MAINTENANCE
HC.IC-CC.SE-0004(Q) - Rev. 25

NUCLEAR INSTRUMENTATION SYSTEM - CHANNEL D
SOURCE RANGE MONITOR C51-K600D

USE CATEGORY : I

- Biennial Review Performed: Yes ____ No ____ NA ✓
- Packages and Affected Document Numbers incorporated into this revision: None
- The following OTSCs were incorporated into this revision: None

REVISION SUMMARY

- Performed the following editorial changes: (70088685)

  * Updated to current format.
  * Updated cross references due to superseding.
  * Changed CDV to PC and CV as required.
  * Separated IV placekeeping from perform steps and made separate IV steps.

IMPLEMENTATION REQUIREMENTS

Effective Date: 9/9/2008

NUCLEAR INSTRUMENTATION SYSTEM - CHANNEL D
SOURCE RANGE MONITOR C51-K600D

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1.0 PURPOSE

- To give instructions for test AND calibration of Source Range Monitor (SRM) channel D, C51-K600D. This procedure will verify calibration AND operability of the following equipment:

  H1SE -1SEXAM-AR14D-C51
  H1SE -1SEXAM-AR23D-C51
  H1SE -1SEXI-M1SRMDC51
  H1SE -1SEXI-M2SRMDC51
  H1SE -1SEXPS-21D-C51
  H1SE -1SEXR-R602B-C51 (Blue Pen)
  H1SE -1SEXSL-Z16SRD-C51
  H1SE -1SEXSHL-Z17SRD-C51
  H1SE -1SEXS-Z18SRDC51
  H1SE -1SEVR-27SRMDC51
  H1SE -1SEVR-29SRMDC51

- When successfully performed in conjunction with Channel Calibration HC.IC-CC.SE-0042(Q), this procedure will satisfy part of surveillance requirements of Technical Specification 4.3.6-1.3.a through 4.3.6-1.3.d and 4.3.7.6.a.2.

- When performed in Operational Conditions 2, 3, 4 OR 5, this procedure includes Functional Test of SRM Channel D AND credit may be taken for its performance with successful completion of this procedure.

- When performed in Operational Condition 1, this procedure does NOT include the Functional Test of SRM Channel D. The Functional Test must also be completed in order to satisfy the Channel Calibration requirements.

2.0 PREREQUISITES

___ 2.1 **RECORD** M&TE data on Attachment 2.

___ 2.2 **REQUEST** SM/CRS permission to perform this test.

___ 2.3 **REQUEST** SM/CRS to determine IF present plant operating condition (mode) requires RPS scram (non-coincident) shorting links to be removed for core alterations.

___ 2.4 **SIGN** Exhibit 1 AND **FORWARD** to RO.

3.0 PRECAUTIONS AND LIMITATIONS

___ 3.1 **ENSURE** all applicable generic precautions and limitations of MA-AA-716-009, Use of Maintenance Procedures, are applied during performance of this procedure.

___ 3.2 Performance of this procedure will initiate a Rod Block.

4.0 EQUIPMENT/MATERIAL REQUIRED

NOTE

The following equipment OR its equivalent (i.e., with equal OR better accuracy AND adequate range to measure the desired parameter) will be required for performance of this procedure.

4.1 M&TE

- DMM (Keithley 197/1978)
- DMM (Fluke 45 for ripple voltage)
- Electronic Counter (HP Model 5328A)
- Stopwatch (Total Timer 700)

4.2 Additional Tools and Equipment

- Extender Cards:
  - GE 129B2048G1 - 2 required
  - GE 129B2048G2 - 1 required
  - GE 129B2048G7 - 1 required
- Jumper, No. 14 AWG stranded, approximately 12 inches, banana plugs on each end - 2 required
- INOP INHIBIT switch clamp
- SRM Test Relay (Mode 1 Testing)

5.0 PROCEDURE

5.1 Test Setup

___ 5.1.1. **VERIFY** Prerequisites have been met.

___ 5.1.2. **VERIFY** Precautions and Limitations have been reviewed.

5.1.3. **VERIFY** a total of 2 SRM channels (3 IF this test is being performed in OPERATIONAL CONDITION 2) are available by performing the following for each channel:

___ ♦ **VERIFY** drawer mode switch for each SRM drawer is in OPERATE

___ ♦ **VERIFY** INOP status light, off (each SRM drawer)

___ ♦ **VERIFY** SOURCE RANGE NEUTRON MONITORING - MONITOR STATUS, UPSC AL OR INOP status light, off for each SRM channel (MCP) (N/A IF in OPERATIONAL CONDITION 1).

___ ♦ **VERIFY** RO regards each SRM channel OPERABLE (N/A IF in OPERATIONAL CONDITION 1).

5.1.4. **VERIFY** the following:

___ ♦ RPS MODE SWITCH NOT in SHUTDOWN (MCP)

___ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, off (N/A IF RPS MODE SWITCH is in RUN)

5.1.5. IF SM/CRS has determined it necessary for non-coincident shorting links to be removed for core alterations, **VERIFY** non-coincident scram shorting links are installed between the following terminals:

___ ♦ Z-8 **AND** Z-9 (panel 10C609)

___ ♦ A-8 **AND** A-9 (panel 10C609)

___ ♦ Z-8 **AND** Z-9 (panel 10C611)

___ ♦ A-8 **AND** A-9 (panel 10C611)

___ 5.1.6. **NOTIFY** SM/CRS that removal of non-coincident shorting links during performance of this test may cause a RPS trip (full scram).

5.1.7. **REQUEST** Job Supervisor to perform the following:

___ A. **OBTAIN** current HV AND HV INOP settings from NOTES section of ICD card for H1SE -1SESC-K600D-C51.

___ B. **RECORD** OPER. HV (HV Setting), INOP TRIP (HV INOP) AND W.O.# in DESIRED columns of Attachment 1, Section 18.0.

5.1.8. **DETERMINE** high voltage DESIRED RANGE AND CALIBRATION TOLERANCE as follows:

___ A. **MULTIPLY** DESIRED OPER. HV on Section 18.0 by 0.02 to obtain high voltage tolerance.

___ B. **SUBTRACT** value in Step 5.1.8.A from DESIRED OPER. HV AND **RECORD** value in DESIRED RANGE FROM AND CALIBRATION TOLERANCE FROM columns for OPER. HV on Attachment 1, Section 18.0.

___ C. **ADD** value in Step 5.1.8.A to DESIRED OPER. HV AND **RECORD** value in DESIRED RANGE TO AND CALIBRATION TOLERANCE TO columns for OPER. HV on Attachment 1, Section 18.0.

5.1.9. **DETERMINE** low high voltage inoperative trip DESIRED RANGE AND CALIBRATION TOLERANCE as follows:

___ A. **MULTIPLY** DESIRED INOP TRIP on Attachment 1, Section 18.0 by 0.02 to obtain low high voltage inoperative trip tolerance.

___ B. **SUBTRACT** value in Step 5.1.9.A from DESIRED INOP TRIP AND **RECORD** value in DESIRED RANGE FROM AND CALIBRATION TOLERANCE FROM columns for INOP TRIP on Attachment 1, Section 18.0.

___ C. **ADD** value in Step 5.1.9.A to DESIRED INOP TRIP AND **RECORD** value in DESIRED RANGE TO AND CALIBRATION TOLERANCE TO columns for INOP TRIP on Attachment 1, Section 18.0.

___ 5.1.10. **RECORD** meter reading from Log Count Rate (LCR) meter at SRM D drawer. (panel 10C636)

_____ (cps)

___ 5.1.11. **REQUEST** RO to bypass SRM channel D.

___ ___ PC 5.1.12. **LOCATE**, **LABEL** AND **REMOVE** Pre-Regulator module (VR27) from SRM D drawer.

5.1.13. IF RPS MODE SWITCH on MCP is in RUN, **PREPARE** SRM for OPERATIONAL CONDITION 1 testing by **PERFORMING** the following:

___ ___ PC A. **LOCATE**, **LABEL** AND **REMOVE** RUN relay K17 from TRIP AUX UNIT D. (SRM D, panel 10C636)

___ B. **INSTALL** SRM Test Relay in K17 socket.

___ 5.1.14. **PLACE** Pre-Regulator module on 129B2048G1 plug-in adapter AND **INSTALL** adapter AND Pre-regulator in SRM drawer.

