3 Place the floppy disk containing the Part 2 RTT software into the AED 2500 Floppy Disk Drive.

_______ / _______
Date Technician

2.4 Set the INIT and WP switches UP.

_______ / _______
Date Technician

2.5 Lift the IPL switch.

_______ / _______
Date Technician

2.3 Place the CPC Coldstart Loader paper tape into the TTY paper tape reader and connect the TTY to the CPC (CEAC) calculator.

_______ / _______
Date Technician

6.0 PROCEDURE

6.23.86.21.4 Hit "FUNCTION" button, then hit "LOCATION" button on the Hexadecimal Display Panel.

/
Date Technician

.5 Set up the following memory locations via the Interdata Hexadecimal Display Panel:

Location	Contents
30	0000
32	0000
34	0000
36	0050
50	D500
52	00CF
54	4300
56	0080
78	0294

/
Date Technician

.6 Read through these same locations to verify the correct contents.

/
Date Technician

.7 Start the processor at location 30.

/
Date Technician

.8 Start the TTY paper tape reader by setting the READER/PUNCH switch to the "MANUAL START" position.

/
Date Technician

.9 Respond to the TEST TRACK prompt with 55.

/
Date Technician

6.0 PROCEDURE

6.23.86.21.10 Verify that the MEMORY PROTECT key switch is OFF.

_____/_____
Date Technician

.11 Remove the disk from the AED 2500 disk drive.

_____/_____
Date Technician

.12 After approximately 10 minutes a TEST REPORT will be output to the TTY. Remove the TEST REPORT from the TTY.

_____/_____
Date Technician

.13 Verify that the actual times are within +5% of the expected time shown in Figures H-1 and H-2 in the column labeled MAX EX. of Appendix H.

_____/_____
Date Technician

.14 Attach the TEST REPORT printout to this procedure as a record of the test.

_____/_____
Date Technician

6.0 PROCEDURE

6.23.86.22 CEA Positions - CEAC to CPC RTT

NOTE: The setup for this test is similar to that for the previous test except that two CPC/CEAC TTY's are required. Operation commonds must be entered in both the CPC and CEAC TTY's. It would be desirable to have three persons available for the performance of this test.

.22.1 Move the momentary contact STEPPED FUNCTIONS STEP switch to RESET and release. The RESET light should be turned ON.

NOTE: It is assumed that the calibration of the voltage signal that was performed on the C-E RTT box for the previous test will be satisfactory for this test. If not, repeat steps 6.23.6.2 through 6.23.6.11.

.22.2 On the Bay B Operator's Module, select the CPC calculator.

.22.3 To set up the TTY's, connect one TTY to the channel B, CPC calculator and enter the command ST CR . If there are any live inputs, make them constant by entering the command NOP X CR .

.22.4 On the Bay B Operator's Module, select the CEAC calculator. The CPC memory in channel is now protected.

.22.5 Connect another TTY to the channel B CEAC calculator and enter the command ST CR . If there are any live inputs make them constant by entering the command NOP X CR . CEAC 1 in Bay B will be used for channel B tests.

.22.6 To set up the C-E RTT box, inside channel B of cabinet L-91, the Auxiliary Protection Cabinet, connect the signal lead to terminal No. 15 (and subsequently as indicated on the following tables) and the reference lead to terminal No. 15 (and subsequently as indicated on the following tables).

6.0 PROCEDURE

6.23.86.22.7 Connect the other end of the probe leads to the C-E RTT box "VOLTAGE, HIGH CURRENT, FREQUENCY, RESISTANCE" banana jacks in the FUNCTION SIGNAL OUTPUTS section.

NOTE: The output from the terminals is connected to the core protection calculators in channel B, and to an isolation amplifier for transmission to CEA calculator No. 1 in Bay B. This test utilizes the signal that is directed to the CEAC.

.22.8 Use six optical pickups. Place the optical pickup ends over the LED's in Channel B, column three (Hi Local Power) and column four (Low DNBR). Insert other ends in the six STOP LAMPS banana jacks and turn ON all stop lamps switches.

.22.9 To initialize the signals, at the CEAC TTY, type in the command LI CEAXX,120,DE CR to make the parameter CEAXX a live input. At the CEAC TTY, enter the command GO to start the program then refer to the following tables for the values that should be substituted for XX.

.22.10 On the Bay B, Operator's Module, select the CPC calculator.

.22.11 At the CPC TTY, type in the command LI PF1 BOTH CR to make the parameter Penalty Factor 1 from CEAC No. 1 a live input. PF1 will be used when checking channel B at the CPC TTY, type in the command "GO".

.22.12 Reset the CEAC calculator trip by pushing the white (SPARE) pushbutton on the Operator's Module and entering an R (for Restart) when prompted by the TTY.

.22.13 Reset the CPC calculator trip by pushing the whete (SPARE) pushbutton on the Operators Module and entering an R (for Restart) when prompted by the TTY.

6.0 PROCEDURE

6.23.86.22.14 With the appropriate selector switch selecting the CEAC, type GO on the CEAC TTY. Verify that the point I.D. displayed on the Operator's Module is 043 and the value is +33.000.

.22.15 With the appropriate selector switch selecting the CPC, type GO on the CPC TTY. Verify that the point I.D. displayed on the Operator's Module is 043 and the value is +33.000.

.22.16 Reset the Low DNBR and Hi LPD trips on the Bistable Control Panel of the PPS.

.22.17 Reset the C-E RTT box digital timer to zero.

.22.18 Move the STEP toggle switch on the C-E RTT box to START, then release.

.22.19 When the timer stops incrementing, note the value.

.22.20 Select the CEAC calculator and using the CEAC TTY, enter ST CR . Make all existing live inputs constant by entering the command NOP CEAXX, where CEAXX is the live parameter.

.22.21 Repeat steps 6.23.7.9 and 6.23.7.12 through 6.23.7.20 for all the parameters on the following list for channel B and C.

CEAC #1
CPC CHANNEL B

PARAMETER NUMBER XX		SIGNAL X	SIGNAL Y	PERFORMED INITIAL/DATE
CEA 01	OTB2-	15	16	/
CEA 02	OTA1-	3	4	/
CEA 03	OTB1-	3	4	/
CEA 04	OTA1-	7	8	/
CEA 05	OTB2-	19	20	/
CEA 06	OTB1-	7	8	/
CEA 07	OTB2-	23	24	/
CEA 08	OTA1-	11	12	/
CEA 09	OTB2-	27	28	/
CEA 10	OTB1-	11	12	/
CEA 11	OTB2-	31	32	/
CEA 12	OTA1-	15	16	/
CEA 13	OTA1-	19	20	/
CEA 14	OTB2-	35	36	/
CEA 15	OTB2-	39	40	/
CEA 16	OTB1-	15	16	/
CEA 17	OTB1-	19	20	/
CEA 18	OTB2-	43	44	/
CEA 19	OTB2-	47	48	/
CEA 20	OTA1-	23	24	/
CEA 21	OTB2-	51	52	/
CEA 22	OTB1-	23	24	/

CEAC #1
CPC CHANNEL B

PARAMETER NUMBER XX		SIGNAL X	SIGNAL Y	PERFORMED INITIAL/DATE
CEA 23	OTB2-	55	56	/
CEA 24	OTA1-	27	28	/
CEA 25	OTB2-	59	60	/
CEA 26	OT 1-	27	28	/
CEA 27	OTB2-	63	64	/
CEA 28	OTA1-	31	32	/
CEA 29	OTA1-	35	36	/
CEA 30	OTB2-	67	68	/
CEA 31	OTA2-	71	72	/
CEA 32	OTB1-	31	32	/
CEA 33	OT 1-	35	36	/
CEA 34	OTB2-	75	76	/
CEA 35	OTB2-	79	80	/
CEA 36	OTA1-	39	40	/
CEA 37	OTB3-	3	4	/
CEA 38	OTB3-	7	8	/
CEA 39	OTB1-	39	40	/
CEA 40	OTB1-	43	44	/
CEA 41	OTB3-	11	12	/
CEA 42	OTB3-	15	16	/

CEAC #1
CPC CHANNEL B

PARAMETER NUMBER XX		SIGNAL X	SIGNAL Y	PERFORMED INITIAL/DATE
CEA 43	OTA1-	43	44	/
CEA 44	OTA1-	47	48	/
CEA 45	OTB3-	19	20	/
CEA 46	OTB1-	47	48	/
CEA 47	OTB3-	23	24	/
CEA 48	OTA1-	51	52	/
CEA 49	OTA1-	55	55	/
CEA 50	OTB3-	27	28	/
CEA 51	OTB3-	31	32	/
CEA 52	OTB1-	51	52	/
CEA 53	OTB1-	55	56	/
CEA 54	OTB3-	35	36	/
CEA 55	OTB3-	39	40	/
CEA 56	OTA1-	59	60	/
CEA 57	OTB3-	43	44	/
CEA 58	OTB1-	59	60	/
CEA 59	OTB3-	47	48	/
CEA 60	OTA1-	53	54	/
CEA 61	OTB3-	43	44	/
CEA 62	OTB3-	59	60	/
CEA 63	OTB1-	47	48	/

CEAC #1
CPC CHANNEL B

PARAMETER NUMBER XX		SIGNAL X	SIGNAL Y	PERFORMED INITIAL/DATE
CEA 64	OTB1-	63	64	/
CEA 65	OTB3-	63	64	/
CEA 66	OTB3-	43	44	/
CEA 67	OTA1-	59	60	/
CEA 68	OTA1-	47	48	/
CEA 69	OTA1-	63	64	/
CEA 70	OTB3-	43	44	/
CEA 71	OTB3-	59	60	/
CEA 72	OTB3-	47	48	/
CEA 73	OTB1-	71	72	/
CEA 74	OTB1-	75	76	/
CEA 75	OTB1-	79	80	/
CEA 76	OTB3-	79	80	/
CEA 77	OTB5-	53	54	/
CEA 78	OTB5-	57	58	/
CEA 79	OTA1-	79	80	/
CEA 80	OTA2-	2	3	/
CEA 81	OTA2-	6	7	/
CEA 82	OTB5-	61	62	/
CEA 83	OTB5-	65	66	/
CEA 84	OTB2-	3	4	/

CEAC #1
CPC CHANNEL B

PARAMETER NUMBER XX		SIGNAL X	SIGNAL Y	PERFORMED INITIAL/DATE
CEA 85	OTB2-	7	7	/
CEA 86	OTB5-	69	70	/
CEA 87	OTB5-	73	74	/
CEA 88	OTA2-	10	11	/
CEA 89	OTB5-	77	78	/
CEA 90	OTB2-	11	12	/
CEA 91	OTB5-	81	82	/

6.0 PROCEDURE

6.24 High Pressurizer Pressure to RTSG Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the rotary relays trip. The C-E test box will be used as the response time measuring device.

6.24.1 Ensure the temporary LED's are installed across the rotary relay contacts per steps 6.19.1 through 6.19.3.

_______ / _______
Date Technician

6.24.2 Remove the PPS input simulator box leads from terminals 39 and 40 on TB-1 of L125, if not already removed.

_______ / _______
Date Technician

6.24.3 Connect the "Bistable Test" leads of L151 to terminals 39 and 40 on TB-1 of L125, if not already connected.

_______ / _______
Date Technician

6.24.4 On the bistable control panel being tested, rotate the bistable selector switch to position number 5.

_______ / _______
Date Technician

6.24.5 Rotate the meter input selector switch to the "TRIP SP" position.

_______ / _______
Date Technician

6.24.6 Record the value indicated on the bistable control panel digital indicator.

_______ Volts _______ / _______
Value/Units Date Technician

6.0 PROCEDURE

6.24.7 Rotate the meter input selector switch to the "INPUT" position.

/
Date Technician

6.24.8 In the "Bistable Test" section of L151 place the toggle switch in the "OPEN" position. The LED should extinguish.

/
Date Technician

6.24.9 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 4.00 Vdc $\pm$.1 Vdc.

/
Date Technician

6.24.10 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSE" position. The LED should energize.

/
Date Technician

6.24.11 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of 2L151 until the digital indicator on the bistable control panel reads approximately .1 Vdc on the tripped side of the value recorded in step 6.24.6.

/
Date Technician

6.24.12 Record the adjusted voltage.

Volts /
Value/Units Date Technician

6.24.13 Connect the optical end of a C-E test box pickup cable to the "Bistable Test" section LED of L151.

/
Date Technician

6.0 PROCEDURE

6.24.14 Connect the other end of this pickup cable to the "LED 1" jacks in the "Start Lamps" section of the C-E test box.

/
Date Technician

6.24.15 Connect the optical end of four pickup cables to the temporary LED's installed in steps 6.19.1 through 6.19.3.

/
Date Technician

6.24.16 Connect the other end of these four pickup cables to the "L1", "L2", "L3", and "L4" jacks in the "STOP LAMPS" section of the C-E test box.

6.24.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1", "L2", "L3", "L4" stop lamps toggle switches are in the "ON" position.

/
Date Technician

.2 "START LAMPS" toggle switch is in the "1/1" position.

/
Date Technician

.3 Start "TIMER MODES" switch is in the step up position.

/
Date Technician

.4 Stop "TIMER MODES" switch is in the step up position.

/
Date Technician

.5 "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

/
Date Technician

6.0 PROCEDURE

6.24.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 5 until the bistable is tripped.

_____ / _____
Date Technician

6.24.19 Ensure the toggle switch in the "Bistable Test" section of 2L151 is in the "OPEN" position.

_____ / _____
Date Technician

6.24.20 Ensure the C-E test box timer is reset.

_____ / _____
Date Technician

6.24.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on 2L151 in the "CLOSED" position. The timer should start.

_____ / _____
Date Technician

6.24.22 Record the response time.

_____ Volts _____ / _____
Value/Units Date Technician

6.24.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 5 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.24.24 Reset bistable number 5 in channel A.

_____ / _____
Date Technician

6.24.25 Repeat steps 6.24.18 through 6.24.24 substituting channel 'C' in place of channel 'A'.

_____ Volts _____ / _____
Value/Units Date Technician

6.0 PROCEDURE

6.24.25 Repeat steps 6.24.18 through 6.24.24 substituting channel 'D' in place of channel 'A'.

Volts
Value/Units Date / Technician

6.25 Low Pressurizer Pressure to RTSG Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the rotary relays trip. The C-E test box will be used as the response time measuring device.

6.25.1 Ensure the temporary LED's are installed across the rotary relay contacts per steps 6.19.1 through 6.19.3.

Date / Technician

6.25.2 Remove the PPS input simulator box leads from terminals 33 and 34 on TB-1 of L125, if not already removed.

Date / Technician

6.25.3 Connect the "Bistable Test" leads of L151 to terminals 33 and 34 on TB-1 of L125, if not already connected.

Date / Technician

6.25.4 On the bistable control panel being tested, rotate the bistable selector switch to position number 5.

Date / Technician

6.25.5 Rotate the meter input selector switch to the "TRIP SP" position.

Date / Technician

6.0 PROCEDURE

6.25.6 Record the value indicated on the bistable control panel digital indicator.

Volts
______ Value/Units ______ Date / Technician

6.25.7 Rotate the meter input selector switch to the "INPUT" position.

______ Date / Technician

6.25.8 In the "Bistable Test" section of L151 place the toggle switch in the "OPEN" position. The LED should extinguish.

______ Date / Technician

6.25.9 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of 2L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.26.5.

______ Date / Technician

6.25.10 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSE" position. The LED should energize.

______ Date / Technician

6.25.11 Adjust the "LOW COURSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads 4.00 VDC $\pm$.1 VDC.

______ Date / Technician

6.25.12 Record the adjusted voltage.

Volts
______ Value/Units ______ Date / Technician

6.0 PROCEDURE

6.25.13 Connect the optical end of a C-E test box pickup cable to the "Bistable Test" section LED of L151.

_______ / _______
Date Technician

6.25.14 Connect the other end of this pickup cable to the "LED 1" jacks in the "START LAMPS" section of the C-E test box.

_______ / _______
Date Technician

6.25.15 Connect the optical end of four pickup cables to the temporary LED's installed in steps 6.21.1 through 6.21.3.

_______ / _______
Date Technician

6.25.16 Connect the other end of these four pickup cables to the "L1", "L2", "L3", and "L4" jacks in the "STOP LAMPS" section of the C-E test box.

6.25.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1", "L2", "L3", "L4" STOP LAMPS toggle switches are in the "ON" position.