5.1.15. **JUMPER** out SRM AND IRM contributions to Activity Control (Card) No. 2 rod block inputs as follows:

___ ___ CV A. **INSTALL** a jumper between test point terminals TB4-10 (TRIP AUX UNIT D) AND BB-71. (front of panel 10C636)

5.1.16. **REQUEST** RO to perform the following:

___ A. **VERIFY** SRM D detector is in full-out position.

___ B. **DRIVE** SRM D detector in for 5 seconds.

___ C. **VERIFY** SRM D detector is NOT in full-out position.

5.1.17. **SIMULATE** SRM D detector full-in by performing the following:

___ ___ CV A. **INSTALL** a jumper between test point terminals AA-57 AND AA-63. (panel H21-P008, Reactor Building area 13, elevation 102', room 4317)

___ 5.1.18. **REQUEST** RO to place IRM RANGE SELECT, CHANNEL B, Range Switch in Range 2.

___ 5.1.19. IF NOT done, **REQUEST** RO to remove IRM channel B from bypass.

5.1.20. **VERIFY** the following:

___ ♦ MONITOR STATUS, SRM D BYPASS status lamp, on (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ ♦ BYPASSED SRM CH D status lamp, on (TRIP AUX UNIT D, panel 10C636)

___ ♦ Computer point C039, SRM BYPASS, in alarm

___ 5.1.21. **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-) at SRM D. (panel 10C636)

___ 5.1.22. **PLACE** SRM D (mode) selector switch S1 to TRIP TEST (LCR).

___ 5.1.23. **ADJUST** Trip Test potentiometer R10 in SRM D for an indication of 10 CPS on LCR front panel meter.

___ 5.1.24. **RESET** SRM D by momentarily **PLACING** RESET switch on SRM front panel to TRIP.

NOTE

INOP INHIBIT switch is cycled to preclude switch failure due to oxidation of contacts. A clamp installed on INOP INHIBIT switch will be used to PRESS/RELEASE switch throughout testing.

INOP INHIBIT switch S4 must be held pressed from Step 5.1.28 through Step 5.6.9.

___ 5.1.25. **CYCLE** INOP INHIBIT switch five times.

___ 5.1.26. **INSTALL** a clamp on SRM D INOP INHIBIT switch S4.

___ 5.1.27. Using clamp, **PRESS** AND **MAINTAIN** SRM D INOP INHIBIT switch S4 pressed.

___ 5.1.28. **REQUEST** RO to remove SRM channel D from bypass.

___ 5.1.29. **VERIFY** INOP status lamp on SRM D front panel, off.

___ 5.1.30. **VERIFY** Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, off (N/A IF RPS MODE SWITCH in RUN).

___ 5.1.31. **VERIFY** $\overline{N_u}$ LED, off (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN).

5.2 **Downscale Test**

___ 5.2.1. Slowly **ADJUST** Trip Test potentiometer R10 CCW until DOWNSCALE status lamp, on (SRM front panel).

___ 5.2.2. **RECORD** DMM indication in AS FOUND TRIP column of Attachment 1, Section 1.0.

5.2.3. **VERIFY** the following:

___ $ ♦ Control Room annunciator C3 E1, SRM DOWNSCALE, on (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, on (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ $\overline{N_u}$ LED, on (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN)

___ ♦ Computer point C013, ROD BLOCK - REFUEL MODE, in alarm (N/A IF RPS MODE SWITCH NOT in REFUEL)

___ ♦ Computer point C048, ROD OUT BLOCK, in alarm (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ MONITOR STATUS, SRM D DNSC status lamp, on (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ 5.2.4. Slowly **ADJUST** R10 CW until DOWNSCALE status lamp, off (SRM front panel).

___ 5.2.5. **RECORD** DMM indication in AS FOUND RESET column of Attachment 1, Section 1.0.

5.2.6. **VERIFY** the following:

___ ♦ Control Room annunciator C3 E1, SRM DOWNSCALE, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ $\overline{N_u}$ LED, off (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN)

___ ♦ Computer point C013, ROD BLOCK - REFUEL MODE, NOT in alarm (N/A IF RPS MODE SWITCH NOT in REFUEL)

___ ♦ Computer point C048, ROD OUT BLOCK, NOT in alarm (N/A IF RPS MODE SWITCH in RUN)

___ ♦ MONITOR STATUS, SRM D DNSC status lamp, off (SOURCE RANGE NEUTRON MONITORING section of MCP)

5.3 **Upscale Alarm Test**

___ 5.3.1. Slowly **ADJUST** R10 CW until UPSCALE ALARM status lamp, on (SRM front panel).

___ 5.3.2. **RECORD** DMM indication in AS FOUND TRIP column of Attachment 1, Section 2.0.

5.3.3. **VERIFY** the following:

___ $ ♦ Control Room annunciator C3 C1, SRM UPSCALE OR INOPERATIVE, on (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, on (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ $\overline{N_u}$ LED, on (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN)

___ ♦ Computer point C015, SRM UPSC ALARM, in alarm

___ $ ♦ MONITOR STATUS, SRM D UPSC AL OR INOP status lamp, on (SOURCE RANGE NEUTRON MONITORING section of MCP)

5.4 Upscale Trip Test

___ 5.4.1. Slowly **ADJUST** R10 CW until UPSCALE TRIP status lamp, on (SRM front panel).

___ 5.4.2. **RECORD** DMM indication in AS FOUND TRIP column of Attachment 1, Section 3.0.

___ 5.4.3. **VERIFY** MONITOR STATUS, SRM D UPSC TRIP status lamp, on (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ 5.4.4. While holding RESET switch on SRM front panel in TRIP, slowly **ADJUST** R10 CCW until UPSCALE TRIP status light, off (SRM front panel).

___ 5.4.5. **RECORD** DMM indication in AS FOUND RESET column of Attachment 1, Section 3.0.

___ 5.4.6. **VERIFY** MONITOR STATUS, SRM D UPSC TRIP status lamp, off (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ 5.4.7. While holding RESET switch on SRM front panel in TRIP, slowly **ADJUST** R10 CCW until UPSCALE ALARM status light, off (SRM front panel).

___ 5.4.8. **RECORD** DMM indication in AS FOUND RESET column of Attachment 1, Section 2.0.

5.4.9. **VERIFY** the following:

___ ♦ Control Room annunciator C3 C1, SRM UPSCALE OR INOPERATIVE, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ $\overline{N_u}$ LED, off (Activity control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN)

___ ♦ Computer point C015, SRM UPSC ALARM, NOT in alarm

___ ♦ MONITOR STATUS, SRM D UPSC AL OR INOP status lamp, off (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ 5.4.10. IF data of Attachment 1, Sections 1.0 OR 2.0 does NOT meet ACCEPTABLE VALUE criteria, **NOTIFY** Job Supervisor AND SM/CRS that a Technical Specification ALLOWABLE VALUE has been exceeded.

5.5 Detector Not Full In/Retract Permit Test

___ 5.5.1. **VERIFY** SRM DETECTOR SELECT, D IN status lamp, on (MCP).

CAUTION

Detector drive damage may occur during detector drive-out IF platform below reactor is NOT properly positioned.