_______ / _______
Date Technician

.2 "START LAMPS" toggle switch is in the "1/1" position.

_______ / _______
Date Technician

.3 Start "TIMER MODES" switch is in the step DOWN position.

_______ / _______
Date Technician

.4 Stop "TIMER MODES" switch is in the step up position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.25.17.5 "L5" and "L6" STOP LAMPS toggle switches are in the "OFF" position.

______ / ______
Date Technician

6.25.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 6 until the bistable is tripped.

______ / ______
Date Technician

6.25.19 Ensure the toggle switch in the "Bistable Test" section of 2L151 is in the "CLOSE" position.

______ / ______
Date Technician

6.25.20 Ensure the C-E test box timer is reset and channel B bistable is reset.

______ / ______
Date Technician

6.25.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on 2L151 in the "OPEN" position. The timer should start.

______ / ______
Date Technician

6.25.22 Record the response time.

______ Volts
Value/Units ______ / ______
Date Technician

6.25.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 6 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.25.24 Reset bistable number 6 in channel A.

______ / ______
Date Technician

6.0 PROCEDURE

6.25.25 Repeat steps 6.25.18 through 6.25.24 substituting channel 'C' in place of channel 'A'.

Volts
_______________ Value/Units _______ Date / _______ Technician

6.25.26 Repeat steps 6.25.18 through 6.25.24 substituting channel 'D' in place of channel 'A'.

_______________ Value/Units _______ Date / _______ Technician

6.25.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.25.1

_______ Date / _______ Technician

6.25.28 Reset all bistables.

_______ Date / _______ Technician

6.25.29 Record the largest response time value of steps 6.25.22, 6.25.25, 6.25.26 in the Data Collection Table.

_______ Date / _______ Technician

6.26 Low Pressurizer Pressure to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test Panel L151) to the time when the mechanical or solid state relays trip. The C-E test box will be used as the response time measuring device.

6.26.1 Remove the input simulator box leads from terminals 33 and 34 on TB-1 of L125, if not already removed.

_______ Date / _______ Technician

6.0 PROCEDURE

6.26.2 Connect the "Bistable Test" leads of L151 to terminals 33 and 34 on TB-1 of L125, if not already connected.

_______/_______
Date Technician

6.26.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 25 and 27 on terminal strip TB65. This monitors contacts on the mechanical relay MR1A. (SIAS)

_______/_______
Date Technician

6.26.4 In bay 5 of cabinet B (L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 25 and 27 on terminal strip TB55. This monitors contacts on the mechanical relay MR1B. (SIAS)

_______/_______
Date Technician

6.26.5 Connect the optical end of a stop cable to the LED installed in step 6.26.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

_______/_______
Date Technician

6.26.6 Connect the optical end of a second stop cable to the LED installed in step 6.26.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

_______/_______
Date Technician

6.26.7 Connect the optical end of a start cable to the LED in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

_______/_______
Date Technician

6.0 PROCEDURE

6.26.8 On channel 'B' bistable control panel, rotate the bistable selector switch to position number 6.

_______ / _______
Date Technician

6.26.9 Rotate the meter input selector switch to the "TRIP SP" position.

_______ / _______
Date Technician

6.26.10 Record the value indicated on the bistable control panel digital indicator.

_______ Volts
Value/Units

_______ / _______
Date Technician

6.26.11 Rotate the meter input selector switch to the "INPUT" position.

_______ / _______
Date Technician

6.26.12 In the "Bistable Test" section of L151 place the toggle switch in the "OPEN" position. The LED should extinguish.

_______ / _______
Date Technician

6.26.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads approximately .1 VDC on the trip side of the value recorded in step 6.26.10.

_______ / _______
Date Technician

6.26.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

_______ / _______
Date Technician

6.0 PROCEDURE

6.26.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads 4.00 ±.1 VDC.

_______/_______
Date Technician

6.26.16 Record the adjusted voltage.

_______ Volts
Value/Units _______/_______
Date Technician

6.26.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

_______/_______
Date Technician

.2 "L3", "L4", "L5", "L6" stop lamps toggle switches are in the "OFF" position.

_______/_______
Date Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

_______/_______
Date Technician

.4 Start "Timer Modes" switch is in the step down position.

_______/_______
Date Technician

.5 Stop "Timer Modes" switch is in the step up position.

_______/_______
Date Technician

6.0 PROCEDURE

6.26.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 6 until the bistable is tripped.

______ / ______
Date Technician

6.26.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "CLOSED" position.

______ / ______
Date Technician

6.26.20 Ensure the C-E test box timer is reset and the bistable is reset in channel 'B'.

______ / ______
Date Technician

6.26.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "OPEN" position. The timer should start.

______ / ______
Date Technician

6.26.22 Record the response time.

______ ______ / ______
Value/Units Date Technician

6.26.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 6 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.26.24 Reset bistable number 6 in channel A.

______ / ______
Date Technician

6.26.25 Repeat steps 6.26.18 through 6.26.24 substituting channel 'C' in place of channel 'A'.

______ ______ / ______
Value/Units Date Technician

6.0 PROCEDURE

6.26.26 Repeat steps 6.26.18 through 6.26.24 substituting channel 'D' in place of channel 'A'.

_______________ Value/Units _______ Date / Technician _______

6.26.27 Reset all bistables.

_______ Date / Technician _______

6.26.28 Record the largest response time value of steps 6.26.22, 6.26.25, 6.26.26 in the "Data Collection Table".

_______ Date / Technician _______

6.26.29 In bay 5 of cabinet A (L034), move the optical pickup setup to terminals 43 and 45 on terminal strip 55. This monitors contacts on the solid state relay SSR1A. (CCAS)

_______ Date / Technician _______

6.26.30 In bay 5 of cabinet B (L035), move the optical pickup setup to terminals 43 and 45 on terminal strip 55. This monitors contacts on the solid state relay SSR1B. (CCAS)

_______ Date / Technician _______

6.26.31 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 6 until the bistable is tripped.

_______ Date / Technician _______

6.26.32 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "CLOSED" position.

_______ Date / Technician _______

6.0 PROCEDURE

6.26.33 Ensure the C-E test box timer and the channel 'B' bistable are both reset.

______ / ______
Date   Technician

6.26.34 Place the "Bistable Test" section toggle switch on L151 in the "OPEN" position. The timer should start.

______ / ______
Date   Technician

6.26.35 Record the response time.

______ Volts   ______ / ______
Value/Units   Date   Technician

6.26.36 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 6 until the bistable input is returned to the value adjusted for in step 6.1.1.

______ / ______
Date   Technician

6.26.37 Reset bistable number 6 in channel 'A'.

______ / ______
Date   Technician

6.26.38 Repeat steps 6.26.31 through 6.26.37 substituting channel 'C' in place of channel 'A'.

______ / ______
Date   Technician

6.26.39 Repeat steps 6.26.31 through 6.26.37 substituting channel 'D' in place of channel 'A'.

______ / ______
Date   Technician

6.0 PROCEDURE

6.26.40 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.26.1.

Date / Technician

6.26.41 Reset all bistables.

Date / Technician

6.26.42 Record the largest response time value of steps 6.26.35, 6.26.38, 6.26.39 in the "Data Collection Table".

Date / Technician

6.27 Low SG-1 Level to RTSG Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the rotary relays trip. The C-E test box will be used as the response time measuring device.

6.27.1 Ensure the temporary LED's are installed across the rotary relay contacts per steps 6.19.1 through 6.19.3.

Date / Technician

6.27.2 Remove the PPS input simulator box leads from terminals 24 and 25 on TB-1 of L125.

Date / Technician

6.27.3 Connect the "Bistable Test" leads of L151 to terminals 24 and 25 on TB-1 of L125.

Date / Technician

6.0 PROCEDURE

6.27.4 On the bistable control panel being tested, rotate the bistable selector switch to position number 7.

_______ / _______
Date Technician

6.27.5 Rotate the meter input selector switch to the "TRIP SP" position.

_______ / _______
Date Technician

6.27.6 Record the value indicated on the bistable control panel digital indicator.

_______ Volts
Value/Units

_______ / _______
Date Technician

6.27.7 Rotate the meter input selector switch to the "INPUT" position.

_______ / _______
Date Technician

6.27.8 In the "Bistable Test" section of L151 place the toggle switch in the "OPEN" position. The LED should extinguish.

_______ / _______
Date Technician

6.27.9 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 3.50 VDC $\pm$.1 VDC.

_______ / _______
Date Technician

6.27.10 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSE" position. The LED should energize.

_______ / _______
Date Technician

6.0 PROCEDURE

6.27.11 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.27.6.

______ / ______
Date Technician

6.27.12 Record the adjusted voltage.

______ Volts
Value/Units ______ / ______
Date Technician

6.27.13 Connect the optical end of a C-E test box pickup cable to the "Bistable Test" section LED of L151.

______ / ______
Date Technician

6.27.14 Connect the other end of this pickup cable to the "LED 1" jacks in the "Start Lamps" section of the C-E test box.

______ / ______
Date Technician

6.27.15 Connect the optical end of four pickup cables to the temporary LED's installed in steps 6.19.1 through 6.19.3.

______ / ______
Date Technician

6.27.16 Connect the other end of these four pickup cables to the "L1", "L2", "L3" and "L4" jacks in the "STOP LAMPS" section of the C-E test box.

6.27.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1", "L2", "L3", "L4" stop lamps toggle switches are in the "ON" position.

______ / ______
Date Technician

6.0 PROCEDURE

6.27.17.2 "START LAMPS" toggle switch is in the "1/1" position.

/
Date Technician

.3 Start "TIMER MODES" switch is in the step up position.

/
Date Technician

.4 Stop "TIMER MODES" switch is in the step up position.

/
Date Technician

.5 "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

/
Date Technician

6.27.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 7 until the bistable is tripped.

/
Date Technician

6.27.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

/
Date Technician

6.27.20 Ensure the C-E test box timer is reset.

/
Date Technician

6.27.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "CLOSED" position. The timer should start.

/
Date Technician

6.0 PROCEDURE

6.27.22 Record the response time.

_______________ Value/Units ______ Date / Technician

6.27.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 7 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.27.24 Reset bistable number 7 in channel A.

______ Date / Technician

6.27.25 Repeat steps 6.27.18 through 6.27.24 substituting channel 'C' in place of channel 'A'.

_______________ Value/Units ______ Date / Technician

6.27.26 Repeat steps 6.27.18 through 6.27.24 substituting channel 'D' in place of channel 'A'.

_______________ Value/Units ______ Date / Technician

6.27.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.27.1

______ Date / Technician

NOTE: This step may be omitted if section 6.28 is to be performed next.

6.27.28 Reset all bistables.

______ Date / Technician

6.0 PROCEDURE

6.27.29 Record the largest response time value of steps 6.27.22, 6.27.25, 6.27.26 in the Data Collection Table.

_______ / _______
Date Technician

6.28 Low SG-1 Level to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the solid state relays trip. The C-E test box will be used as the response time measuring device.

6.28.1 Remove the input simulator box leads from terminals 24 and 25 on TB-1 of L125. If not already connected.

_______ / _______
Date Technician

6.28.2 Connect the "Bistable Test" leads of L151 to terminals 24 and 25 on TB-1 of L125, if not already removed.

_______ / _______
Date Technician

6.28.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 37 and 39 on terminal strip TB55. This monitors contacts on the solid state relay SSR1A. (EFAS-1)

_______ / _______
Date Technician

6.28.4 In bay 5 of cabinet B (L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 37 and 39 on terminal strip TB55. This monitors contacts on the solid state relay SSR1B. (EFAS-1)

_______ / _______
Date Technician

6.0 PROCEDURE

6.28.5 Connect the optical end of a stop cable to the LED installed in step 6.28.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

_______ / _______
Date Technician

6.28.6 Connect the optical end of a second stop cable to the LED installed in step 6.23.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

_______ / _______
Date Technician

6.28.7 Connect the optical end of a start cable to the LED installed in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

_______ / _______
Date Technician

6.28.8 On the channel 'B' bistable control panel, rotate the bistable selector switch to position number 7.

_______ / _______
Date Technician

6.28.9 Rotate the meter input selector switch to the "TRIP SP" position.

_______ / _______
Date Technician

6.28.10 Record the value indicated on the bistable control panel digital indicator.

_______ Volts _______ / _______
Value/Units Date Technician

6.28.11 Rotate the meter input selector switch to the "INPUT" position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.28.12 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

_______ / _______
Date Technician

6.28.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads 3.50 VDC $\pm$.1 VDC.

_______ / _______
Date Technician

6.28.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

_______ / _______
Date Technician

6.28.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.28.10.

_______ / _______
Date Technician

6.28.16 Record the adjusted voltage.

_______ Volts _______ / _______
Value/Units Date Technician

6.28.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.28.17.2 "L3", "L4", "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_____ / _____
Date Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

_____ / _____
Date Technician

.4 Start "TIMER MODES" switch is in the step up position.

_____ / _____
Date Technician

.5 Stop "TIMER MODES" switch is in the step up position.

_____ / _____
Date Technician

6.28.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 7 until the bistable is tripped.

_____ / _____
Date Technician

6.28.19 Ensure the toggle switch in the "Bistable Test" section of 2L151 is in the "OPEN" position.

_____ / _____
Date Technician

6.28.20 Ensure the C-E test box timer is reset, and channel 'B' bistable is reset.

_____ / _____
Date Technician

6.28.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "CLOSE" position. The timer should start.

_____ / _____
Date Technician

6.0 PROCEDURE

6.28.22 Record the response time.

__________ Value/Units __________ Date / Technician

6.28.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 7 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.28.24 Reset bistable number 7 in channel A.

__________ Date / Technician

6.28.25 Repeat steps 6.28.18 through 6.28.24 substituting channel 'C' in place of channel 'A'.

Volts
__________ Value/Units __________ Date / Technician

6.28.26 Repeat steps 6.28.18 through 6.28.24 substituting channel 'D' in place of channel 'A'.

Volts
__________ Value/Units __________ Date / Technician

6.28.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.28.1

__________ Date / Technician

6.28.28 Reset all bistables.

__________ Date / Technician

6.28.29 Record the largest response time value of steps 6.28.22, 6.28.25, 6.28.26 in the "Data Collection Table".

__________ Date / Technician

6.29 Low SG-2 Level to RTSG Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the rotary relays trip. The C-E test box will be used as the response time measuring device.

6.29.1 Ensure the temporary LED's are installed across the rotary relay contacts per steps 6.21.1 through 6.21.3.

_______ / _______
Date Technician

6.29.2 Remove the PPS input simulator box leads from terminals 21 and 22 on TB-1 of L125.

_______ / _______
Date Technician

6.29.3 Connect the "Bistable Test" leads of L151 to terminals 21 and 22 on TB-1 of L125.

_______ / _______
Date Technician

6.29.4 On the bistable control panel being tested, rotate the bistable selector switch to position number 8.

_______ / _______
Date Technician

6.29.5 Rotate the meter input selector switch to the "TRIP SP" position.

_______ / _______
Date Technician

6.29.6 Record the value indicated on the bistable control panel digital indicator.

_______ Volts
Value/Units

_______ / _______
Date Technician

6.0 PROCEDURE

6.29.7 Rotate the meter input selector switch to the "INPUT" position.

_______ / _______
Date Technician

6.29.8 In the "Bistable Test" section of L151 place the toggle switch in the "OPEN" position. The LED should extinguish.

_______ / _______
Date Technician

6.29.9 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 3.50 VDC $\pm$.1 VDC.

_______ / _______
Date Technician

6.29.10 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSE" position. The LED should energize.

_______ / _______
Date Technician

6.29.11 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.29.6.

_______ / _______
Date Technician

6.29.12 Record the adjusted voltage.

_______ Volts
Value/Units

_______ / _______
Date Technician

6.29.13 Connect the optical end of a C-E test box pickup cable to the "Bistable Test" section LED of L151.

_______ / _______
Date Technician

6.0 PROCEDURE

6.29.14 Connect the other end of this pickup cable to the "LED 1" jacks in the "START LAMPS" section of the C-E test box.

_____ / _____
Date Technician

6.29.15 Connect the optical end of four pickup cables to the temporary LED's installed in steps 6.19.1 through 6.19.3.

_____ / _____
Date Technician

6.29.16 Connect the other end of these four pickup cables to the "L1", "L2", "L3", and "L4" jacks in the "STOP LAMPS" section of the C-E test box.

6.29.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1", "L2", "L3", "L4" stop lamps toggle switches are in the "ON" position.

_____ / _____
Date Technician

.2 "START LAMPS" toggle switch is in the "1/1" position.

_____ / _____
Date Technician

.3 Start "TIMER MODES" switch is in the step up position.

_____ / _____
Date Technician

.4 Stop "TIMER MODES" switch is in the step up position.

_____ / _____
Date Technician

.5 "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_____ / _____
Date Technician

6.0 PROCEDURE

6.29.18 Adjust the input simulator box potentiometer in cha el 'A' corresponding to bistable number 8 until the bistable is tripped.

__________ / __________
Date Technician

6.29.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

__________ / __________
Date Technician

6.29.20 Ensure the C-E test box timer is reset.

__________ / __________
Date Technician

6.29.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on 2L151 in the "CLOSE" position. The timer should start.

__________ / __________
Date Technician

6.29.22 Record the response time.

__________ __________ / __________
Value/Units Date Technician

6.29.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 8 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.29.24 Reset bistable number 8 in channel 'A'.

__________ / __________
Date Technician

6.28.25 Repeat steps 6.29.18 through 6.29.24 substituting channel 'C' in place of channel 'A'.

__________ __________ / __________
Value/Units Date Technician

6.0 PROCEDURE

6.29.26 Repeat steps 6.29.18 through 6.29.24 substituting channel 'D' in place of channel 'A'.

______ Value/Units ______ Date / Technician

6.29.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.29.1

______ Date / Technician

NOTE: This step may be omitted if section 6.30 is to be performed next.

6.29.28 Reset all bistables.

______ Date / Technician

6.29.29 Record the largest response time value of steps 6.29.22, 6.29.25, 6.29.26 in the Data Collection Table.

______ Date / Technician

6.30 Low SG-2 Level to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the solid state relays trip. The C-E test box will be used as the response time measuring device.

6.30.1 Remove the input simulator box leads from terminals 21 and 22 on TB-1 of 125, if not already removed.

______ Date / Technician

6.0 PROCEDURE

6.30.2 Connect the "Bistable Test" leads of L151 to terminals 21 and 22 on TB-1 of L125, if not already connected.

______ / ______
Date Technician

6.30.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 40 and 42 on terminal strip TB55. This monitors contacts on the solid state relay SSR1A. (EFAS-2)

______ / ______
Date Technician

6.30.4 In bay 5 of cabinet B (L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 40 and 42 on terminal strip TB55. This monitors contacts on the solid state relay SSR1B. (EFAS-2)

______ / ______
Date Technician

6.30.5 Connect the optical end of a stop cable to the LED installed in step 6.30.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

______ / ______
Date Technician

6.30.6 Connect the optical end of a second stop cable to the LED installed in step 6.28.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

______ / ______
Date Technician

6.30.7 Connect the optical end of a start cable to the LED installed in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

______ / ______
Date Technician

6.0 PROCEDURE

6.30.8 On the channel 'B' bistable control panel, rotate the bistable selector switch to position number 8.

_____ / _____
Date Technician

6.30.9 Rotate the meter input selector switch to the "TRIP SP" position.

_____ / _____
Date Technician

6.30.10 Record the value indicated on the bistable control panel digital indicator.

_____ Volts _____ / _____
Value/Units Date Technician

6.30.11 Rotate the meter input selector switch to the "INPUT" position.

_____ / _____
Date Technician

6.30.12 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

_____ / _____
Date Technician

6.30.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads 3.50 VDC $\pm$.1 VDC.

_____ / _____
Date Technician

6.30.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

_____ / _____
Date Technician

6.0 PROCEDURE

6.30.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.30.10.

_____ / _____
Date Technician

6.30.16 Record the adjusted voltage.

_____ Volts _____ / _____
Value/Units Date Technician

6.30.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

_____ / _____
Date Technician

.2 "L3", "L4", "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_____ / _____
Date Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

_____ / _____
Date Technician

.4 Start "TIMER MODES" switch is in the step up position.

_____ / _____
Date Technician

.5 Stop "TIMER MODES" switch is in the step up position.

_____ / _____
Date Technician

6.0 PROCEDURE

6.30.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 8 until the bistable is tripped.

_______ / _______
Date Technician

6.30.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

_______ / _______
Date Technician

6.30.20 Ensure the C-E test box timer is reset.

_______ / _______
Date Technician

6.30.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "CLOSE" position. The timer should start.

_______ / _______
Date Technician

6.30.22 Record the response time.

_______ Value/Units _______ / _______
Date Technician

6.30.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 8 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.30.24 Reset bistable number 8 in channel 'A'.

_______ / _______
Date Technician

6.30.25 Repeat steps 6.30.18 through 6.30.24 substituting channel 'C' in place of channel 'A'.

_______ Value/Units _______ / _______
Date Technician

6.0 PROCEDURE

6.30.26 Repeat steps 6.30.18 through 6.30.24 substituting channel 'D' in place of channel 'A'.

Value/Units ____ Date / Technician ____

6.30.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.30.1

Date / Technician ____

6.30.28 Reset all bistables.

Date / Technician ____

6.30.29 Record the largest response time value of steps 6.30.22, 6.30.25, 6.30.26 in the "Data Collection Table".

Date / Technician ____

6.31 Low SG-1 Pressure to RTSG Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the rotary relays trip. The C-E test box will be used as the response time measuring device.

6.31.1 Ensure the temporary LED's are installed across the rotary relay contacts per steps 6.19.1 through 6.19.3.

Date / Technician ____

6.31.2 Remove the PPS input simulator box leads from terminals 30 and 31 on TB-1 of L125.

Date / Technician ____

6.0 PROCEDURE

6.31.3 Connect the "Bistable Test" leads of L151 to terminals 30 and 31 on TB-1 of L125.

Date / Technician

6.31.4 On the bistable control panel being tested, rotate the bistable selector switch to position number 11.

Date / Technician

6.31.5 Rotate the meter input selector switch to the "TRIP SP" position.

Date / Technician

6.31.6 Record the value indicated on the bistable control panel digital indicator.

Volts
Value/Units

Date / Technician

6.31.7 Rotate the meter input selector switch to the "INPUT" position.

Date / Technician

6.31.8 In the "Bistable Test" section of L151 place the toggle switch in the "OPEN" position. The LED should extinguish.

Date / Technician

6.31.9 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.31.6.

Date / Technician

6.0 PROCEDURE

6.31.10 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSE" position. The LED should energize.

_______________/_______________
Date Technician

6.31.11 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads 3.70 VDC ±.1 VDC.

_______________/_______________
Date Technician

6.31.12 Record the adjusted voltage.

_______________Volts
Value/Units

_______________/_______________
Date Technician

6.31.13 Connect the optical end of a C-E test box pickup cable to the "Bistable Test" section LED of L151.

_______________/_______________
Date Technician

6.31.14 Connect the other end of this pickup cable to the "LED 1" jacks in the "START LAMPS" section of the C-E test box.

_______________/_______________
Date Technician

6.31.15 Connect the optical end of four pickup cables to the temporary LED's installed in steps 6.19.1 through 6.19.3.

_______________/_______________
Date Technician

6.31.16 Connect the other end of these four pickup cables to the "L1", "L2", "L3" and "L4" jacks in the "STOP LAMPS" section of the C-E test box.

6.0 PROCEDURE

6.31.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1", "L2", "L3", "L4" stop lamps toggle switches are in the "ON" position.

/
Date Technician

.2 "START LAMPS" toggle switch is in the "1/1" position.

/
Date Technician

.3 Start "TIMER MODES" switch is in the step up position.

/
Date Technician

.4 Stop "TIMER MODES" switch is in the step down position.

/
Date Technician

.5 "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

/
Date Technician

6.31.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 11 until the bistable is tripped.

/
Date Technician

6.31.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "CLOSED" position.

/
Date Technician

6.0 PROCEDURE

6.31.20 Ensure the C-E test box timer is reset .

_______________ / _______________
Date Technician

6.31.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "OPEN" position. The timer should start.

_______________ / _______________
Date Technician

6.31.22 Record the response time.

_______________ _______________ / _______________
Value/Units Date Technician

6.31.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 11 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.31.24 Reset bistable number 11 in channel 'A'.

_______________ / _______________
Date Technician

6.31.25 Repeat steps 6.31.18 through 6.31.24 substituting channel 'C' in place of channel 'A'.

Volts
_______________ _______________ / _______________
Value/Units Date Technician

6.31.26 Repeat steps 6.31.18 through 6.31.24 substituting channel 'D' in place of channel 'A'.

Volts
_______________ _______________ / _______________
Value/Units Date Technician

6.31.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.31.1

_______________ / _______________
Date Technician

6.0 PROCEDURE

NOTE: This step may be omitted if section 6.32 is to be performed next.

6.31.28 Reset all bistables.

_______/_______
Date Technician

6.31.29 Record the largest response time value of steps 6.31.22, 6.31.25, 6.31.26 in the "Data Collection Table".

_______/_______
Date Technician

6.32 Low SG-1 Pressure to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the solid state relays trip. The C-E test box will be used as the response time measuring device.

6.32.1 Remove the input simulator box leads from terminals 33 and 31 on TB-1 of L125, if not already removed.

_______/_______
Date Technician

6.32.2 Connect the "Bistable Test" leads of L151 to terminals 30 and 31 on TB-1 of L125, if not already connected.

_______/_______
Date Technician

6.32.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 34 and 36 on terminal strip TB65. This monitors contacts on the solid state relay SSR1A. (MSIS)

_______/_______
Date Technician

6.0 PROCEDURE

6.32.4 In bay 5 of cabinet B (L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 34 and 35 on terminal strip TB55. This monitors contacts on the solid state relay SSR1B. (MSIS)

_____ / _____
Date Technician

6.32.5 Connect the optical end of a stop cable to the LED installed in step 6.32.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

_____ / _____
Date Technician

6.32.6 Connect the optical end of a second stop cable to the LED installed in step 6.32.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

_____ / _____
Date Technician

6.32.7 Connect the optical end of a start cable to the LED installed in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

_____ / _____
Date Technician

6.32.8 On the channel 'B' bistable control panel, rotate the bistable selector switch to position number 11.

_____ / _____
Date Technician

6.32.9 Rotate the meter input selector switch to the "TRIP SP" position.

_____ / _____
Date Technician

6.32.10 Record the value indicated on the bistable control panel digital indicator.

_____ Volts _____ / _____
Value/Units Date Technician

6.0 PROCEDURE

6.32.11 Rotate the meter input selector switch to the "INPUT" position.

_______ / _______
Date Technician

6.32.12 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

_______ / _______
Date Technician

6.32.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.32.6.

_______ / _______
Date Technician

6.32.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

_______ / _______
Date Technician

6.32.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads 3.70 VDC $\pm$.1 VDC.

_______ / _______
Date Technician

6.32.16 Record the adjusted voltage.

_______ Volts _______ / _______
Value/Units Date Technician

6.0 PROCEDURE

6.32.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

_____ / _____
Date Technician

.2 "L3", "L4", "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_____ / _____
Date Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

_____ / _____
Date Technician

.4 Start "TIMER MODES" switch is in the step DOWN position.

_____ / _____
Date Technician

.5 Stop "TIMER MODES" switch is in the step up position.

_____ / _____
Date Technician

6.32.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 11 until the bistable is tripped.

_____ / _____
Date Technician

6.32.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "CLOSED" position.

_____ / _____
Date Technician

6.32.20 Ensure the C-E test box timer is reset.

_____ / _____
Date Technician

6.0 PROCEDURE

6.32.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "OPEN" position. The timer should start.

_______________/_______________
Date Technician

6.32.22 Record the response time.

_______________ _______________/_______________
Value/Units Date Technician

6.32.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 11 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.32.24 Reset bistable number 11 in channel 'A'.

_______________/_______________
Date Technician

6.32.25 Repeat steps 6.32.18 through 6.32.24 substituting channel 'C' in place of channel 'A'.

_______________ _______________/_______________
Value/Units Date Technician

6.32.26 Repeat steps 6.32.18 through 6.32.24 substituting channel 'D' in place of channel 'A'.

_______________ _______________/_______________
Value/Units Date Technician

6.32.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.32.1

_______________/_______________
Date Technician

6.32.28 Reset all bistables.

_______________/_______________
Date Technician

6.0 PROCEDURE

6.32.29 Record the largest response time value of steps 6.32.22, 6.32.25, 6.32.26 in the "Data Collection Table".

_______ / _______
Date Technician

6.33 Low SG-2 Pressure to RTSG Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the rotary relays trip. The C-E test box will be used as the response time measuring device.

6.33.1 Ensure the temporary LED's are installed across the rotary relay contacts per steps 6.19.1 through 6.19.3.

_______ / _______
Date Technician

6.33.2 Remove the PPS input simulator box leads from terminals 27 and 23 on TB-1 of L125, if not already removed.

_______ / _______
Date Technician

6.33.3 Connect the "Bistable Test" leads of L151 to terminals 27 and 23 on TB-1 of L125, if not already connected.

_______ / _______
Date Technician

6.33.4 On the bistable control panel being tested, rotate the bistable selector switch to position number 12.

_______ / _______
Date Technician

6.33.5 Rotate the meter input selector switch to the "TRIP SP" position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.33.6 Record the value indicated on the bistable control panel digital indicator.

Volts
Value/Units ____ Date ____ / Technician ____

6.33.7 Rotate the meter input selector switch to the "INPUT" position.

Date ____ / Technician ____

6.33.8 In the "Bistable Test" section of L151 place the toggle switch in the "OPEN" position. The LED should extinguish.

Date ____ / Technician ____

6.33.9 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.33.6.

Date ____ / Technician ____

6.33.10 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSE" position. The LED should energize.

Date ____ / Technician ____

6.33.11 Adjust the "Low Coarse" and "Low Fine" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 3.70 VDC ±.1 VDC.

Date ____ / Technician ____

6.33.12 Record the adjusted voltage.

Volts
Value/Units ____ Date ____ / Technician ____

6.0 PROCEDURE

6.33.13 Connect the optical end of a C-E test box pickup cable to the "Bistable Test" section LED of L151.

______ / ______
Date Technician

6.33.14 Connect the other end of this pickup cable to the "LED 1" jacks in the "START LAMPS" section of the C-E test box.

______ / ______
Date Technician

6.33.15 Connect the optical end of four pickup cables to the temporary LED's installed in steps 6.19.1 through 6.21.3.

______ / ______
Date Technician

6.32.16 Connect the other end of these four pickup cables to the "L1", "L2", "L3" and "L4" jacks in the "STOP LAMPS" section of the C-E test box.

6.33.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1", "L2", "L3", "L4" stop lamps toggle switches are in the "ON" position.

______ / ______
Date Technician

.2 "START LAMPS" toggle switch is in the "1/1" position.

______ / ______
Date Technician

.3 Start "TIMER MODES" switch is in the step DOWN position.

______ / ______
Date Technician

.4 Stop "TIMER MODES" switch is in the step up position.

______ / ______
Date Technician

6.0 PROCEDURE

6.33.17.5 "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_______ / _______
Date Technician

6.33.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 12 until the bistable is tripped.

_______ / _______
Date Technician

6.33.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "CLOSED" position.

_______ / _______
Date Technician

6.33.20 Ensure the C-E test box timer is reset.

_______ / _______
Date Technician

6.33.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "OPEN" position. The timer should start.

_______ / _______
Date Technician

6.33.22 Record the response time.

_______ Volts _______ / _______
Value/Units Date Technician

6.33.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 12 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.33.24 Reset bistable number 12 in channel 'A'.

_______ / _______
Date Technician

6.0 PROCEDURE

6.33.25 Repeat steps 6.33.18 through 6.33.24 substituting channel 'C' in place of channel 'A'.

_______ Value/Units _______ Date / Technician

6.33.26 Repeat steps 6.33.18 through 6.33.24 substituting channel 'D' in place of channel 'A'.

_______ Value/Units _______ Date / Technician

6.33.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.32.1

_______ Date / Technician

NOTE: This step may be omitted if section 6.34 is to be performed next.

6.33.28 Reset all bistables.

_______ Date / Technician

6.33.29 Record the largest response time value of steps 6.33.22, 6.33.25, 6.33.26 in the "Data Collection Table".

_______ Date / Technician

6.34 Low SG-2 Level to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the solid state relays trip. The C-E test box will be used as the response time measuring device.