___ ___ CV 5.5.2. IF RPS MODE SWITCH is in RUN, **REMOVE** jumper installed between terminals AA-57 AND AA-63, panel H21-P008 (as part of Step 5.1.17); OTHERWISE **REQUEST** RO to drive out SRM D detector until SRM DETECTOR SELECT, D IN status lamp, off. (MCP)

___ 5.5.3. Slowly **ADJUST** R10 CCW until RETR PERM DOWNSCALE status lamp, on (SRM front panel).

___ 5.5.4. **RECORD** DMM indication in AS FOUND TRIP column of Attachment 1, Section 4.0.

5.5.5. **VERIFY** the following:

___ $ ♦ Control Room annunciator C3 E2, SRM DET REMOVAL NOT PERMITTED, on (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, on (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ $\overline{N_u}$ LED, on (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN)

___ ♦ Computer point C014, SRM DET NOT START- UP POS, in alarm (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ SRM DETECTOR SELECT, D RETRACT PERMIT status lamp, off (MCP)

___ 5.5.6. **REQUEST** RO to place SRM D in bypass.

5.5.7. **VERIFY** the following:

___ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ $\overline{N_u}$ LED, off (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN)

___ ♦ SRM DETECTOR SELECT, D RETRACT PERMIT status lamp, on (MCP)

___ 5.5.8. **REQUEST** RO to take SRM D out of bypass.

5.5.9. **VERIFY** the following:

___ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, on (N/A IF RPS MODE SWITCH in RUN)

___ ♦ $\overline{N_u}$ LED, on (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN)

___ ♦ SRM DETECTOR SELECT, D RETRACT PERMIT status lamp, off (MCP)

___ 5.5.10. Slowly **ADJUST** R10 CW until RETR PERM DOWNSCALE status lamp, off (SRM front panel).

___ 5.5.11. **RECORD** DMM indication in AS FOUND RESET column of Attachment 1, Section 4.0.

5.5.12. **VERIFY** the following:

___ ♦ SRM DETECTOR SELECT, D RETRACT PERMIT status lamp, on (MCP)

___ ♦ Computer point C014, SRM DET NOT START-UP POS, NOT in alarm (N/A IF RPS MODE SWITCH in RUN)

___ ♦ Control Room annunciator C3 E2, SRM DET REMOVAL NOT PERMITTED, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ $\overline{N_u}$ LED, off (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN

___ 5.5.13. **REQUEST** RO to withdraw SRM D detector until SRM DETECTOR SELECT, D OUT status lamp, on (MCP) (detector is full-out).

___ 5.5.14. **VERIFY** SRM DETECTOR SELECT, D RETRACT PERMIT status lamp, off. (MCP)

___ ___ CV 5.5.15. IF RPS MODE SWITCH is in RUN, **INSTALL** 12 inch jumper between terminals AA-57 AND AA-63 at panel H21-P008; OTHERWISE **REQUEST** RO to drive SRM D detector in until SRM DETECTOR SELECT, D IN status lamp, on (MCP) (detector is full-in).

___ 5.5.16. **DISCONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

5.6 **Period Trip Test**

___ 5.6.1. **ADJUST** R10 to fully CCW.

___ 5.6.2. **PLACE** SRM D front panel selector switch to TRIP TEST (PER).

___ 5.6.3. **CONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-) on SRM D.

___ 5.6.4. Momentarily **PLACE** SRM D front panel RESET switch to TRIP.

___ 5.6.5. Slowly **ADJUST** R10 CW until PERIOD status lamp, on (SRM D front panel).

___ 5.6.6. **RECORD** DMM indication in AS FOUND TRIP column of Attachment 1, Section 5.0.

5.6.7. **VERIFY** the following:

___ ♦ Control Room annunciator C3 D1, SRM PERIOD, on (N/A IF RPS MODE SWITCH in RUN)

___ ♦ MONITOR STATUS, SRM D PERIOD status lamp, on (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ 5.6.8. **PLACE** SRM D front panel selector switch to OPERATE.

___ 5.6.9. **RELEASE** INOP INHIBIT switch S4.

___ 5.6.10. Momentarily **PLACE** SRM D front panel RESET switch to TRIP.

5.6.11. **VERIFY** the following:

___ ♦ Control Room annunciator C3 D1, SRM PERIOD, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ MONITOR STATUS, SRM D PERIOD status lamp, off (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ ♦ PERIOD status lamp, off (SRM D front panel)

___ 5.6.12. **DISCONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-).

5.7 **Inoperative Trip Test**

___ 5.7.1. **PLACE** SRM D (mode) selector switch S1 to TRIP TEST (LCR).

___ 5.7.2. **ADJUST** trip test potentiometer R1O in SRM D for an indication of 10 CPS on LCR front panel meter.

NOTE

In the following steps the INOP INHIBIT switch must be held pressed until instructed to release. Installed clamp on INOP INHIBIT switch will maintain switch pressed.

___ 5.7.3. **PRESS** AND **HOLD** SRM D INOP INHIBIT switch S4.

___ 5.7.4. **RESET** SRM D by momentarily placing RESET switch on SRM front panel to TRIP.

5.7.5. **VERIFY** the following:

___ ♦ Control Room annunciator C3 C1, SRM UPSCALE OR INOPERATIVE, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ $\overline{N_u}$ LED, off (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN)

___ ♦ Computer Point C016, SRM INOP TRIP, NOT in alarm

___ ♦ MONITOR STATUS, SRM D UPSC AL OR INOP status lamp, off (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ ♦ INOP status lamp, off (SRM front panel)

___ 5.7.6. **RELEASE** SRM D INOP INHIBIT switch S4.

5.7.7. **VERIFY** the following:

___ $ ♦ Control Room annunciator C3 C1, SRM UPSCALE OR INOPERATIVE, on (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, on (N/A IF RPS MODE SWITCH in RUN)

___ $ ♦ $\overline{N_u}$ LED, on (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH Not in RUN)

___ ♦ Computer point C016, SRM INOP TRIP, in alarm

___ $ ♦ MONITOR STATUS, SRM D UPSC AL OR INOP, status lamp, on (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ $ ♦ INOP status lamp, on (SRM front panel)

___ 5.7.8. **PRESS** AND **HOLD** SRM D INOP INHIBIT SWITCH S4.

5.7.9. **VERIFY** the following:

___ ♦ Control Room annunciator C3 C1, SRM UPSCALE OR INOPERATIVE, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ Control Room annunciator C6 D3, ROD OUT MOTION BLOCK, off (N/A IF RPS MODE SWITCH in RUN)

___ ♦ $\overline{N_u}$ LED, off (Activity Control No. 2, panel 10C616) (N/A IF RPS MODE SWITCH NOT in RUN)

___ ♦ Computer Point C016, SRM INOP TRIP, NOT in alarm

___ ♦ MONITOR STATUS, SRM D UPSC AL OR INOP status lamp, off (SOURCE RANGE NEUTRON MONITORING section of MCP)

___ ♦ INOP status lamp, off (SRM front panel)

___ 5.7.10. **PLACE** SRM D (mode) selector switch S1 to OPERATE.

___ 5.7.11. **RELEASE** SRM D INOP INHIBIT switch S4.

5.8 **Pre-Regulator (VR27) Test**

___ 5.8.1. **REQUEST** RO to bypass SRM channel D.

___ 5.8.2. **MEASURE** voltage between P1-17 (+) AND P1-3 (-) on plug-in adapter with DMM set to measure 20 VDC.

___ 5.8.3. **RECORD** DMM indication in AS FOUND +20.000 column of Attachment 1, Section 6.0.

___ 5.8.4. **MEASURE** voltage between P1-1 (+) AND P1-3 (-) on plug-in adapter.

___ 5.8.5. **RECORD** DMM indication in AS FOUND -20.000 column of Attachment 1, Section 6.0.

5.9 **Voltage Regulator (VR29) Test**

___ 5.9.1. **MEASURE** voltage between J1 (+) AND J2 (-) on voltage regulator with DMM set to measure 20 VDC.

___ 5.9.2. **RECORD** DMM indication in AS FOUND +15.000 column of Attachment 1, Section 7.0.

___ 5.9.3. **MEASURE** voltage between J3 (+) AND J2 (-) on voltage regulator with DMM set to measure 20 VDC.

___ 5.9.4. **RECORD** DMM indication in AS FOUND -15.000 column of Attachment 1, Section 7.0.

5.10 **Internal 10 and 10^5 Circuit Test**

___ 5.10.1. **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.10.2. **CONNECT** electronic counter to monitor period (seconds) to scaler output jack J8 at rear of SRM D drawer.