6.0 PROCEDURE

6.34.1 Remove the input simulator box leads from terminals 27 and 28 on TB-1 of L125, if not already removed.

/
Date Technician

6.34.2 Connect the "Bistable Test" leads of L151 to terminals 27 and 28 on TB-1 of L125, if not already connected.

/
Date Technician

6.34.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 34 and 36 on terminal strip TB65. This monitors contacts on the solid state relay SSR1A. (MSIS)

/
Date Technician

6.34.4 In bay 5 of cabinet B (L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 34 and 36 on terminal strip TB55. This monitors contacts on the solid state relay SSR1B. (MSIS)

/
Date Technician

6.34.5 Connect the optical end of a stop cable to the LED installed in step 6.34.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

/
Date Technician

6.34.6 Connect the optical end of a second stop cable to the LED installed in step 6.34.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

/
Date Technician

6.0 PROCEDURE

6.34.7 Connect the optical end of a start cable to the LED installed in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

_____ / _____
Date Technician

6.34.8 On the channel 'B' bistable control panel, rotate the bistable selector switch to position number 12.

_____ / _____
Date Technician

6.34.9 Rotate the meter input selector switch to the "TRIP SP" position.

_____ / _____
Date Technician

6.34.10 Record the value indicated on the bistable control panel digital indicator.

_____ Volts
Value/Units

_____ / _____
Date Technician

6.34.11 Rotate the meter input selector switch to the "INPUT" position.

_____ / _____
Date Technician

6.34.12 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

_____ / _____
Date Technician

6.34.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.34.6.

_____ / _____
Date Technician

6.0 PROCEDURE

6.34.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

_____/_____
Date Technician

6.34.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads 3.70 VDC ± .1 VDC.

_____/_____
Date Technician

6.34.16 Record the adjusted voltage.

_____ Volts
Value/Units

_____/_____
Date Technician

6.34.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

_____/_____
Date Technician

.2 "L3", "L4", "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_____/_____
Date Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

_____/_____
Date Technician

.4 Start "TIMER MODES" switch is in the step DOWN position.

_____/_____
Date Technician

.5 Stop "TIMER MODES" switch is in the step up position.

_____/_____
Date Technician

6.0 PROCEDURE

6.34.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 12 until the bistable is tripped.

_______ / _______
Date Technician

6.34.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "CLOSED" position.

_______ / _______
Date Technician

6.34.20 Ensure the C-E test box timer is reset.

_______ / _______
Date Technician

6.34.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "OPEN" position. The timer should start.

_______ / _______
Date Technician

6.34.22 Record the response time.

_______ _______ / _______
Value/Units Date Technician

6.34.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 12 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.34.24 Reset bistable number 12 in channel 'A'.

_______ / _______
Date Technician

6.0 PROCEDURE

6.34.25 Repeat steps 6.34.18 through 6.34.24 substituting channel 'C' in place of channel 'A'.

_______________ Value/Units   _______ Date / _______ Technician

6.34.26 Repeat steps 6.34.18 through 6.34.24 substituting channel 'D' in place of channel 'B'.

_______________ Value/Units   _______ Date / _______ Technician

6.34.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.34.1

_______ Date / _______ Technician

6.34.28 Reset all bistables.

_______ Date / _______ Technician

6.34.29 Record the largest response time value of steps 6.34.22, 6.34.25, 6.34.26 in the Data Collection Table.

_______ Date / _______ Technician

6.35 High Containment Pressure to RTSG Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the rotary relays trip. The C-E test box will be used as the response time measuring device.

6.35.1 Ensure the temporary LED's are installed across the rotary relay contacts per steps 6.19.1 through 6.19.3.

_______ Date / _______ Technician

6.0 PROCEDURE

6.35.2 Remove the PPS input simulator box leads from terminals 43 and 44 on TB-1 of L125, if not already removed.

______ / ______
Date Technician

6.35.3 Connect the "Bistable Test" leads of L151 to terminals 43 and 44 on TB-1 of L125, if not already connected.

______ / ______
Date Technician

6.35.4 On the bistable control panel being tested, rotate the bistable selector switch to position number 13.

______ / ______
Date Technician

6.35.5 Rotate the meter input selector switch to the "TRIP SP" position.

______ / ______
Date Technician

6.35.6 Record the value indicated on the bistable control panel digital indicator.

______ Volts ______ / ______
Value/Units Date Technician

6.35.7 Rotate the meter input selector switch to the "INPUT" position.

______ / ______
Date Technician

6.35.8 In the "Bistable Test" section of L151 place the toggle switch in the "OPEN" position. The LED should extinguish.

______ / ______
Date Technician

6.0 PROCEDURE

6.35.9 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 1.00 VDC ± .1 VDC.

_______ / _______
Date Technician

6.35.10 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSE" position. The LED should energize.

_______ / _______
Date Technician

6.35.11 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.35.6.

_______ / _______
Date Technician

6.35.12 Record the adjusted voltage.

_______ Volts _______ / _______
Value/Units Date Technician

6.35.13 Connect the optical end of a C-E test box pickup cable to the "Bistable Test" section LED of L151.

_______ / _______
Date Technician

6.35.14 Connect the other end of this pickup cable to the "LED 1" jacks in the "START LAMPS" section of the C-E test box.

_______ / _______
Date Technician

6.35.15 Connect the optical end of four pickup cables to the temporary LED's installed in steps 6.19.1 through 6.19.3.

_______ / _______
Date Technician

6.0 PROCEDURE

6.35.16 Connect the other end of these four pickup cables to the "L1", "L2", "L3" and "L4" jacks in the "STOP LAMPS" section of the C-E test box.

6.35.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1", "L2", "L3", "L4" stop lamps toggle switches are in the "ON" position.

Date / Technician

.2 "START LAMPS" toggle switch is in the "1/1" position.

Date / Technician

.3 Start "TIMER MODES" switch is in the step up position.

Date / Technician

.4 Stop "TIMER MODES" switch is in the step up position.

Date / Technician

.5 "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

Date / Technician

6.35.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 13 until the bistable is tripped.

Date / Technician

6.35.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

Date / Technician

6.0 PROCEDURE

6.35.20 Ensure the C-E test box timer is reset.

_____ / _____
Date Technician

6.35.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "CLOSED" position. The timer should start.

_____ / _____
Date Technician

6.35.22 Record the response time.

_____ _____ / _____
Value/Units Date Technician

6.35.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 13 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.35.24 Reset bistable number 13 in channel 'A'.

_____ / _____
Date Technician

6.35.25 Repeat steps 6.35.18 through 6.35.24 substituting channel 'C' in place of channel 'A'.

_____ _____ / _____
Value/Units Date Technician

6.35.26 Repeat steps 6.35.18 through 6.35.24 substituting channel 'D' in place of channel 'A'.

_____ _____ / _____
Value/Units Date Technician

6.35.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the Terminals they were removed from in step 6.35.1

_____ / _____
Date Technician

NOTE: This step may be omitted if section 6.36 is to be performed next.

6.0 PROCEDURE

6.35.28 Reset all bistables.

_______/_______
Date Technician

6.35.29 Record the largest response time value of steps 6.35.22, 6.35.25, 6.35.25 in the Data Collection Table.

_______/_______
Date Technician

6.36 High Containment Pressure to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the solid state or mechanical relays trip. The C-E test box will be used as the response time measuring device.

6.36.1 Remove the input simulator box leads from terminals 43 and 44 on TB-1 of L125.

_______/_______
Date Technician

6.36.2 Connect the "Bistable Test" leads of L151 to terminals 43 and 44 on TB-1 of L125.

_______/_______
Date Technician

6.36.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 28 and 30 on terminal strip TB65. This monitors contacts on the mechanical relay MR1A. (CIAS)

_______/_______
Date Technician

6.0 PROCEDURE

6.36.4 In bay 5 of cabinet B (L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 28 and 30 on terminal strip TB55. This monitors contacts on the mechanical relay MRID. (CIAS)

______ / ______
Date Technician

6.36.5 Connect the optical end of a stop cable to the LED installed in step 6.36.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

______ / ______
Date Technician

6.36.6 Connect the optical end of a second stop cable to the LED installed in step 6.36.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

______ / ______
Date Technician

6.36.7 Connect the optical end of a start cable to the LED in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

______ / ______
Date Technician

6.36.8 On the channel 'B' bistable control panel, rotate the bistable selector switch to position number 18.

______ / ______
Date Technician

6.36.9 Rotate the meter input selector switch to the "TRIP SP" position.

______ / ______
Date Technician

6.36.10 Record the value indicated on the bistable control panel digital indicator.

______ Volts
Value/Units

______ / ______
Date Technician

6.0 PROCEDURE

6.36.11 Rotate the meter input selector switch to the "INPUT" position.

_______ / _______
Date Technician

6.36.12 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

_______ / _______
Date Technician

6.36.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 1.00 VDC $\pm$ .1 VDC.

_______ / _______
Date Technician

6.36.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

_______ / _______
Date Technician

6.36.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.36.10.

_______ / _______
Date Technician

6.36.16 Record the adjusted voltage.

_______ Volts _______ / _______
Value/Units Date Technician

6.0 PROCEDURE

6.36.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

_______ / _______
Date Technician

.2 "L3", "L4", "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_______ / _______
Date Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

_______ / _______
Date Technician

.4 Start "TIMER MODES" switch is in the step up position.

_______ / _______
Date Technician

.5 Stop "TIMER MODES" switch is in the step up position.

_______ / _______
Date Technician

6.36.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 18 until the bistable is tripped.

_______ / _______
Date Technician

6.36.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

_______ / _______
Date Technician

6.36.20 Ensure the C-E test box timer is reset.

_______ / _______
Date Technician

6.0 PROCEDURE

6.36.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "CLOSE" position. The timer should start.

Date / Technician

6.36.22 Record the response time.

Value/Units Date / Technician

6.36.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 18 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.36.24 Reset bistable number 18 in channel 'A'.

Date / Technician

6.36.25 Repeat steps 6.36.18 through 6.36.24 substituting channel 'C' in place of channel 'A'.

Value/Units Date / Technician

6.36.26 Repeat steps 6.36.18 through 6.36.24 substituting channel 'D' in place of channel 'A'.

Value/Units Date / Technician

6.36.27 Reset all bistables.

Date / Technician

6.36.28 Record the largest response time value of steps 6.36.22, 6.36.25, 6.36.26 in the "Data Collection Table."

Date / Technician

6.0 PROCEDURE

6.36.29 In bay 5 of cabinet A (L034), move the optical pickup setup to terminals 43 and 45 on terminal strip 65. This monitors contacts on the solid state relay SSR1A. (CCAS)

_______ / _______
Date Technician

6.36.30 In bay 5 of cabinet B (L035), move the optical pickup setup to terminals 43 and 45 on terminal strip 55. This monitors contacts on the solid state relay SSR1B. (CCAS)

_______ / _______
Date Technician

6.36.31 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 18 until the bistable is tripped.

6.36.32 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

_______ / _______
Date Technician

6.36.33 Ensure the C-E test box timer and the channel 'B' bistable are both reset.

_______ / _______
Date Technician

6.36.34 Place the "Bistable Test" section toggle switch on L151 in the "CLOSE" position. The timer should start.

_______ / _______
Date Technician

6.36.35 Record the response time.

_______ / _______
Date Technician

6.36.36 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 18 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.0 PROCEDURE

6.36.37 Reset bistable number 18 in channel 'A'.

Date / Technician

6.36.38 Repeat steps 6.36.31 through 6.36.37 substituting channel 'C' in place of channel 'A'.

Date / Technician

6.36.39 Repeat steps 6.36.31 through 6.36.37 substituting channel 'D' in place of channel 'A'.

Date / Technician

6.36.40 Reset all bistables.

Date / Technician

6.36.41 Record the largest response time value of steps 6.36.35, 6.36.38, 6.36.39 in the "Data Collection Table".

Date / Technician

6.36.42 In bay 6 of cabinet A (L034), move the optical pickup setup to terminals 25 and 27 on terminal strip 55. This monitors contacts on the mechanical relay MR1A. (SIAS)

Date / Technician

6.36.43 In bay 5 of cabinet B (L035), move the optical pickup setup to terminals 25 and 27 on terminal strip 55. This monitors contacts on the mechanical relay MR1B. (SIAS)

Date / Technician

6.36.44 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 18 until the bistable is tripped.

6.0 PROCEDURE

6.36.45 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

Date / Technician

6.36.46 Ensure the C-E test box timer and the channel 'B' bistable are both reset.

Date / Technician

6.36.47 Place the "Bistable Test" section toggle switch on L151 in the "CLOSE position. The timer should start.

Date / Technician

6.36.48 Record the response time.

Volts
Value/Units Date / Technician

6.36.49 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 18 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.36.50 Reset bistable number 18 in channel 'A'.

Date / Technician

6.36.51 Repeat steps 6.36.44 through 6.36.50 substituting channel 'C' in place of channel 'A'.

Value/Units Date / Technician

6.36.52 Repeat steps 6.36.44 through 6.36.50 substituting channel 'D' in place of channel 'A'.

Value/Units Date / Technician

6.0 PROCEDURE

6.36.53 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.36.1

/
Date Technician

6.36.54 Reset all bistables.

/
Date Technician

6.36.55 Record the largest response time value of steps 6.36.35, 6.36.38, 6.36.39 in the "Data Collection Table".

/
Date Technician

6.37 Low SG-1 Flow to RTSG Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the rotary relays trip. The C-E test box will be used as the response time measuring device.

6.37.1 Ensure the temporary LED's are installed across the rotary relay contacts per steps 6.19.1 through 6.19.3.

/
Date Technician

6.37.2 Remove the PPS input simulator box leads from terminals 13 and 14 on TB-3 of L125.

/
Date Technician

6.37.3 Connect the "Bistable Test" leads of L151 to terminals 13 and 14 on TB-3 of L125.

/
Date Technician

6.0 PROCEDURE

6.37.4 On the bistable control panel being tested, rotate the bistable selector switch to position number 15.

_____ / _____
Date / Technician

6.37.5 Rotate the meter input selector switch to the "TRIP SP" position.

_____ / _____
Date / Technician

6.37.6 Record the value indicated on the bistable control panel digital indicator.

_____ Volts
Value/Units

_____ / _____
Date / Technician

6.37.7 Rotate the meter input selector switch to the "INPUT" position.

_____ / _____
Date / Technician

6.37.8 In the "Bistable Test" section of L151 place the toggle switch in the "OPEN" position. The LED should extinguish.

_____ / _____
Date / Technician

6.37.9 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.37.6.

_____ / _____
Date / Technician

6.37.10 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSE" position. The LED should energize.

_____ / _____
Date / Technician

6.0 PROCEDURE

6.37.11 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 5.00 VDC $\pm$ .1 VDC.

_______ / _______
Date Technician

6.37.12 Record the adjusted voltage.

_______ Volts
Value/Units

_______ / _______
Date Technician

6.37.13 Connect the optical end of a C-E test box pickup cable to the "Bistable Test" section LED of L151.

_______ / _______
Date Technician

6.37.14 Connect the other end of this pickup cable to the "LED 1" jacks in the "START LAMPS" section of the C-E test box.

_______ / _______
Date Technician

6.37.15 Connect the optical end of four pickup cables to the temporary LED's installed in steps 6.19.1 through 6.19.3.

_______ / _______
Date Technician

6.37.16 Connect the other end of these four pickup cables to the "L1", "L2", "L3" and "L4" jacks in the "STOP LAMPS" section of the C-E test box.

6.37.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1", "L2", "L3", "L4" stop lamps toggle switches are in the "ON" position.

_______ / _______
Date Technician

.2 "START LAMPS" toggle switch is in the "1/1" position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.37.17.3 Start "TIMER MODES" switch is in the step down position.

_______ / _______
Date Technician

.4 Stop "TIMER MODES" switch is in the step up position.

_______ / _______
Date Technician

.5 "L5" and "L6" STOP LAMPS toggle switches are in the "OFF" position.

_______ / _______
Date Technician

6.37.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 15 until the bistable is tripped.

_______ / _______
Date Technician

6.37.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "CLOSE" position.

_______ / _______
Date Technician

6.37.20 Ensure the C-E test box timer is reset.

_______ / _______
Date Technician

6.37.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "OPEN" position. The timer should start.