___ 5.10.3. **PLACE** SRM D front panel selector switch in 10.

___ 5.10.4. **RECORD** electronic counter period for 10 CPS in AS FOUND column of Attachment 1, Section 8.0.

___ 5.10.5. **RECORD** DMM indication for 10 CPS in AS FOUND column of Attachment 1, Section 8.0.

___ 5.10.6. **PLACE** SRM D front panel selector switch in 10^5.

___ 5.10.7. **ADJUST** electronic counter to monitor frequency (kHz) AND **RECORD** electronic counter frequency for 10^5 CPS in AS FOUND column of Attachment 1, Section 8.0.

___ 5.10.8. **RECORD** DMM indication for 10^5 CPS in AS FOUND column of Attachment 1, Section 8.0.

___ 5.10.9. **DISCONNECT** electronic counter from scaler output jack J8 at rear of SRM D drawer.

5.11 **Ramp Circuit Test**

___ 5.11.1. **PLACE** SRM D front panel selector switch in PERIOD.

___ 5.11.2. **HOLD** SRM front panel RESET switch in RAMP position until DMM indicates as close to 0.000 VDC as possible.

NOTE

A stopwatch will be required for the following step.

___ 5.11.3. Simultaneously **START** stopwatch AND **HOLD** front panel RAMP switch in FIXED position. **STOP** stopwatch when DMM indicates +7.140 VDC.

___ 5.11.4. **RECORD** time for voltage to go from 0.000 to +7.140 VDC in AS FOUND column of Attachment 1, Section 9.0.

5.12 **LCR Front Panel Meter, Remote LCR Recorder and Computer Point B3030 Test**

___ 5.12.1. **PLACE** SRM D front panel selector switch in TRIP TEST (LCR).

___ 5.12.2. **ADJUST** R10 in SRM drawer until LCR front panel meter indicates INPUT values specified in Attachment 1, Section 10.0. **RECORD** DMM indication in AS FOUND column for each input.

___ 5.12.3. **ADJUST** R10 in SRM drawer until Recorder H1SE -1SEXR-R602B-C51 (BLUE PEN) indicates INPUT values specified in Attachment 1, Section 11.0. **RECORD** DMM indication in AS FOUND column for each input.

___ 5.12.4. **ADJUST** R10 in SRM drawer until DMM indicates INPUT values specified in Attachment 1, Section 12.0. **RECORD** computer indication for computer point B3030 in AS FOUND column for each input.

5.13 **LCR Amplifier (AR23) Zero and Period Amplifier (AR14) Zero Test**

___ 5.13.1. **PLACE** SRM D front panel selector switch in ZERO.

___ 5.13.2. **RECORD** DMM indication in AS FOUND column of Attachment 1, Section 13.0.

___ 5.13.3. **DISCONNECT** DMM lead at AR23-J1 (+) AND **CONNECT** lead to AR14-J1 (+).

___ 5.13.4. **RECORD** DMM indication in AS FOUND column of Attachment 1, Section 14.0.

5.14 **Period Circuit Test**

___ 5.14.1. **PLACE** SRM D front panel selector switch in PERIOD.

___ 5.14.2. **PLACE** SRM D front panel RESET switch in RAMP for approximately 5 seconds.

___ 5.14.3. **HOLD** SRM D front panel RAMP switch in FIXED.

___ 5.14.4. **RECORD** DMM indication in AS FOUND column of Attachment 1, Section 15.0.

___ 5.14.5. **RELEASE** SRM D front panel RAMP switch.

5.15 **Period Front panel Meter and Computer Point B3004 Test**

___ 5.15.1. **PLACE** SRM D front panel selector switch to TRIP TEST (PER).

NOTE

With the selector switch in the TRIP TEST (PER), the test circuit will saturate after a period of time, depending on the adjustment of R10. Placing the RESET switch in the RAMP for approximately 5 seconds will reset the ramp circuit.

___ 5.15.2. **ADJUST** R10 in SRM drawer until PERIOD front panel meter indicates INPUT values specified in Attachment 1, Section 16.0. **RECORD** DMM indication in AS FOUND column for each input.

___ 5.15.3. **ADJUST** R10 in SRM drawer until DMM indicates INPUT values specified in Attachment 1, Section 17.0. **RECORD** computer indication for computer point B3004 in AS FOUND column for each input.

___ 5.15.4. **DISCONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-).

___ 5.15.5. **PLACE** SRM D front panel selector switch in OPERATE.

5.16 **High Voltage and Inoperative Test**

NOTE

IF high voltage can NOT be achieved, INFORM the Job Supervisor AND/OR Engineering that new AND refurbished High Voltage power supplies typically arrive from the manufacturer with the voltage jumpered for 100 to 350 VDC operation. The jumper wire connected to J21-A3 must be removed for 350 to 600 VDC operation.

CAUTION

High voltage is present at test points in the following step. Use caution to prevent injury.

___ 5.16.1. **CONNECT** DMM set to measure 600 VDC between PS21-TP1 (+) AND VR29-J2 (-).

___ 5.16.2. **RECORD** DMM indication in AS FOUND OPER HV column of Attachment 1, Section 18.0.

___ 5.16.3. **ADJUST** R1 on High Voltage Power Supply module (PS21) to lower high voltage until INOP status lamp, on (front of SRM drawer).

___ 5.16.4. **VERIFY** INOP status lamp, on (SRM front panel).
$

___ 5.16.5. **RECORD** DMM indication in AS FOUND INOP TRIP column of Attachment 1, Section 18.0.

___ 5.16.6. **ADJUST** R1 until DMM indicates AS FOUND OPER. HV recorded on Attachment 1, Section 18.0, in Step 5.16.2.

___ 5.16.7. **VERIFY** INOP status lamp, off (SRM front panel).

___ 5.16.8. **DISCONNECT** DMM from SRM drawer.

___ 5.16.9. Using Fluke 45, **RECORD** ripple voltage between PS21-TP1 AND VR29-J2 on Attachment 1.

___ 5.16.10. IF ripple voltage is greater than tolerance specified, **INITIATE** a notification to repair/replace power supply. (This does NOT make the equipment unsatisfactory, power supply is operational.)

5.17 **Data Evaluation**

___ 5.17.1. **EVALUATE** AS FOUND data recorded on Attachment 1, Sections 1.0 through 18.0. IF any AS FOUND data exceeds DESIRED RANGE, **GO TO** Section 5.18, **Calibration Setup**.

___ 5.17.2. IF all AS FOUND data is within DESIRED RANGE, **RECORD** data in AS LEFT column AND **GO TO** Section 5.54, **Return to Service**.

5.18 **Calibration Setup**

NOTE

Sections 8.1 through 8.4 show location of module adjustments.

___ 5.18.1. IF NOT done, **REQUEST** RO to bypass SRM channel D.

___ 5.18.2. **PERFORM** applicable calibration section(s) below, either as directed by each section, OR at request of Job Supervisor.

5.19 **Pre-Regulator (VR27) Calibration**

___ 5.19.1. IF AS FOUND data in Attachment 1, Section 6.0 is within DESIRED RANGE, **GO TO** Section 5.20, **Voltage Regulator (VR29) Calibration**.

___ 5.19.2. **MONITOR** voltage between P1-17 (+) AND P1-3 (-) on plug-in adapter with DMM (set to measure 20 VDC).

NOTE

In Steps 5.19.5 AND 5.19.5, use the following adjustment resistors as applicable for the installed pre-regulator:
GE Part # 234C5955G001 - R1 AND R2
GE Part # 194X386G001, 194X386G002 - R9 AND R20

___ 5.19.3. **ADJUST** R1 (R9) on pre-regulator for a (positive) DMM indication within CALIBRATION TOLERANCE of Attachment 1, Section 6.0.