_______ / _______
Date Technician

6.37.22 Record the response time.

_______ _______ / _______
Value/Units Date Technician

6.0 PROCEDURE

6.37.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 15 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.37.24 Reset bistable number 15 in channel A.

________/________
Date Technician

6.37.25 Repeat steps 6.36.18 through 6.36.24 substituting channel 'C' in place of channel 'A'.

________ ________/________
Value/Units Date Technician

6.37.26 Repeat steps 6.37.18 through 6.37.24 substituting channel 'D' in place of channel 'A'.

________ ________/________
Value/Units Date Technician

6.37.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.37.1

________/________
Date Technician

6.37.28 Reset all bistables.

________/________
Date Technician

6.37.29 Record the largest response time value of steps 6.37.22, 6.37.25, 6.37.26 in the "Data Collection Table".

________/________
Date Technician

6.0 PROCEDURE

6.38 Low SG-2 Flow to RTSG Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the rotary relays trip. The C-E test box will be used as the response time measuring device.

6.38.1 Ensure the temporary LED's are installed across the rotary relay contacts per steps 6.19.1 through 6.19.3

_______ / _______
Date Technician

6.38.2 Remove the PPS input simulator box leads from terminals 19 and 20 on TB-3 of L125.

_______ / _______
Date Technician

6.38.3 Connect the "Bistable Test" leads of L151 to terminals 19 and 20 on TB-3 of L125.

_______ / _______
Date Technician

6.38.4 On the bistable control panel being tested, rotate the bistable selector switch to position number 16.

_______ / _______
Date Technician

6.38.5 Rotate the meter input selector switch to the "TRIP SP" position.

_______ / _______
Date Technician

6.38.6 Record the value indicated on the bistable control panel digital indicator.

_______ Volts _______ / _______
Value/Units Date Technician

6.38.7 Rotate the meter input selector switch to the "INPUT" position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.38.8 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

_______ / _______
Date Technician

6.38.9 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.38.6.

_______ / _______
Date Technician

6.38.10 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSE" position. The LED should energize.

_______ / _______
Date Technician

6.38.11 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads 5.00 VDC $\pm$ .1 VDC.

_______ / _______
Date Technician

6.38.12 Record the adjusted voltage.

_______ Volts
Value/Units

_______ / _______
Date Technician

6.38.13 Connect the optical end of a C-E test box pickup cable to the "Bistable Test" section LED of L151.

_______ / _______
Date Technician

6.38.14 Connect the other end of this pickup cable to the "LED 1" jacks in the "START LAMPS" section of the C-E test box.

_______ / _______
Date Technician

6.0 PROCEDURE

6.38.15 Connect the optical end of four pickup cables to the temporary LED's installed in steps 6.19.1 through 6.19.3.

_____/_____
Date Technician

6.38.16 Connect the other end of these four pickup cables to the "L1", "L2", "L3" and "L4" jacks in the "STOP LAMPS" section of the C-E test box.

6.38.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1", "L2", "L3", "L4" stop lamps toggle switches are in the "ON" position.

_____/_____
Date Technician

.2 "START LAMPS" toggle switch is in the "1/1" position.

_____/_____
Date Technician

.3 Start "TIMER MODES" switch is in the step down position.

_____/_____
Date Technician

.4 Stop "TIMER MODES" switch is in the step up position.

_____/_____
Date Technician

.5 "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_____/_____
Date Technician

6.38.18 Adjust the input simulator box potentiometer in channel 'B' corresponding to bistable number 16 until the bistable is tripped.

_____/_____
Date Technician

6.0 PROCEDURE

6.38.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "CLOSED" position.

_______ / _______
Date Technician

6.38.20 Ensure the C-E test box timer is reset.

_______ / _______
Date Technician

6.38.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "OPEN" position. The timer should start.

_______ / _______
Date Technician

6.38.22 Record the response time.

_______ _______ / _______
Value/Units Date Technician

6.38.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 16 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.38.24 Reset bistable number 16 in channel 'A'.

_______ / _______
Date Technician

6.38.25 Repeat steps 6.38.18 through 6.38.24 substituting channel 'C' in place of channel 'A'.

_______ _______ / _______
Value/Units Date Technician

6.38.26 Repeat steps 6.38.18 through 6.38.24 substituting channel 'D' in place of channel 'A'.

_______ _______ / _______
Value/Units Date Technician

6.0 PROCEDURE

6.38.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.38.1

/
Date Technician

6.38.28 Reset all bistables.

/
Date Technician

6.38.29 Record the largest response time value of steps 6.38.22, 6.38.25, 6.38.26 in the "Data Collection Table".

/
Date Technician

6.39 High-High Containment Pressure to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the solid state relays trip. The C-E test box will be used as the response time measuring device.

6.39.1 Remove the input simulator box leads from terminals 46 and 47 on TB-1 of L125.

/
Date Technician

6.39.2 Connect the "Bistable Test" leads of L151 to terminals 46 and 47 on TB-1 of L125.

/
Date Technician

6.39.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 46 and 48 on terminal strip TB65. This monitors contacts on the solid state relay SSR1A (CCAS)

/
Date Technician

6.0 PROCEDURE

6.39.4 In bay 5 of cabinet B (2L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 45 and 48 on terminal strip TB55. This monitors contacts on the mechanical relay SSR1B. (CSAS)

_____ / _____
Date Technician

6.39.5 Connect the optical end of a stop cable to the LED installed in step 6.39.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

_____ / _____
Date Technician

6.39.6 Connect the optical end of a second stop cable to the LED installed in step 6.39.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

_____ / _____
Date Technician

6.39.7 Connect the optical end of a start cable to the LED installed in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

_____ / _____
Date Technician

6.39.8 On the channel 'B' bistable control panel, rotate the bistable selector switch to position number 19.

_____ / _____
Date Technician

6.39.9 Rotate the meter input selector switch to the "TRIP SP" position.

_____ / _____
Date Technician

6.39.10 Record the value indicated on the bistable control panel digital indicator.

_____ _____ / _____
Value/Units Date Technician

6.0 PROCEDURE

6.39.11 Rotate the meter input selector switch to the "INPUT" position.

/
Date Technician

6.39.12 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

/
Date Technician

6.39.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 1.00 VDC ± .1 VDC.

/
Date Technician

6.39.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

/
Date Technician

6.39.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.39.10.

/
Date Technician

6.39.16 Record the adjusted voltage.

Volts
Value/Units Date / Technician

6.39.17 Energize the C-E test box and ensure the following switches are in the correct positions.

6.0 PROCEDURE

6.39.17.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

Date / Technician

.2 "L3", "L4", "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

Date / Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

Date / Technician

.4 Start "TIMER MODES" switch is in the step up position.

Date / Technician

.5 Stop "TIMER MODES" switch is in the step up position.

Date / Technician

6.39.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 19 until the bistable is tripped.

Date / Technician

6.39.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

Date / Technician

6.39.20 Ensure the C-E test box timer is reset.

Date / Technician

6.0 PROCEDURE

6.39.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "CLOSE" position. The timer should start.

_____ / _____
Date Technician

6.39.22 Record the response time.

_____ _____ / _____
Value/Units Date Technician

6.39.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 19 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.39.24 Reset bistable number 19 in channel 'A'.

_____ / _____
Date Technician

6.39.25 Repeat steps 6.39.18 through 6.39.24 substituting channel 'C' in place of channel 'A'.

_____ _____ / _____
Value/Units Date Technician

6.39.26 Repeat steps 6.39.18 through 6.39.24 substituting channel 'D' in place of channel 'A'.

_____ _____ / _____
Value/Units Date Technician

6.39.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.39.1.

_____ / _____
Date Technician

6.39.28 Reset all bistables.

_____ / _____
Date Technician

6.0 PROCEDURE

6.39.29 Record the largest response time value of steps 6.39.22, 6.39.25, 6.39.26 in the "Data Collection Table."

_______ / _______
Date Technician

6.40 Low RWT Level to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the solid state relays trip. The C-E test box will be used as the response time measuring device.

6.40.1 Remove the input simulator box leads from terminals 35 and 37 on TB-1 of L125.

_______ / _______
Date Technician

6.40.2 Connect the "Bistable Test" leads of L151 to terminals 36 and 37 on TB-1 of L125.

_______ / _______
Date Technician

6.40.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 31 and 33 on terminal strip TB65. This monitors contacts on the solid state relay SSR1A. (RAS)

_______ / _______
Date Technician

6.40.4 In bay 5 of cabinet B (L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 31 and 33 on terminal strip TB55. This monitors contacts on the solid state relay SSR1B. (RAS)

_______ / _______
Date Technician

6.40.5 Connect the optical end of a stop cable to the LED installed in step 6.40.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

_______ / _______
Date Technician

6.0 PROCEDURE

6.40.6 Connect the optical end of a second stop cable to the LED installed in step 6.40.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

_______ / _______
Date Technician

6.40.7 Connect the optical end of a start cable to the LED installed in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

_______ / _______
Date Technician

6.40.8 On the channel 'B' bistable control panel, rotate the bistable selector switch to position number 20.

_______ / _______
Date Technician

6.40.9 Rotate the meter input selector switch to the "TRIP SP" position.

_______ / _______
Date Technician

6.40.10 Record the value indicated on the bistable control panel digital indicator.

_______ Volts _______ / _______
Value/Units Date Technician

6.40.11 Rotate the meter input selector switch to the "INPUT" position.

_______ / _______
Date Technician

6.40.12 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

_______ / _______
Date Technician

5.0 PROCEDURE

6.40.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 2.50 VDC ± .1 VDC.

_______/_______
Date / Technician

6.40.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

_______/_______
Date / Technician

6.40.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately .1 VDC on the tripped side of the value recorded in step 6.40.10.

_______/_______
Date / Technician

6.40.16 Record the adjusted voltage.

_______ Volts
Value/Units

_______/_______
Date / Technician

6.40.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

_______/_______
Date / Technician

.2 "L3", "L4", "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_______/_______
Date / Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

_______/_______
Date / Technician

6.0 PROCEDURE

6.40.17.4 Start "TIMER MODES" switch is in the step up position.

_______________/_______________
Date Technician

.5 Stop "TIMER MODES" switch is in the step up position.

_______________/_______________
Date Technician

6.40.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 20 until the bistable is tripped.

_______________/_______________
Date Technician

6.40.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

_______________/_______________
Date Technician

6.40.20 Ensure the C-E test box timer is reset.

_______________/_______________
Date Technician

6.40.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "CLOSE" position. The timer should start.

_______________/_______________
Date Technician

6.40.22 Record the response time.

_______________ _______________/_______________
Value/Units Date Technician

6.40.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 20 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.0 PROCEDURE

6.40.24 Reset bistable number 20 in channel 'A'.

_____ / _____
Date Technician

6.40.25 Repeat steps 6.40.18 through 6.40.24 substituting channel 'C' in place of channel 'A'.

_____ _____ / _____
Value/Units Date Technician

6.40.26 Repeat steps 6.40.18 through 6.40.24 substituting channel 'D' in place of channel 'A'.

_____ _____ / _____
Value/Units Date Technician

6.40.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.40.1

_____ / _____
Date Technician

6.40.28 Reset all bistables.

_____ / _____
Date Technician

6.40.29 Record the largest response time value of steps 6.40.22, 6.40.25, 6.40.26 in the "Data Collection Table".

_____ / _____
Date Technician

6.41 High SG-1 Differential Pressure to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the solid state relays trip. The C-E test box will be used as the response time measuring device.

6.0 PROCEDURE

6.41.1 Remove the input simulator box leads from terminals 30 and 31 on TB-1 of L125.

/
Date Technician

6.41.2 Connect the "Bistable Test" leads of L151 to terminals 30 and 31 on TB-1 of L125.

/
Date Technician

6.41.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 37 and 39 on terminal strip TB55. This monitors contacts on the solid state relay SSR1A. (EFAS-1)

/
Date Technician

6.41.4 In bay 5 of cabinet B (L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 37 and 39 on terminal strip TB55. This monitors contacts on the solid state relay SSR1B. (EFAS-1)

/
Date Technician

6.41.5 Connect the optical end of a stop cable to the LED installed in step 6.39.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

/
Date Technician

6.41.6 Connect the optical end of a second stop cable to the LED installed in step 6.40.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

/
Date Technician

6.0 PROCEDURE

6.41.7 Connect the optical end of a start cable to the LED installed in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

_____ / _____
Date Technician

6.41.8 On channel 'B' bistable control panel, rotate the bistable selector switch to position number 21.

_____ / _____
Date Technician

6.41.9 Rotate the meter input selector switch to the "TRIP SP" position.

_____ / _____
Date Technician

6.41.10 Record the value indicated on the bistable control panel digital indicator.

_____ Volts
Value/Units

_____ / _____
Date Technician

6.41.11 Rotate the meter input selector switch to the "INPUT" position.

_____ / _____
Date Technician

6.41.12 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

_____ / _____
Date Technician

6.41.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 3.70 VDC $\pm$ .1 VDC.

_____ / _____
Date Technician

6.0 PROCEDURE

6.41.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

_______________ / _______________
Date Technician

6.41.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately the sum of: .1 VDC plus the input value of position 22 plus the value recorded in step 6.41.10.

_______________ / _______________
Date Technician

6.41.16 Record the adjusted voltage.

_______________ Volts
Value/Units

_______________ / _______________
Date Technician

6.41.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

_______________ / _______________
Date Technician

.2 "L3", "L4", "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_______________ / _______________
Date Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

_______________ / _______________
Date Technician

.4 Start "TIMER MODES" switch is in the step up position.

_______________ / _______________
Date Technician

6.0 PROCEDURE

6.41.17.5 Stop "TIMER MODES" switch is in the step up position.

_____/_____
Date Technician

6.41.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 21 until the bistable is tripped.

_____/_____
Date Technician

6.41.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

_____/_____
Date Technician

6.41.20 Ensure the C-E test box timer is reset.

_____/_____
Date Technician

6.41.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "CLOSE" position. The timer should start.

_____/_____
Date Technician

6.41.22 Record the response time.

_____ _____/_____
Value/Units Date Technician

6.41.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 21 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.41.24 Reset bistable number 21 in channel 'A'.

_____/_____
Date Technician

6.0 PROCEDURE

6.41.25 Repeat steps 6.41.18 through 6.41.24 substituting channel 'C' in place of channel 'A'.

Value/Units Date / Technician

6.41.26 Repeat steps 6.41.18 through 6.41.24 substituting channel 'D' in place of channel 'A'.

Value/Units Date / Technician

6.41.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.41.1

Date / Technician

6.41.28 Reset all bistables.

Date / Technician

6.41.29 Record the largest response time value of steps 6.41.22, 6.41.25, 6.41.26 in the "Data Collection Table".

Date / Technician

6.42 High SG-2 Differential Pressure to ESFAS Response Time

NOTE: The following section measures the response time from the simulation of a trip signal into the Foxboro cabinet (using the PPS Response Time Test panel L151) to the time when the solid state relays trip. The C-E test box will be used as the response time measuring device.

6.42.1 Remove the input simulator box leads from terminals 27 and 28 on TB-1 of L125.

Date / Technician

6.0 PROCEDURE

6.42.2 Connect the "Bistable Test" leads of L151 to terminals 27 and 28 on TB-1 of L125.

/
Date Technician

6.42.3 In bay 6 of cabinet A (L034), connect an LED jumper cable in series with a six VDC power supply across terminals 40 and 42 on terminal strip TB65. This monitors contacts on the solid state relay SSR1A. (EFAS-2)

/
Date Technician

6.42.4 In bay 5 of cabinet B (L035), connect an LED jumper cable in series with a six volt DC power supply across terminals 40 and 42 on terminal strip TB55. This monitors contacts on the solid state relay SSR1B. (EFAS-2)

/
Date Technician

6.42.5 Connect the optical end of a stop cable to the LED installed in step 6.42.3 and connect the double banana plug end to the "L1" jacks of the C-E test box.

/
Date Technician

6.42.6 Connect the optical end of a second stop cable to the LED installed in step 6.42.4 and connect the double banana plug end to the "L2" jacks of the C-E test box.

/
Date Technician

6.42.7 Connect the optical end of a start cable to the LED in the "Bistable Test" section of L151 and connect the double banana plug end to the "LED 1" jacks on the C-E test box.