___ 5.19.4. **MONITOR** voltage between P1-1 (+) AND P1-3 (-) on plug-in adapter with DMM.

___ 5.19.5. **ADJUST** R2 (R20) on pre-regulator for a (negative) DMM indication within CALIBRATION TOLERANCE of Attachment 1, Section 6.0.

___ 5.19.6. **DISCONNECT** DMM from SRM drawer.

___ 5.19.7. IF further calibration is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.20 **Voltage Regulator (VR29) Calibration**

___ 5.20.1. IF AS FOUND data in Attachment 1, Section 7.0 is within DESIRED RANGE, **GO TO** Section 5.21, **LCR Amplifier (AR23) Zero Calibration**.

___ ___ CV 5.20.2. **LOCATE**, **LABEL** AND **REMOVE** Voltage Regulator module (VR29) from SRM D drawer.

___ 5.20.3. **REMOVE** cover on voltage regulator, **INSTALL** it on second 129A2048G1 plug-in adapter AND **INSTALL** both module AND adapter in SRM drawer.

___ 5.20.4. **MONITOR** voltage between J1 (+) AND J2 (-) on voltage regulator with DMM set to measure 20 VDC.

___ 5.20.5. **ADJUST** R9 on voltage regulator for a (positive) DMM indication within CALIBRATION TOLERANCE of Attachment 1, Section 7.0.

___ 5.20.6. **MONITOR** voltage between J3 (+) AND J2 (-) on voltage regulator with DMM.

___ 5.20.7. **ADJUST** R12 on regulator for a (negative) DMM indication within CALIBRATION TOLERANCE of Attachment 1, Section 7.0.

___ 5.20.8. **DISCONNECT** DMM from SRM drawer.

___ 5.20.9. **REMOVE** module AND plug-in adapter, **REPLACE** cover, AND **REPLACE** module (VR29) in SRM drawer.

___ 5.20.10. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.21 **LCR Amplifier (AR23) Zero Calibration**

___ 5.21.1. IF AS FOUND data in Attachment 1, Section 13.0 is within DESIRED RANGE, **GO TO** Section 5.22, **Period Amplifier (AR14) Zero Calibration**.

___ 5.21.2. **PLACE** SRM D front panel selector switch in ZERO.

___ 5.21.3. **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.21.4. **ADJUST** AR23-R20 on LCR Amplifier for a DMM indication of 0.000 (-0.001 to +0.001) VDC.

___ 5.21.5. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.22 **Period Amplifier (AR14) Zero Calibration**

___ 5.22.1. IF AS FOUND data in Attachment 1, Section 14.0 is within DESIRED RANGE, **GO TO** Section 5.23, **Internal 10 and 10^5 Circuit Calibration**.

___ 5.22.2. IF NOT done, **PLACE** SRM D front panel selector switch in ZERO.

___ 5.22.3. **CONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-).

___ 5.22.4. **ADJUST** AR14-R22 on Period Amplifier for a DMM indication of 0.000 (-0.001 to +0.001) VDC.

___ 5.22.5. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.23 **Internal 10 and 10^5 Circuit Calibration**

___ 5.23.1. IF AS FOUND data in Attachment 1, Section 8.0 is within DESIRED RANGE, **GO TO** Section 5.24, **Ramp Circuit Calibration**.

___ ___ CV 5.23.2. **LOCATE**, **LABEL** AND **REMOVE** LCR Amplifier module (AR23) from SRM D drawer.

___ 5.23.3. **REMOVE** LCR Amplifier cover, **INSTALL** it on 129B2048G7 plug-in adapter AND **INSTALL** both module AND adapter in SRM drawer.

___ 5.23.4. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.23.5. **CONNECT** electronic counter to monitor period (seconds) to scaler output jack J8 at rear of SRM D drawer.

___ 5.23.6. **PLACE** SRM D front panel selector switch in 10.

___ 5.23.7. **ADJUST** Z24-R11 on Signal Generator module for an indication of 0.1000 (0.0998 to 0.1002) seconds on electronic counter.

___ 5.23.8. **PLACE** SRM D front panel selector switch in 10^5.

___ 5.23.9. **ADJUST** electronic counter to monitor frequency (kHz).

___ ___ PC 5.23.10. IF electronic counter does NOT indicate 100 (99.8 to 100.2) kHz, **LOCATE**, **LABEL** AND **REMOVE** Signal Generator module (Z24) from SRM D drawer.

___ 5.23.11. **REMOVE** Signal Generator cover, **INSTALL** it on 129B2048G2 plug-in adapter, AND **INSTALL** both module AND adapter in SRM drawer.

___ 5.23.12. **ADJUST** Z24-C1 on Signal Generator module for an indication of 100 (99.8 to 100.2) kHz on electronic counter.

___ 5.23.13. **REPEAT** Steps 5.23.5 through 5.23.12 as necessary, until electronic counter indications are within PERIOD AND FREQ CALIBRATION TOLERANCE of Attachment 1, Section 8.0.

___ 5.23.14. **REMOVE** Signal Generator module AND plug-in adapter, **REPLACE** cover AND **INSTALL** Signal Generator module (Z24) in SRM drawer.

___ 5.23.15. **PLACE** SRM D front panel selector switch in 10.

___ 5.23.16. **ADJUST** Z13-R19 on Log Integrator module for a DMM indication of 2.86 (2.76 to 2.96) VDC.

___ 5.23.17. **PLACE** SRM D front panel selector switch in 10^5.

___ 5.23.18. **ADJUST** AR23-R7 on LCR Amplifier for a DMM indication of 8.57 (8.47 to 8.67) VDC.

___ 5.23.19. **REPEAT** Steps 5.23.15 through 5.23.18 as necessary, until DMM indications are within VOLTS CALIBRATION TOLERANCE of Attachment 1, Section 8.0.

___ 5.23.20. **DISCONNECT** DMM from SRM drawer.

___ 5.23.21. **DISCONNECT** electronic counter from scaler output jack J8 at rear of SRM D drawer.

___ 5.23.22. **REMOVE** LCR Amplifier module AND plug-in adapter, **REPLACE** cover AND **INSTALL** LCR Amplifier module (AR23) in SRM drawer.

___ 5.23.23. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.24 Ramp Circuit Calibration

___ 5.24.1. IF AS FOUND data in Attachment 1, Section 9.0 is within DESIRED RANGE, **GO TO** Section 5.25, **Period Circuit Calibration**.

___ 5.24.2. **PLACE** SRM D front panel selector switch in PERIOD.

___ 5.24.3. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.24.4. **ADJUST** AR23-R1 on LCR Amplifier in direction required to raise (CCW) OR lower (CW) period.

___ 5.24.5. **HOLD** SRM front panel RESET switch in RAMP until DMM indicates as close to 0.000 VDC as possible.

NOTE

A stopwatch will be required for the following step.

___ 5.24.6. Simultaneously **START** stopwatch AND **HOLD** front panel RAMP switch in FIXED. **STOP** stopwatch when DMM indicates +7.140 VDC AND **NOTE** time.

___ 5.24.7. **REPEAT** Steps 5.24.4 through 5.24.6 as necessary, until time is within CALIBRATION TOLERANCE of Attachment 1, Section 9.0.

___ 5.24.8. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.25 Period Circuit Calibration

NOTE

Adjustments made to Ramp circuit in Section 5.24 will affect AS FOUND data in Attachment 1, Section 15.0.

___ 5.25.1. IF AS FOUND data in Attachment 1, Section 15.0 is within DESIRED RANGE AND Section 5.24 was NOT performed, **GO TO** Section 5.26, **Downscale Alarm Calibration**.

___ 5.25.2. IF NOT done, **PLACE** SRM D front panel selector switch in PERIOD.

___ 5.25.3. IF NOT done, **CONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-).

___ 5.25.4. **PLACE** (SRM front panel) RESET switch in RAMP for approximately 5 seconds.

NOTE

Holding RAMP switch in FIXED position for more than two minutes will saturate test circuit. Placing RESET switch in RAMP position for approximately 5 seconds will reset ramp circuit.

___ 5.25.5. **HOLD** SRM front panel RAMP switch in FIXED.

___ 5.25.6. **ADJUST** AR14-R2 on Period Amplifier for a DMM indication of -10.000 (-9.980 to -10.020) VDC.

___ 5.25.7. **RELEASE** SRM front panel RAMP switch.

___ 5.25.8. **REPEAT** Steps 5.25.4 through 5.25.7 as necessary, until DMM indication is within CALIBRATION TOLERANCE of Attachment 1, Section 15.0.

___ 5.25.9. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.26 **Downscale Alarm Calibration**

___ 5.26.1. IF AS FOUND data in Attachment 1, Section 1.0 is within DESIRED RANGE, **GO TO** Section 5.27, **Upscale Alarm Calibration**.

___ 5.26.2. IF NOT done, **CONNECT** a DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.26.3. **PLACE** SRM D front panel selector switch in TRIP TEST (LCR).

___ 5.26.4. **ADJUST** R10 to obtain a DMM indication within CALIBRATION TOLERANCE for DOWNSCALE trip setpoint.

___ 5.26.5. IF DOWNSCALE status lamp, on (front of SRM drawer), **ADJUST** Z15-R2 until DOWNSCALE status lamp, off.

___ 5.26.6. **ADJUST** Z15-R2 until front panel DOWNSCALE status lamp, on.

___ 5.26.7. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.27 **Upscale Alarm Calibration**

___ 5.27.1. IF AS FOUND data in Attachment 1, Section 2.0 is within DESIRED RANGE, **GO TO** Section 5.28, **Upscale Trip Calibration**.

___ 5.27.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.27.3. IF NOT done, **PLACE** SRM D front panel selector switch in TRIP TEST (LCR).

___ 5.27.4. **ADJUST** R10 to obtain a DMM indication within CALIBRATION TOLERANCE for UPSCALE ALARM trip setpoint.

___ 5.27.5. IF UPSCALE ALARM status lamp, on (front of SRM drawer), **HOLD** front panel RESET switch in TRIP AND IF necessary, **ADJUST** Z15-R4 until front panel status lamp, off. **RELEASE** RESET switch.

___ 5.27.6. **ADJUST** Z15-R4 until front panel UPSCALE ALARM status lamp, on.

___ 5.27.7. While maintaining RESET switch in TRIP, **ADJUST** R10 until front panel UPSCALE ALARM status lamp, off. **RELEASE** RESET switch.

___ 5.27.8. Slowly **ADJUST** R10 until front panel UPSCALE ALARM status lamp, on.

___ 5.27.9. **REPEAT** Steps 5.27.4 through 5.27.8 as necessary, until trip setpoint is within CALIBRATION TOLERANCE of Attachment 1, Section 2.0.

___ 5.27.10. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.28 **Upscale Trip Calibration**

___ 5.28.1. IF AS FOUND data in Attachment 1, Section 3.0 is within DESIRED RANGE, **GO TO** Section 5.29, **Retract Permit Downscale Calibration**.

___ 5.28.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.28.3. IF NOT done, **PLACE** SRM D front panel selector switch in TRIP TEST (LCR).

___ 5.28.4. **ADJUST** R10 to obtain a DMM indication within CALIBRATION TOLERANCE for UPSCALE TRIP setpoint.

___ 5.28.5. IF UPSCALE TRIP status lamp, on (front of SRM drawer), **HOLD** front panel RESET switch in TRIP AND IF necessary, **ADJUST** Z15-R6 until front panel status lamp, off. **RELEASE** RESET switch.

___ 5.28.6. **ADJUST** Z15-R6 until front panel UPSCALE TRIP status lamp, on.

___ 5.28.7. While maintaining RESET switch in TRIP, **ADJUST** R10 until front panel UPSCALE TRIP status lamp, off. **RELEASE** RESET switch.

___ 5.28.8. Slowly **ADJUST** R10 until front panel UPSCALE TRIP status lamp, on.

___ 5.28.9. **REPEAT** Steps 5.28.4 through 5.28.8 as necessary, until trip setpoint is within CALIBRATION TOLERANCE of Attachment 1, Section 3.0.

___ 5.28.10. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.29 **Retract Permit Downscale Calibration**

___ 5.29.1. IF AS FOUND data in Attachment 1, Section 4.0 is within DESIRED RANGE, **GO TO** Section 5.30, **Period Trip Calibration**.

___ 5.29.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.29.3. IF NOT done, **PLACE** SRM D front panel selector switch in TRIP TEST (LCR).

___ 5.29.4. **ADJUST** R10 to obtain a DMM indication within CALIBRATION TOLERANCE for RETRACT PERMIT DOWNSCALE trip setpoint.

___ 5.29.5. IF RETR PERM DOWNSCALE status lamp, on (front of SRM drawer), **ADJUST** Z15-R3 until RETR PERM DOWNSCALE status lamp, off.

___ 5.29.6. **ADJUST** Z15-R3 until front panel RETR PERM DOWNSCALE status lamp, on.

___ 5.29.7. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.30 **Period Trip Calibration**

___ 5.30.1. IF AS FOUND data in Attachment 1, Section 5.0 is within DESIRED RANGE, **GO TO** Section 5.31, **LCR Front panel Meter M1 Calibration**.

___ 5.30.2. IF NOT done, **CONNECT** a DMM between AR14-J1 (+) AND VR29-J2 (-).

___ 5.30.3. **PLACE** SRM D selector switch to TRIP TEST (PER).

NOTE

With selector switch in TRIP TEST (PER), the test circuit will saturate after a period of time, depending on adjustment of R10. Placing RESET switch in RAMP for approximately 5 seconds will reset ramp circuit.

___ 5.30.4. **ADJUST** R10 to obtain a DMM indication within CALIBRATION TOLERANCE for PERIOD trip setpoint.

___ 5.30.5. IF PERIOD status lamp, on (front of SRM drawer), **HOLD** front panel RESET switch in TRIP AND, IF necessary, **ADJUST** Z15-R5 until front panel status lamp, off. **RELEASE** RESET switch.

___ 5.30.6. **ADJUST** Z15-R5 until front panel PERIOD status lamp, on.

___ 5.30.7. While maintaining RESET switch in TRIP, **ADJUST** R10 until front panel PERIOD status lamp, off. **RELEASE** RESET switch.

___ 5.30.8. Slowly **ADJUST** R10 until front panel PERIOD status lamp, on.

___ 5.30.9. **REPEAT** Steps 5.30.4 through 5.30.8 as necessary, until trip setpoint is within CALIBRATION TOLERANCE.

___ 5.30.10. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.31 LCR Front panel Meter M1 Calibration

___ 5.31.1. IF AS FOUND data in Attachment 1, Section 10.0 is within DESIRED RANGE, **GO TO** Section 5.32, **Remote LCR Recorder Calibration**.

___ 5.31.2. **REMOVE** pre-regulator AND plug-in adapter from SRM D drawer.

___ 5.31.3. **ADJUST** mechanical zero on LCR front panel meter M1 to indicate precisely 10^{-1} CPS.

___ 5.31.4. **INSTALL** pre-regulator AND plug-in adapter into SRM drawer.

___ 5.31.5. IF NOT done, **CONNECT** a DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.31.6. IF NOT done, **PLACE** SRM D selector switch to TRIP TEST (LCR).

___ 5.31.7. **ADJUST** R10 to obtain a DMM indication of 10.000 (9.900 to 10.100) VDC.

___ 5.31.8. **ADJUST** AR23-R22 on LCR Amplifier until LCR front panel meter indicates 10^{6} CPS.

___ 5.31.9. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.32 Remote LCR Recorder Calibration

___ 5.32.1. IF AS FOUND data in Attachment 1, Section 11.0 is within DESIRED RANGE, **GO TO** Section 5.33, **Computer Point B3030 Calibration**.