/
Date Technician

6.0 PROCEDURE

6.42.8 On channel 'B' bistable control panel, rotate the bistable selector switch to position number 22.

_______ / _______
Date Technician

6.42.9 Rotate the meter input selector switch to the "TRIP SP" position.

_______ / _______
Date Technician

6.42.10 Record the value indicated on the bistable control panel digital indicator.

_______ Volts
Value/Units

_______ / _______
Date Technician

6.42.11 Rotate the meter input selector switch to the "INPUT" position.

_______ / _______
Date Technician

6.42.12 In the "Bistable Test" section of L151, place the toggle switch in the "OPEN" position. The LED should extinguish.

_______ / _______
Date Technician

6.42.13 Adjust the "HIGH COARSE" and the "HIGH FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator at the bistable control panel reads 3.70 VDC $\pm$ .1 VDC.

_______ / _______
Date Technician

6.42.14 In the "Bistable Test" section of L151, place the toggle switch in the "CLOSED" position. The LED should energize.

_______ / _______
Date Technician

6.0 PROCEDURE

6.42.15 Adjust the "LOW COARSE" and "LOW FINE" potentiometers in the "Bistable Test" section of L151 until the digital indicator on the bistable control panel reads approximately the sum of: .1 VDC plus the input value of position 21 plus value recorded in step 6.42.10.

_______ / _______
Date Technician

6.42.16 Record the adjusted voltage.

_______ Volts _______ / _______
Value/Units Date Technician

6.42.17 Energize the C-E test box and ensure the following switches are in the correct positions.

.1 "L1" and "L2" stop lamps toggle switches are in the "ON" position.

_______ / _______
Date Technician

.2 "L3", "L4", "L5" and "L6" stop lamps toggle switches are in the "OFF" position.

_______ / _______
Date Technician

.3 "START LAMPS" toggle switch is in the "1/1" position.

_______ / _______
Date Technician

.4 Start "TIMER MODES" switch is in the step up position.

_______ / _______
Date Technician

.5 Stop "TIMER MODES" switch is in the step up position.

_______ / _______
Date Technician

6.0 PROCEDURE

6.42.18 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 22 until the bistable is tripped.

_______ / _______
Date Technician

6.42.19 Ensure the toggle switch in the "Bistable Test" section of L151 is in the "OPEN" position.

_______ / _______
Date Technician

6.42.20 Ensure the C-E test box timer is reset.

_______ / _______
Date Technician

6.42.21 After the test equipment has stabilized, place the "Bistable Test" section toggle switch on L151 in the "CLOSE" position. The timer should start.

_______ / _______
Date Technician

6.42.22 Record the response time.

_______ Value/Units _______ / _______
Date Technician

6.42.23 Adjust the input simulator box potentiometer in channel 'A' corresponding to bistable number 22 until the bistable input is returned to the value adjusted for in step 6.1.1.

6.42.24 Reset bistable number 22 in channel 'A'.

_______ / _______
Date Technician

6.42.25 Repeat steps 6.42.18 through 6.42.24 substituting channel 'C' in place of channel 'A'.

_______ Value/Units _______ / _______
Date Technician

6.0 PROCEDURE

6.42.26 Repeat steps 6.42.18 through 6.42.24 substituting channel 'D' in place of channel 'A'.

_______________ Value/Units _______ Date / Technician _______

6.42.27 Disconnect the "Bistable Test" leads and replace the input simulator leads on the terminals they were removed from in step 6.42.1

_______ Date / Technician _______

6.42.28 Reset all bistables.

_______ Date / Technician _______

6.42.29 Record the largest response time value of steps 6.42.22, 6.42.25, 6.42.26 in the "Data Collection Table".

_______ Date / Technician _______

6.42.30 After completing the "DATA COLLECTION TABLE", use the data to fill in the "RESPONSE TIME TABLE" and verify that the total response time value meets the technical specifications listed on table 3.3-2.

NOTE: The ESFAS field component response time values will be supplied by engineering personnel.

NOTE: If more than one combination of integral response times exist for a given function, use the most conservative (longest) response time value when filling in the time response table.

6.43 Restoration

6.43.1 Disconnect all test boxes and reconnect proper leads to terminals.

_______ Date / Technician _______

6.0 PROCEDURE

6.43.2 Reconnect P34 and P35 in all four channels.

_____/_____
Date Technician

6.43.3 Verify the RPS/ESFAS per press bypass is enabled on all four channels.

_____/_____
Date Technician

6.43.4 Verify the DNBR/LOCAL POWER DENSITY BYPASS is enabled on all four channels.

_____/_____
Date Technician

6.43.5 Verify the LOSS OF LOAD BYPASS is enabled on all four channels.

_____/_____
Date Technician

6.43.6 Verify the HI LOG POWER BYPASS is not enabled on any channel.

_____/_____
Date Technician

6.43.7 Verify the TEST POWER SUPPLY is deenergized.

_____/_____
Date Technician

6.43.8 Step the variable SG pressure setpoint down to its minimum to clear the LO SG PRESS trips.

NOTE: Depending on actual RWT level and steam generator levels, it may not be possible to clear the LOW SG LEVEL and LOW RWT LEVEL trips.

6.43.9 Verify no bistable Pretrip, Trip, or Bypass lights are energized on any of the four channels.

_____/_____
Date Technician

6.0 PROCEDURE

6.43.10 Verify all PPS bay doors are closed and locked.

_____ / _____
Date Technician

6.43.11 Remove all jumpers that were installed in step 6.1.4 and unisolate all the field wiring that was isolated in step 6.1.4.

_____ / _____
Date Technician

6.43.12 Inform the watch engineer that the test has been completed.

_____ / _____
Date Technician

7.0 RECORDS

7.1 On completion of this test, this procedure shall be signed by the technician and responsible Instrument Foreman. The Supervisor of Nuclear Plant Instrumentation shall review and approve the data.

7.2 Transfer of data shall be made to the CDM Center per SO23-IC-4 on completion of this test. Copies of this procedure may be made for retention in the Instrument and Test Shop Files.

7.3 List the test equipment as instructed in Step 3.6.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

67.0 RECORDS

7.4 Record the date test completed ______________________

Technicians ______________ ________ ________

Foreman ______________________

Approved by ______________________ Date ______________

Remarks ____

____

____

8.0 ATTACHMENTS

8.1 Data Collection Tables (11pages)

8.2 Drawings and Diagrams (7 pages)

8.3 Pressure Transient Information (Appendix C) (1 page)

8.4 Rotary Select Switch Positions (Appendix D) (3 pages)

8.5 ESFAS Actuation Relays Electrical Line Up (Appendix E) (4 pages)

8.6 ESFAS Actuation Relays (Appendix F) (3 pages)

8.7 ESFAS Interposing Relays (Appendix G) (1 page)

8.8 CPC/CEAC Response Time Test (Appendix H) (9 pages)

8.9 Valid User Entries (Table H1) (5 pages)

8.10 RTT Part 2 CPC Sample Run (2 pages)

8.11 CPC Point ID Assignments (Table H2) (3 pages)

8.12 CPC Point ID Assignments (Table H3) (8 pages)

Brian Katz

B. KATZ
Station Technical Manager

VS:1944b/mr
Continued from 1943b

DATA COLLECTION TABLE

STEP NO.	DESCRIPTION	VALUE	UNITS
6.2.12	PT-0101-1 High Pzr Press		
6.3.12	PT-0102-1 Low Pzr Press		
6.4.12	PT-1013-1 Low SG-1 Press		
6.5.12	PT-1023-1 Low SG-2 Press		
6.6.12	LT-1113-1 Low SG-1 Level		
6.7.12	LT-1123-1 Low SG-2 Level		
6.8.12	PT-0351-1 High Cont. Press		
6.9.12	PT-0352-1 High High Cont. Press		
6.10.12	LT-0305-1 Low RWT Level		
6.11.12	PDT-0978-1 Low SG-1 Flow		
6.12.12	PDT-0979-1 Low SG-2 Flow		
6.14.16	TE-0112-1		
6.15.16	TE-9178-1		
6.16.16	TE-0122-1		
6.17.16	TE-9179-1		
6.18.4	RTSG Uncorrected		
6.19.35	High Linear Power to RTSG		
6.20.13	High Log Bistable to RTSG		
6.20.28	High Log Preamp		
6.22.2.20	Low Temperature TT112CA		
6.22.2.40	Low Temperature TT122CA		
6.22.2.60	High Temperature TT112HA		
6.22.2.80	High Temperature TT122HA		
6.22.3.21	Pzr Pressure		
6.22.4.28	Excore Power		
6.22.5.23	ST 113A W1 RCP Speed		
6.22.5.46	ST 123 W2 RCP Speed		
6.22.5.58	ST 133 W3 RCP Speed		
6.22.6.19	ST 143 W4 RCP Speed		
6.23.29	High Pzr Press to RTSG		
6.24.29	Low Pzr Press to RTSG		
6.25.28	Low Pzr Press to SIAS		
6.25.42	Low Pzr Press to CCAS		
6.26.29	Low SG-1 Level to RTSG		
6.27.29	Low SG-1 Level to EFAS-1		
6.28.29	Low SG-2 Level to RTSG		
6.29.29	Low SG-2 Level to EFAS-2		
6.30.29	Low SG-1 Press to RTSG		
6.31.29	Low SG-1 Press to MSIS		
6.32.29	Low SG-2 Press to RTSG		
6.33.29	Low SG-2 Press to MSIS		
6.34.29	High Cont. Press to RTSG		
6.35.28	High Cont. Press to CIAS		
6.35.41	High Cont. Press to CCAS		
6.35.55	High Cont. Press to SIAS		

DATA COLLECTION TABLE

(Continued)

STEP NO.	DESCRIPTION	VALUE	UNITS
6.36.29	Low SG-1 Flow to RTSG		
6.37.29	Low SG-2 Flow to RTSG		
6.38.29	High-High Cont. Press to CSAS		
6.39.29	Low RWT Level to RAS		
6.40.29	HighΔP SG-1 to EFAS-1		
6.41.29	HighΔP SG-2 to EFAS-2		

TRAIN A

1. Pressurizer Pressure-Low

a. SIAS
(1). Safety Injection
a. High Pressure Safety Injection

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
*P017					
*P018					
*HV-9324					
*HV-9327					
*HV-9330					
*HV-9333					

b. Low Pressure Safety Injection
*P015
*HV-9325
*HV-9328

3. Containment Isolation
Emerg. Diesel Start Delay of 10 sec + Instr. and Logic Response Only

4. Containment Spray (pumps)

*P-012
*HV-6501

5. Containment Emergency Cooling

a. Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
a. CCW. Pumps					
*P-024					
*P-025					

b. C.C.W. Valves
HV-6212
HV-6218
HV-6366
HV-6367
HV-6370
HV-6371

c. Emergency Cooling Fans

A-071
A-074
* E-399
* E-401

3. Containment Pressure High

a. SIAS (see Pressurizer Pressure Low)
b. CIAS
(1.) Containment Isolation (See Items)

4. Containment Pressure High High

a. CSAS
(1) Containment Spray
* HV-9367

5. Steam Generator Pressure Low

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
a. MSIS					
(1) Main Steam Isolation (MSIV)					
HV-8204					
HV-8205					
(2) Main Feedwater Isolation					
HV-4048					
HV-4052					

6. Refueling Water Storage Tank

a. RAS
(1) Containment Sump Valves Open
* HV-9303
* HV-9305
(2) ECCS Miniflow Valves Shut
* HV-9306
* HV-9307

7. 4.16 KV. Emergency Bus Undervoltage
a. LOV (Loss of voltage and degraded voltage)

8. Steam Generator #1 Level-Low

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
Aux. F.W. AC Train EFAS					
HV-4713					
HV-4731					
Aux. F.W. DC Train EFAS					
P-141					
HV-4730					
HV-4716					
HV-4705					
HV-8201					
HV-4054					

TRAIN B

1. Pressurizer Pressure-Low

a. SIAS
(1). Safety Injection
a. High Pressure Safety Injection

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
* P019					
* HV-9323					
* HV-9326					
* HV-9329					
* HV-9333					

b. Low Pressure SAfety Injection

* P016
* HV-9322
* HV-9331

3. Containment Isolation
Emerg. Diesel Start Delay of 10 Sec + Instr. and Logic Response Only

4. Containment Spray (Pumps)

* P-013
* HV-6500

5. Containment Emergency Cooling

a. Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
a. CCW. Pumps					
*P-026					

b. C.C.W. Valves
HV-6213
HV-6219
HV-6368
HV-6369
HV-6372
HV-6373

c. Emergency Cooling Fans

A-072
A-073
* E-400
* E-402

3. Containment Pressure High

a. SIAS (see Pressurizer Pressure Low)
b. CIAS
(1.) Containment Isolation (See Items)

4. Containment Pressure High High

a. CSAS
(1) Containment Spray
* HV-9368

5. Steam Generator Pressure Low

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
a. MSIS					
(1) Main Steam Isolation (MSIV)					
HV-8204					
HV-8205					
(2) Main Feedwater Isolation					
HV-4048					
HV-4052					

6. Refueling Water Storage Tank

a. RAS
(1) Containment Sump Valves Open
* HV-9302
* HV-9304
(2) ECCS Miniflow Valves Shut
* HV-9347
* HV-9348

7. 4.16 KV. Emergency Bus Undervoltage
a. LOV (Loss of voltage and degraded voltage)

8. Steam Generator #2 Level-Low

Field Comp.	Rec. Time	Test No.	Relay Time	Test No.	Total Time
Aux. F.W. AC Train EFAS					
P-145					
HV-4715					
HV-4706					
HV-4716					
HV-4712					
HV-4714					
Aux. F.W. DC Train EFAS					
HV-8200					
HV-4053					
P-504					

RESPONSE TIME TABLE

Reactor Trips

Function	Sensor	Trip Unit to RTSG	RTSG (Corrected)	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
Linear Power High					≤ .40 sec*	
Log Pwr High					≤ .45 sec*	
PZR Press High					≤ .90 sec	
PZR Press Low					≤ .90 sec	
Cntmt. Press High					≤ .90 sec	
SG-1 Press Low					≤ .90 sec	
SG-2 Press Low					≤ .90 sec	
SG-1 LVL Low					≤ .90 sec	
SG-2 LVL Low					≤ .90 sec	
SG-1 Low Flow					≤ .90 sec	
SG-2 Low Flow					≤ .90 sec	

FOOTNOTES:

*Neutron detectors are exempt from response time testing. Response time of the neutron flux signal portion of the channel shall be measured from detector output or input of first electronic component in channel.

**Response time shall be measured from the onset of a single CEA drop.

#Response time shall be measured from the onset of a 2 out of 4 Reactor Coolant Pump coastdown.

##Response time shall be measured from the output of the sensor. RTD response time shall be measured at least once per 18 months by means of the Loop Current Step Response (LCSR) method. The measured R_T of the slowest RTD shall be less than or equal to 6.0 seconds.

###Response time shall be measured from the output of the pressure transmitter. The transmitter response time constant shall be less than or equal to 0.7 seconds where the pressure transmitter response time is equivalent to the time interval required for the transmitter to achieve 63.2% of its total change when subjected to a step change in pressure transmitter pressure.

RESPONSE TIME TABLE (Continued)

Reactor Trips

Function	CPC Signal Processing	RTSG (Corrected)	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
Local Power Density Hi					
1. Ex-Core Detectors				.68 sec*	
2. CEA Positions				.53 sec**	
DNBR Low					
1. Ex-Core Detectors				.68 sec*	
2. CEA Position				sec**	
3. Cold Leg Temp.				.68 sec##	
4. Hot Leg Temp.				.68 sec##	
5. RC Pump Shaft Speed				.68 sec#	
6. PRSRZR Pressure				.68 sec###	

NOTE: Cold and Hot Leg Temperature sensors are response time tested on a stand alone basis. Record the time constants separately.

		Acceptance Criteria	Verified
1. Cold Leg Temp. Sensors	____________ value/units	5.4 sec	____________ initial/date
2. Hot Leg Temp. Sensors	____________ value units	5.4 sec	____________ initial/date

FOOTNOTES:

*Neutron detectors are exempt from response time testing. Response time of the neutron flux signal portion of the channel shall be measured from detector output or input of first electronic component in channel.

**Response time shall be measured from the onset of a single CEA drop.

#Response time shall be measured from the onset of a 2 out of 4 Reactor Coolant Pump coastdown.

##Response time shall be measured from the output of the sensor. RTD response time shall be measured at least once per 18 months by means of the Loop Current Step Response (LCSR) method. The measured R of the slowest RTD shall be less than or equal to 6.0 seconds.