___ 5.32.2. IF recorder H1SE -1SEXR-R602B-C51 (Blue) requires calibration, **NOTIFY** Job Supervisor that HC.IC-DC.ZZ-0348(Q) must be performed AND **NOTE** in COMMENTS section of Attachment 2.

___ 5.32.3. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.33 **Computer Point B3030 Calibration**

___ 5.33.1. IF AS FOUND data in Attachment 1, Section 12.0 is within DESIRED RANGE, **GO TO** Section 5.34, **Period Front Panel Meter M2 Calibration**.

___ 5.33.2. IF computer point B3030 requires calibration AND AS FOUND data in Attachment 1, Section 10.0 is within DESIRED RANGE, **INITIATE** a notification to Digital Systems Group that PIU potentiometer for B3030 may require adjustment AND/OR B3030 requires calibration AND **NOTE** in COMMENTS section of ADMINISTRATIVE DATA PACKAGE.

___ 5.33.3. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.34 **Period Front panel Meter M2 Calibration**

___ 5.34.1. IF AS FOUND data in Attachment 1, Section 16.0 is within DESIRED RANGE, **GO TO** Section 5.35, **Computer Point B3004 Calibration**.

___ ___ PC 5.34.2. **LOCATE**, **LABEL** AND **REMOVE** Period Amplifier module (AR14) from SRM D drawer.

___ 5.34.3. **ADJUST** mechanical zero on PERIOD front panel meter M2 to indicate precisely -100 SECONDS.

___ 5.34.4. **REMOVE** Period Amplifier cover, **INSTALL** it on 129B2048G2 plug-in adapter, AND **INSTALL** both module AND adapter in SRM drawer.

___ 5.34.5. IF NOT done, **CONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-).

___ 5.34.6. IF NOT done, **PLACE** SRM D selector switch to TRIP TEST (PER).

NOTE

With selector switch in TRIP TEST (PER), the test circuit will saturate after a period of time, depending on adjustment of R10. Placing RESET switch in RAMP for approximately 5 seconds will reset ramp circuit.

___ 5.34.7. **ADJUST** R10 to obtain a DMM indication of +1.000 (0.900 to 1.100) VDC.

___ 5.34.8. **ADJUST** AR14-R16 on Period Amplifier until PERIOD front panel meter indicates -100 SECONDS.

___ 5.34.9. **ADJUST** R10 to obtain a DMM indication of -10.000 (-9.900 to -10.100) VDC.

___ 5.34.10. **ADJUST** AR14-R23 on Period Amplifier until PERIOD front panel meter indicates 10 SECONDS.

___ 5.34.11. **REPEAT** Steps 5.34.7 through 5.34.10 as necessary, until no further adjustment is required.

___ 5.34.12. **REMOVE** Period Amplifier module AND plug-in adapter, **REPLACE** cover AND **INSTALL** Period Amplifier module (AR14) in SRM drawer.

___ 5.34.13. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.35 Computer Point B3004 Calibration

___ 5.35.1. IF AS FOUND data in Attachment 1, Section 17.0 is within DESIRED RANGE, **GO TO** Section 5.36, **Low High Voltage Inoperative Trip Calibration**.

___ 5.35.2. IF computer point B3004 requires calibration AND AS FOUND data in Attachment 1, Section 16.0 is within DESIRED RANGE, **INITIATE** a notification to Digital Systems Group that PIU potentiometer for B3004 may require adjustment AND/OR B3004 requires calibration AND **NOTE** in COMMENTS section of ADMINISTRATIVE DATA PACKAGE.

___ 5.35.3. IF further calibration of SRM is required, **GO TO** applicable section(s) of calibration; OTHERWISE **GO TO** Section 5.37, **Data Verification**.

5.36 Low High Voltage Inoperative Trip Calibration

NOTE

This section is to be performed only IF Low High Voltage INOP TRIP requires calibration. Calibration of OPER. HV will be performed in Section 5.37, **Data Verification**.

___ 5.36.1. IF AS FOUND INOP TRIP data in Attachment 1, Section 18.0 is within DESIRED RANGE, **GO TO** Section 5.37, **Data Verification**.

___ 5.36.2. IF NOT done, **PLACE** SRM D front panel selector switch in OPERATE.

CAUTION

High voltage is present at test points in the following step. Use caution to prevent injury.

___ 5.36.3. **CONNECT** DMM set to measure 600 VDC between PS21-TP1 (+) AND VR29-J2 (-).

___ 5.36.4. **ADJUST** R1 on High Voltage Power Supply module (PS21) until DMM indicates an INOP TRIP setpoint voltage that is within CALIBRATION TOLERANCE on Attachment 1, Section 18.0.

___ 5.36.5. IF INOP status lamp, on (front of SRM drawer), **ADJUST** Z15-R1 until INOP status lamp, off.

___ 5.36.6. **ADJUST** Z15-R1 until INOP status lamp, on (front of SRM drawer).

___ 5.36.7. **ADJUST** R1 on High Voltage Power Supply until front panel INOP status lamp, off.

___ 5.36.8. Slowly **ADJUST** R1 until front panel INOP status lamp, on (High Voltage Power Supply)

___ 5.36.9. **REPEAT** Steps 5.36.4 through 5.36.8 as necessary, until trip setpoint is within CALIBRATION TOLERANCE of Attachment 1, Section 18.0.

___ 5.36.10. **ADJUST** R1 until front panel INOP status lamp, off (High Voltage Power Supply).

___ 5.36.11. **DISCONNECT** DMM from SRM drawer.

5.37 **Data Verification Test Setup**

___ 5.37.1. IF NOT done, **REQUEST** RO to bypass SRM D.

___ 5.37.2. IF NOT done, **PLACE** SRM D front panel selector switch in OPERATE.

___ 5.37.3. **REQUEST** Job Supervisor to review Calibration sections of this test AND determine which Data Verification sections should be performed because associated component(s) may have been affected by calibration of another component.

5.38 **Pre-Regulator (VR27) Verification**

___ 5.38.1. IF pre-regulator was calibrated, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 6.0 AND **GO TO** Section 5.39, **Voltage Regulator (VR29) Verification.**

___ 5.38.2. **MEASURE** voltage between P1-17 (+) AND P1-3 (-) on plug-in adapter with DMM (20 VDC) AND **NOTE** +20.000 DMM indication.

___ 5.38.3. **MEASURE** voltage between P1-1 (+) AND P1-3 (-) on plug-in adapter AND **NOTE** -20.000 VDC DMM indication.

___ 5.38.4. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 6.0.

___ ___ IV 5.38.5. **REMOVE** Pre-Regulator module AND plug-in adapter AND **INSTALL** Pre-Regulator module in SRM drawer.

5.39 **Voltage Regulator (VR29) Verification**

___ 5.39.1. IF voltage regulator was calibrated OR may have been affected by calibration of another component, as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 7.0 AND **GO TO** Section 5.40, **LCR Amplifier (AR23) Zero Verification.**

___ 5.39.2. **MEASURE** voltage between J1 (+) AND J2 (-) on voltage regulator with DMM (20 VDC) AND **NOTE** +15.000 DMM indication.

___ 5.39.3. **MEASURE** voltage between J3 (+) AND J2 (-) on voltage regulator with DMM AND **NOTE** -15.000 DMM indication.

___ 5.39.4. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 7.0.

5.40 **LCR Amplifier (AR23) Zero Verification**

___ 5.40.1. IF LCR Amplifier (AR23) zero was calibrated OR may have been affected by calibration of another component, as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE, **RECORD** AS FOUND data in AS LEFT column of Attachment 1, Section 13.0 AND **GO TO** Section 5.41, **Period Amplifier (AR14) Zero Verification.**

___ 5.40.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.40.3. **PLACE** SRM D front panel selector switch in ZERO AND **NOTE** DMM indication.