###Response time shall be measured from the output of the pressure transmitter. The transmitter response time constant shall be less than or equal to 0.7 seconds where the pressure transmitter response time is equivalent to the time interval required for the transmitter to achieve 63.2% of its total change when subjected to a step change in pressure transmitter pressure.

RESPONSE TIME TABLE

ESFAS

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
PZR Press Low HPSI					≤ 31.2 sec*	
PZR Press Low LPSI					≤ 41.2 sec*	
PZR Press Low Cntmt. Isol.					≤ 11.2 sec* Note 2 and 3	
PZR Press Low Cntmt. Spray Pumps					≤ 25.6 sec*	
PZR Press Low CCW Pumps					≤ 31.2 sec*	
PZR Press Low CCW Valves					≤ 11.2 sec Note 4	
PZR Press Low Emer. Clg. Fans					≤ 21.2 sec*	
Cntmt. Press High HPSI					≤ 41.0 sec*	
Cntmt. Press High LPSI					≤ 41.0 sec*	
Cntmt. Press High Cntmt. Spray Pumps					≤ 25.4 sec*	
Cntmt. Press High CCW Pumps					≤ 31.0 sec*	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

* Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

3. All CIAS-Actuated valves except MSIVs and MFIVs.

4. CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219.

5. Response time includes instrumentation, logic, and isolation damper closure times only.

RESPONSE TIME TABLE

ESFAS

(Continued)

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
Cntmt Press High CCW Valves					≤ 11.0 sec Note 4	
Cntmt. Press High Emer. Clg. Fans					≤ 21.0 sec*	
Cntmt. Press High Cntmt. Isol.					≤ 10.9 sec* Note 2	
Cntmt. Press High-High Cntmt. Spray					≤ 21.0 sec*	
SG-1 Press Low MSIV					≤ 20.9 sec	
SG-1 Press Low MFW Isol.					≤ 10.9 sec	
SG-2 Press Low MSIV					≤ 20.9 sec	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

* Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

3. All CIAS-Actuated valves except MSIVs and MFIVs.

4. CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219.

5. Response time includes instrumentation, logic and isolation damper closure times only.

RESPONSE TIME TABLE

ESFAS

(Continued)

Function	Sensor	Trip Unit to ESFAS	Field Components	Total Response Time	Tech. Spec. Accept. Crit.	Verified Initial/Date
SG-2 Press Low MFW Isol.					≤ 10.9 sec*	
Low RWT LVL Cntmt. Sump VLVs Open					≤ 50.7 sec*	
Low RWT LVL ECCS Miniflow VLVs Shut					≤ 40.7 sec*	
SG-1 LVL Low Aux. FW AC Trains					≤ 40.9 sec*	
SG-1 LVL Low Aux. FW Stm./DC Train					≤ 30.9 sec	
SG-2 LVL Low Aux. FW AC Trains					≤ 40.9 sec*	
SG-2 LVL Low Aux. FW Stm./DC Train					≤ 30.9 sec	

FOOTNOTES:

1. Response times include movement of valves and attainment of pump or blower discharge pressure as applicable.

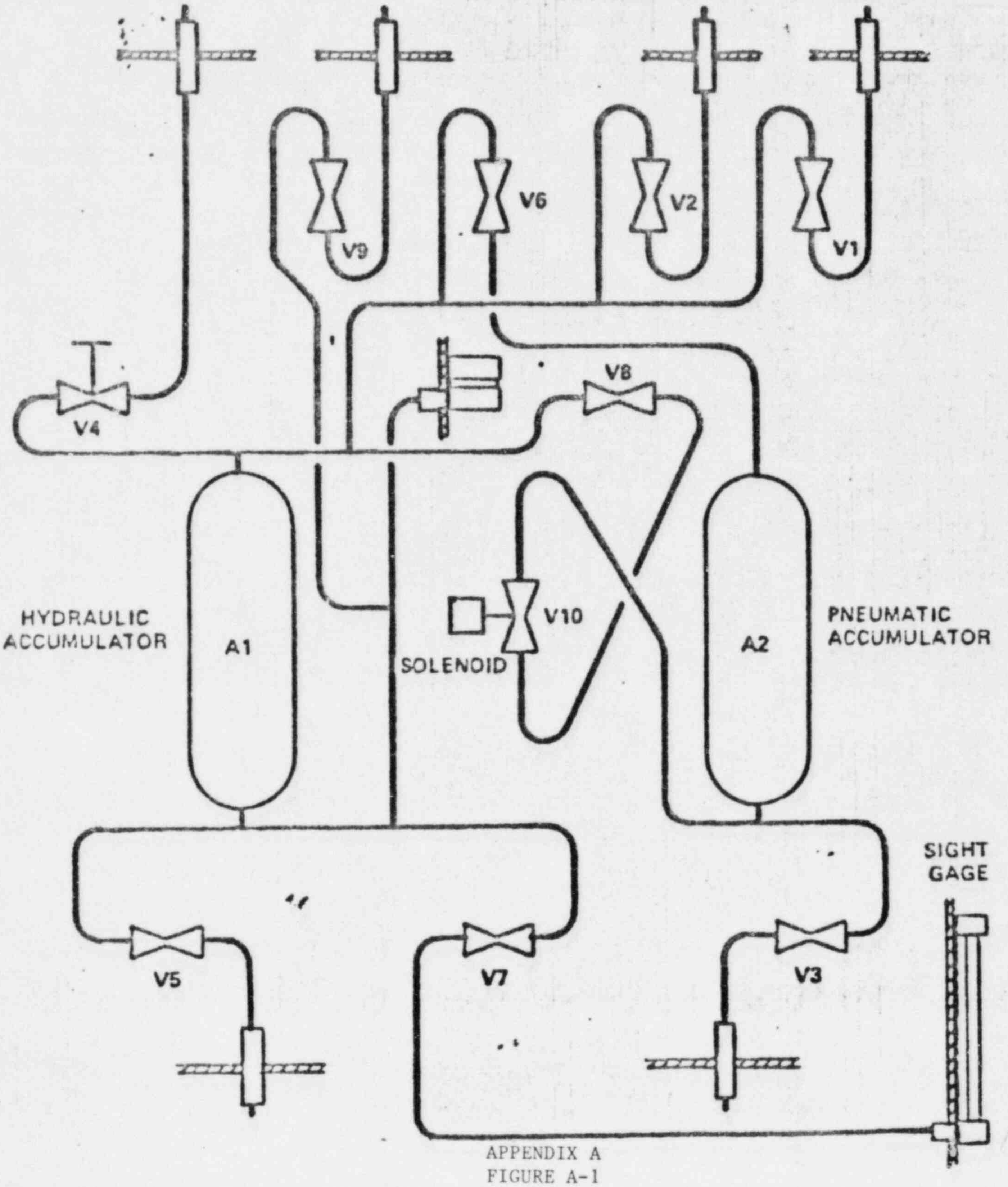
* Emergency diesel generator starting delay (10 sec.) and sequence loading delays for SIAS are included.

2. Response time includes emergency diesel generator starting delay (applicable to AC motor operated valves other than containment purge valves), instrumentation and logic response only. Refer to table 3.6-1 for containment isolation valve closure times.

3. All CIAS-Actuated valves except MSIVs and MFIVs.

4. CCW non-critical loop isolation valves HV-6212, HV-6213, HV-6218 and HV-6219.

5. Response time includes instrumentation, logic, and isolation damper closure times only.



APPENDIX A
FIGURE A-1
HYDRAULIC SIGNAL GENERATOR
REAR VIEW

TIME RESPONSE TEST SET CONTROLS

	IDENTIFICATION	FUNCTION
A	Sight Gage	Accumulator level indication and filling point
V1	Gas Isolation	Isolation valve
V2	Gage Isolation	Isolation valve
V6	Pressurize	Accumulator pressurization select valve
V9	Signal Isolation	Output Isolation valve
V8	Signal Rate	Throttle valve
V4	Pressure Bleed	Bleed valve
B	Zero	Reference transmitter zero adjust
C	Span	Reference transmitter span adjust
D	Ref-Bias	Reference transmitter output bias adjust
E	Process-Bias	Process transmitter output bias adjust
F	Signal Conditioning	Process transmitter input signal select
G	DVM Monitor	DVM test point select
H	Pressure Switch Output Voltage	Pressure switch output voltage
SI	Signal Initiate	Solenoid valve actuation switch
J	Power	On-Off switch
RT	Reference transducer	Reference signal source
V3	Vent/Drain	Vent-Drain valve for pneumatic accumulator
V5	Drain	Drain valve for hydraulic accumulator
V7	Sight Gage/Fill	Sight gage isolation valve

APPENDIX A

Figure A-2

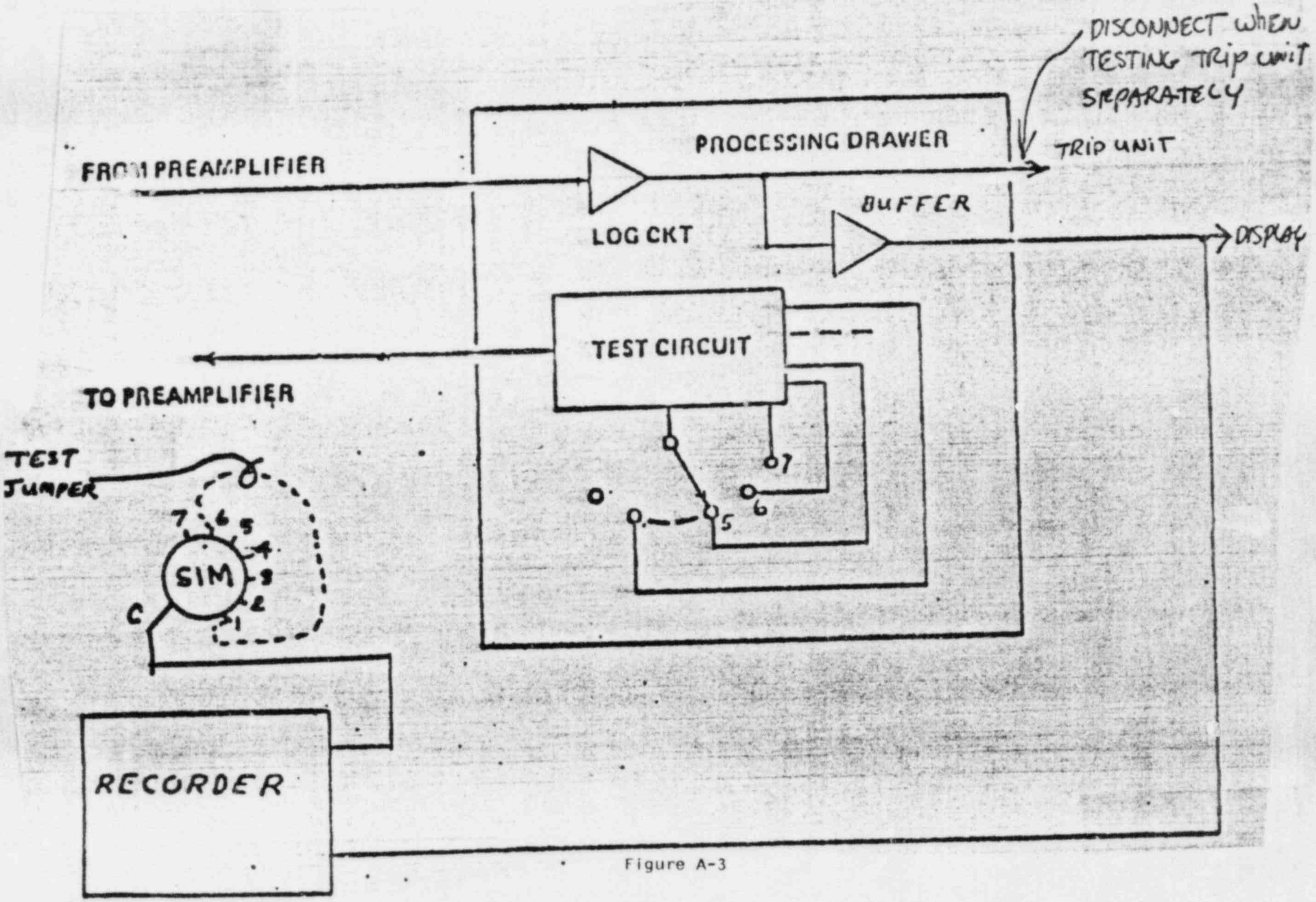

DISCONNECT when TESTING Trip unit SEPARATELY
PROCESSING DRAWER
TRIP UNIT
FROM PREAMPLIFIER
BUFFER
LOG CKT
DISPLAY
TEST CIRCUIT
TO PREAMPLIFIER
TEST JUMPER
SIM
C
RECORDER

Figure A-3

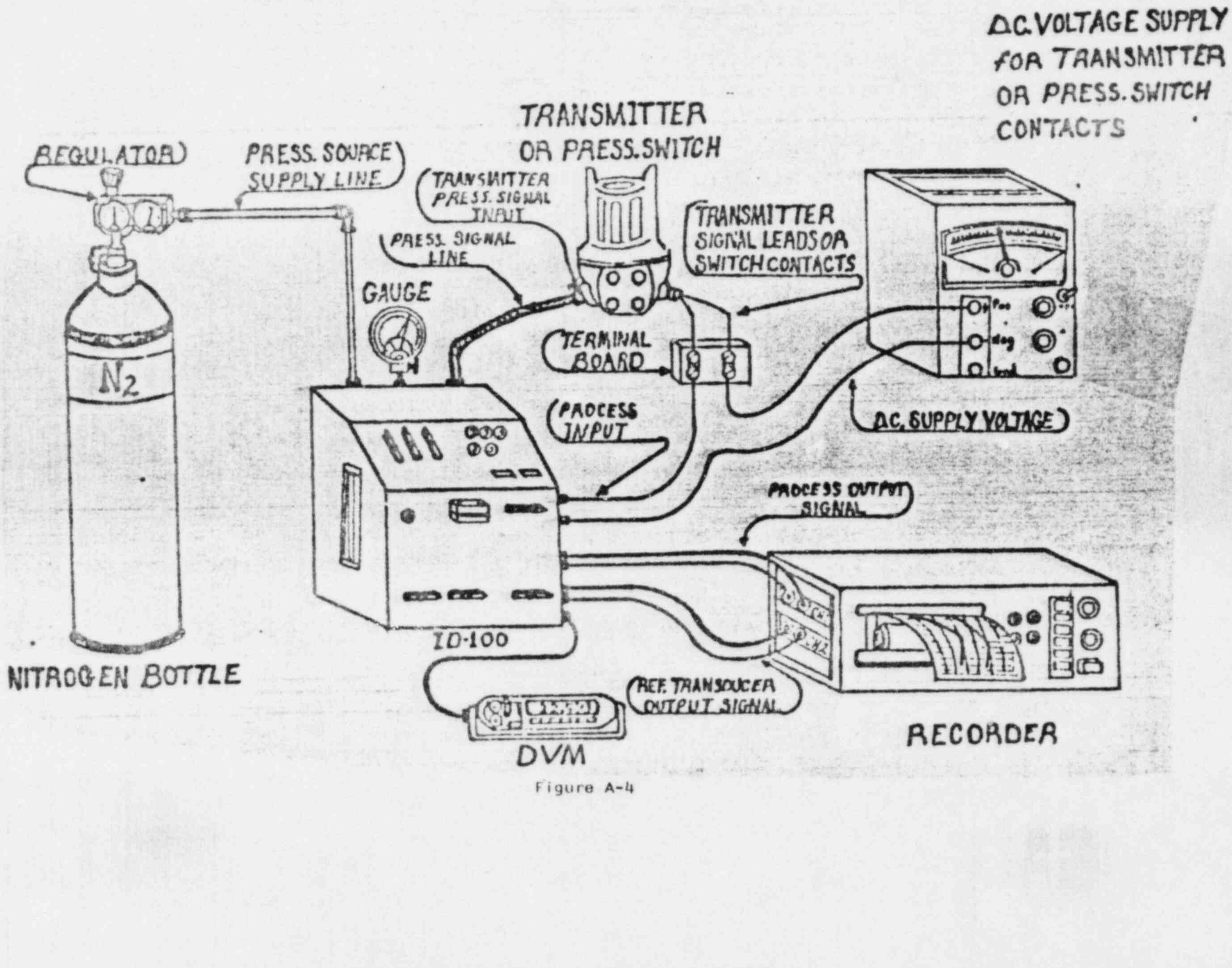

D.C. VOLTAGE SUPPLY FOR TRANSMITTER OR PRESS. SWITCH CONTACTS
TRANSMITTER OR PRESS. SWITCH
REGULATOR
PRESS. SOURCE SUPPLY LINE
TRANSMITTER PRESS. SIGNAL INPUT
PRESS. SIGNAL LINE
TRANSMITTER SIGNAL LEADS OR SWITCH CONTACTS
GAUGE
TERMINAL BOARD
N2
PROCESS INPUT
D.C. SUPPLY VOLTAGE
PROCESS OUTPUT SIGNAL
ID-100
NITROGEN BOTTLE
REF. TRANSDUCER OUTPUT SIGNAL
RECORDER
DVM

Figure A-4

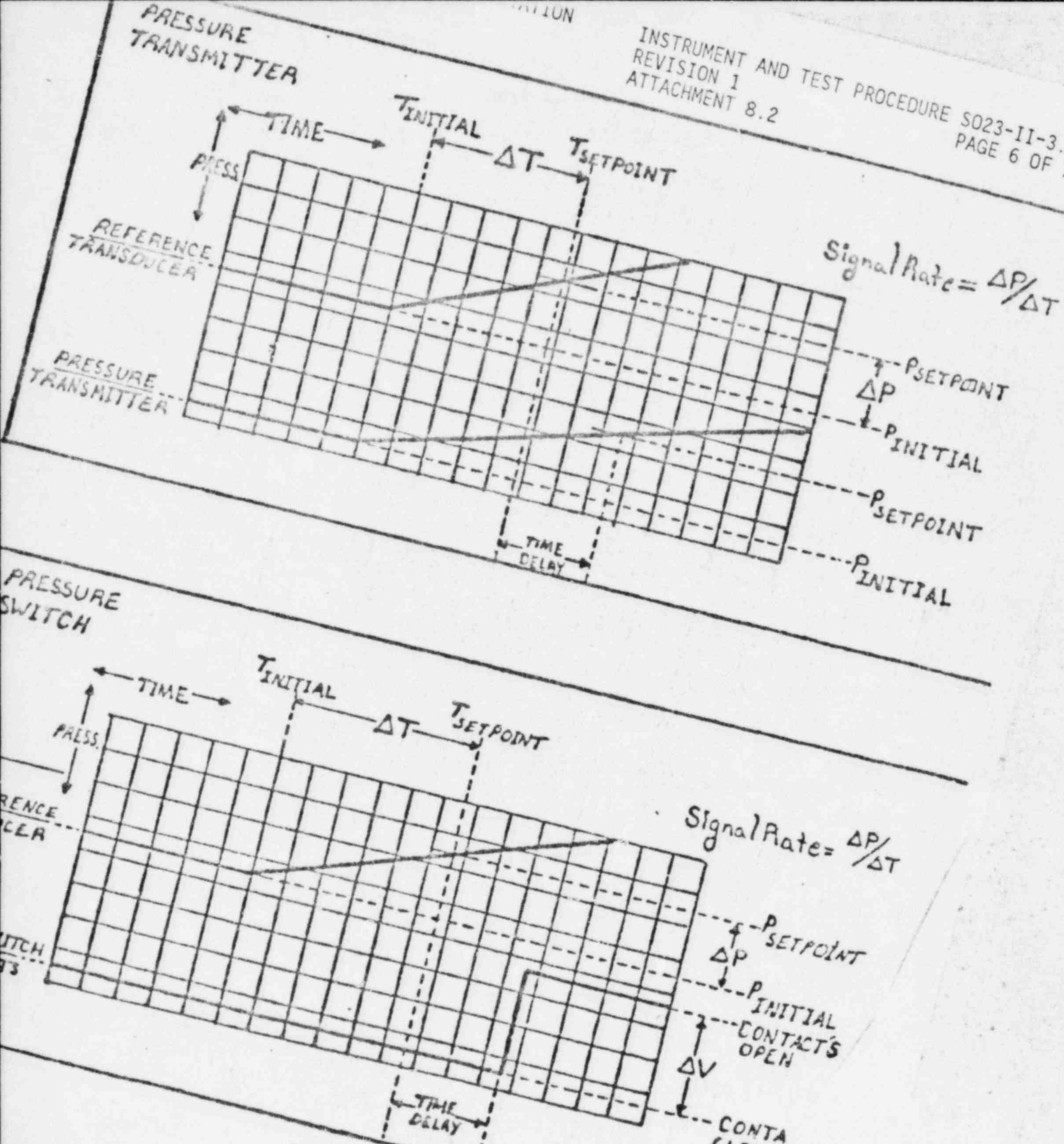

PRESSURE TRANSMITTER
TIME
$T_{INITIAL}$
ΔT
$T_{SETPOINT}$
PRESS
REFERENCE TRANSDUCER
Signal Rate = $\Delta P / \Delta T$
$P_{SETPOINT}$
ΔP
$P_{INITIAL}$
PRESSURE TRANSMITTER
$P_{SETPOINT}$
$P_{INITIAL}$
TIME DELAY
PRESSURE SWITCH
TIME
$T_{INITIAL}$
ΔT
$T_{SETPOINT}$
PRESS.
Signal Rate = $\Delta P / \Delta T$
$P_{SETPOINT}$
ΔP
$P_{INITIAL}$
CONTACTS OPEN
ΔV
TIME DELAY

Figure A-6

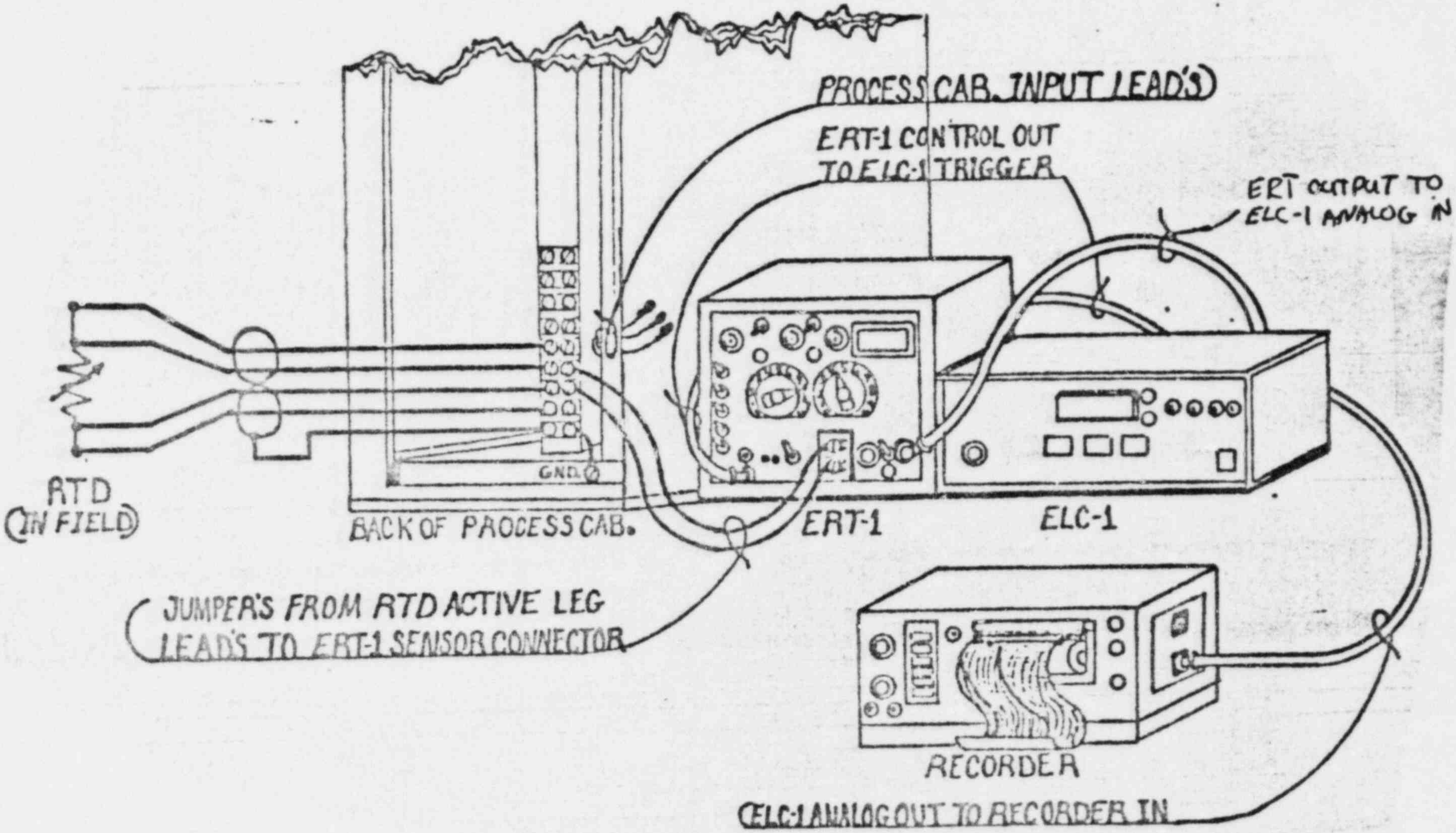
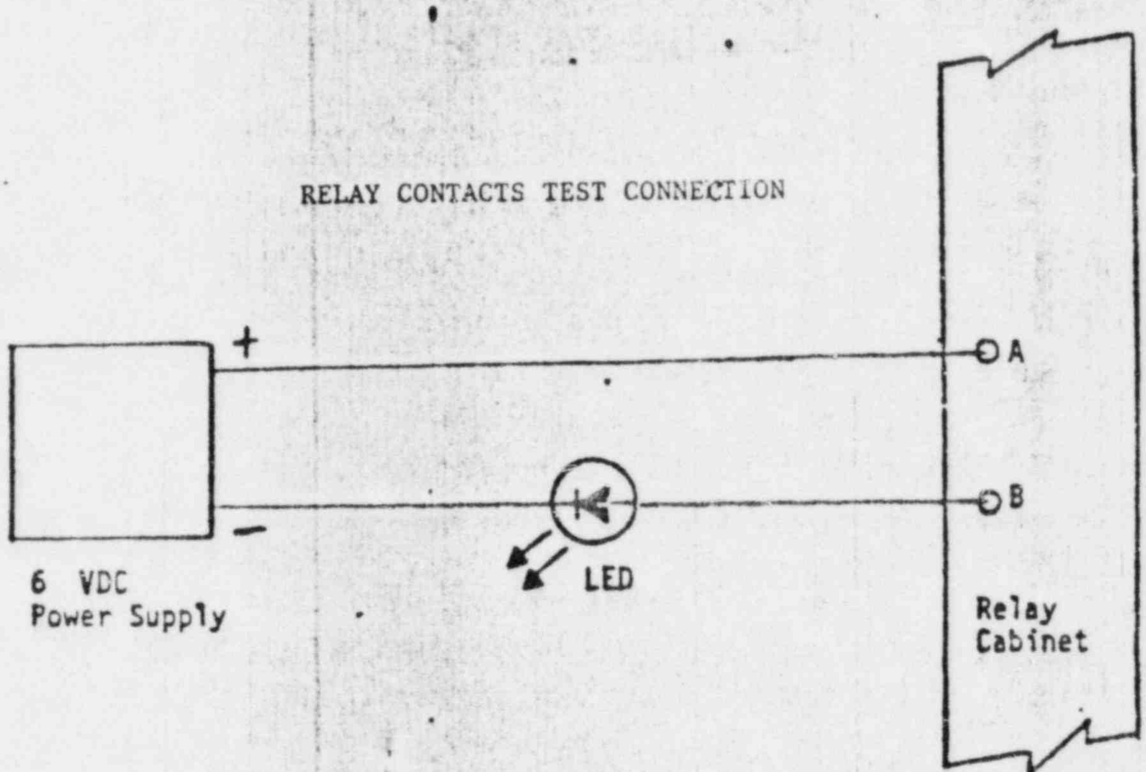

PROCESS CAB. INPUT LEAD'S
ERT-1 CONTROL OUT
TO ELC-1 TRIGGER
ERT OUTPUT TO
ELC-1 ANALOG IN
GND.
RTD
(IN FIELD)
BACK OF PROCESS CAB.
ERT-1
ELC-1
JUMPER'S FROM RTD ACTIVE LEG
LEAD'S TO ERT-1 SENSOR CONNECTOR
RECORDER
ELC-1 ANALOG OUT TO RECORDER IN

Figure A-5

RELAY CONTACTS TEST CONNECTION



Where A is the first terminal given for the relay to be tested in.

and B is the second terminal given for the relay to be tested.

Example: K301 in 2L034
A = TB31-165
B = TB31-166

Figure A-7

March 13, 1983

MR. A. E. CHAFFEE

SUBJECT: NRC Requested Documents

Enclosed are copies of the following documents requested by the NRC:

1. Operating Instruction S023-3-5.1, Rev. 7, "Emergency Plant Shutdown," which identifies operator actions following reactor trip or initiating reactor trip. It is provided in response to what was identified as item "I.d. Reactor Trip Followup (including ATWS)," on the "Paper" attachment to the NRC-prepared agenda.

2. Operating Instruction S023-3-2.19.1, Rev. 5, "CEDM MG Set Operation," which specifies operator actions in performing testing of the Reactor Trip Circuit Breakers pursuant to Technical Specification 4.3.1.1, Table 4.3-1, item 1.

3. Instrument and Test Procedure S023-II-1.1, Rev. 8, "Surveillance Requirement, Reactor Plant Protection System, Channel Functional Test (31 Day Interval)," including TCNs 42, 43 and 44. This procedure, in combination with item 4, below, specifies I&C testing of, among other things, the Reactor Trip Circuit Breakers pursuant to Technical Specification 4.3.1.1, Table 4.3-1, item 13.

4. Instrument and Test Procedure S023-II-11.161, Rev. 2, "Surveillance Requirement, Reactor Breakers Undervoltage and Shunt Trip Device Circuit Test."

5. Instrument and Test Procedure S023-II-3.1, Rev. 1, "Plant Protection System, Response Time Test for Channel A (Eighteen Month Interval)," including TCNs 7, 8, 9, 10 and 11. This procedure, in combination with items 6, 7 and 8 below, specifies I&C testing of, among other things, the Reactor Trip Circuit Breakers pursuant to Technical Specification 4.3.1.3.

6. Instrument and Test Procedure S023-II-3.2, Rev. 1, "Plant Protection System, Response Time Test for Channel B (Eighteen Month Interval)," including TCNs 7, 8, 9 and 10.

7. Instrument and Test Procedure S023-II-3.3, Rev. 1, "Plant Protection System, Response Time Test for Channel C (Eighteen Month Interval)," including TCNs 7, 8 and 9.

8. Instrument and Test Procedure S023-II-3.4, Rev. 1, "Plant Protection System, Response Time Test for Channel D (Eighteen Month Interval)," including TCNs 6, 7 and 8.

Items 2 through 8, above, are provided in response to item VII.D.1 of the NRC-prepared agenda.

9. Station Procedure SO23-MPES008, Rev. 0, "Under-Voltage Tripping Device of GE AK-2-25 Circuit Breakers in the Reactor Trip Switchgear," which represents issuance, as a Station document, of Startup procedure MPES008, Rev. 1. Reference to "Tripping Device" in the title is reference to the Reactor Trip Circuit Breakers.

10. Maintenance Procedure SO23-I-4.36, Rev. 0, "Inspection and Adjustment of Under-Voltage Tripping Device (GE Circuit Breaker AK-15 and 25)," including TCN 1. This procedure represents the development of a Station procedure which would replace item 9, above, but has not been used in any maintenance of the Reactor Trip Circuit Breakers (item 9, above, has been used). Reference to "Tripping Device" in the title is reference to the Reactor Trip Circuit Breakers. Action has been initiated to cancel this procedure and its TCN. It will be reissued when what represented TCN 1 to the procedure can be incorporated into a revision rather than a TCN.

Items 9 and 10, above, are provided in response to item VII.E.1 of the NRC-prepared agenda.

11. A "Document History Summary" which identifies the chronological history of all revisions and TCNs for each of the procedures identified above.

WCM

W. C. MOODY

1620v/jms

cc: H. B. Ray
J. M. Price
CDM