___ 5.40.4. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT column of Attachment 1, Section 13.0.

5.41 **Period Amplifier (AR14) Zero Verification**

___ 5.41.1. IF Period Amplifier (AR14) zero was calibrated OR may have been affected by calibration of another component, as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT column of Attachment 1, Section 14.0 AND **GO TO** Section 5.42, **Internal 10 and 10^5 Circuit Verification.**

___ 5.41.2. IF NOT done, **CONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-).

___ 5.41.3. **PLACE** SRM D front panel selector switch in ZERO AND **NOTE** DMM indication.

___ 5.41.4. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT column of Attachment 1, Section 14.0.

5.42 **Internal 10 and 10^5 Circuit Verification**

___ 5.42.1. IF Internal 10 AND 10^5 circuit was calibrated OR may have been affected by calibration of another component, as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 8.0 AND **GO TO** Section 5.43, **Ramp Circuit Verification.**

___ 5.42.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.42.3. **CONNECT** electronic counter to monitor period (seconds) to scaler output jack J8 at rear of SRM D drawer.

___ 5.42.4. **PLACE** SRM D front panel selector switch in 10 AND **NOTE** electronic counter period AND DMM indication.

___ 5.42.5. **ADJUST** electronic counter to monitor frequency (kHz).

___ 5.42.6. **PLACE** SRM front panel selector switch in 10^5 AND **NOTE** electronic counter frequency AND DMM indication.

___ 5.42.7. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 8.0.

___ 5.42.8. **DISCONNECT** electronic counter from scaler output jack J8 at rear of SRM D drawer.

5.43 **Ramp Circuit Verification**

___ 5.43.1. IF Ramp circuit was calibrated OR may have been affected by calibration of another component, as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT column of Attachment 1, Section 9.0 AND **GO TO** Section 5.44, **Period Circuit Verification.**

___ 5.43.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.43.3. IF NOT done, **PLACE** SRM D front panel selector switch in PERIOD.

___ 5.43.4. **HOLD** SRM front panel RESET switch in RAMP position until DMM indicates as close to 0.000 VDC as possible.

NOTE

A stopwatch will be required for the following step.

___ 5.43.5. Simultaneously **START** stopwatch AND **HOLD** front panel RAMP switch in FIXED. **STOP** stopwatch when DMM indicates +7.140 VDC AND **NOTE** time.

___ 5.43.6. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** new data in AS LEFT column of Attachment 1, Section 9.0.

5.44 **Period Circuit Verification**

___ 5.44.1. IF Period circuit was calibrated OR may have been affected by calibration of another component (e.g., Ramp circuit), as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT column of Attachment 1, Section 15.0 AND **GO TO** Section 5.45, **Downscale Alarm Verification.**

___ 5.44.2. IF NOT done, **CONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-).

___ 5.44.3. IF NOT done, **PLACE** SRM front panel selector switch in PERIOD.

___ 5.44.4. **PLACE** SRM front panel RESET switch in RAMP for approximately 5 seconds.

___ 5.44.5. **HOLD** SRM front panel RAMP switch in FIXED AND **NOTE** DMM indication.

___ 5.44.6. **RELEASE** SRM front panel RAMP switch.

___ 5.44.7. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT column of Attachment 1, Section 15.0.

5.45 **Downscale Alarm Verification**

___ 5.45.1. IF Downscale trip OR reset point was calibrated OR may have been affected by calibration of another component, as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 1.0 AND **GO TO** Section 5.46, **Upscale Alarm Verification.**

___ 5.45.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.45.3. IF NOT done, **PLACE** SRM D front panel selector switch in TRIP TEST (LCR).

___ 5.45.4. **ADJUST** R10 to obtain an indication of 10 CPS on LCR front panel meter.

___ 5.45.5. Slowly **ADJUST** R10 until DOWNSCALE status lamp, on (SRM front panel) AND **NOTE** TRIP DMM indication.

___ 5.45.6. **ADJUST** R10 until DOWNSCALE status lamp, off AND **NOTE** RESET DMM indication.

___ 5.45.7. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 1.0.

5.46 **Upscale Alarm Verification**

___ 5.46.1. IF Upscale Alarm was calibrated OR may have been affected by calibration of another component, as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 2.0 AND **GO TO** Section 5.47, **Upscale Trip Verification.**

___ 5.46.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.46.3. IF NOT done, **PLACE** SRM D front panel selector switch in TRIP TEST (LCR).

___ 5.46.4. **ADJUST** R10 to obtain an indication of 10 CPS on LCR front panel meter.

___ 5.46.5. Momentarily **PLACE** RESET switch on SRM front panel in TRIP.

___ 5.46.6. Slowly **ADJUST** R10 CW until UPSCALE ALARM status lamp, on (SRM front panel) AND **NOTE** TRIP DMM indication.

___ 5.46.7. **HOLD** RESET switch on SRM front panel in TRIP.

___ 5.46.8. Slowly **ADJUST** R10 CCW until UPSCALE ALARM status lamp, off (SRM front panel) AND **NOTE** RESET DMM indication.

___ 5.46.9. **RELEASE** RESET switch on SRM front panel.

___ 5.46.10. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 2.0.

5.47 **Upscale Trip Verification**

___ 5.47.1. IF Upscale Trip was calibrated OR may have been affected by calibration of another component, as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 3.0 AND **GO TO** Section 5.48, **Retract Permit Downscale Verification.**

___ 5.47.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.47.3. IF NOT done, **PLACE** SRM D front panel selector switch in TRIP TEST (LCR).

___ 5.47.4. **ADJUST** R10 to obtain an indication of 10 CPS on LCR front panel meter.

___ 5.47.5. Momentarily **PLACE** RESET switch on SRM front panel in TRIP.

___ 5.47.6. Slowly **ADJUST** R10 CW until UPSCALE TRIP status lamp, on (SRM front panel) AND **NOTE** TRIP DMM indication.

___ 5.47.7. **HOLD** RESET switch on SRM front panel in TRIP.

___ 5.47.8. Slowly **ADJUST** R10 CCW until UPSCALE TRIP status lamp, off (SRM front panel) AND **NOTE** RESET DMM indication.

___ 5.47.9. **RELEASE** RESET switch on SRM front panel.

___ 5.47.10. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 3.0.

5.48 **Retract Permit Downscale Verification**

___ 5.48.1. IF Retract Permit Downscale trip OR reset point was calibrated, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 4.0 AND **GO TO** Section 5.49, **Period Trip Verification.**

___ 5.48.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.48.3. IF NOT done, **PLACE** SRM D front panel selector switch in TRIP TEST (LCR).

___ 5.48.4. IF necessary, **ADJUST** R10 CW until RETR PERM DOWNSCALE status light, off (SRM front panel).

___ 5.48.5. Slowly **ADJUST** R10 CCW until RETR PERM DOWNSCALE status light, on (SRM front panel) AND **NOTE** TRIP DMM indication.

___ 5.48.6. Slowly **ADJUST** R10 CW until RETR PERM DOWNSCALE status light, off (SRM front panel) AND **NOTE** RESET DMM indication.

___ 5.48.7. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 4.0.

5.49 **Period Trip Verification**

___ 5.49.1. IF Period Trip was calibrated, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT column of Attachment 1, Section 5.0 AND **GO TO** Section 5.50, **Low High Voltage Inoperative Circuit Verification.**

___ 5.49.2. IF NOT done, **CONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-).

___ 5.49.3. **ADJUST** R10 to fully CCW.

___ 5.49.4. IF NOT done, **PLACE** SRM D front panel selector switch in TRIP TEST (PER).

___ 5.49.5. Momentarily **PLACE** RESET switch to TRIP.

___ 5.49.6. Slowly **ADJUST** R10 CW until PERIOD status lamp, on (SRM front panel) AND **NOTE** DMM indication.

___ 5.49.7. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT column of Attachment 1, Section 4.0.

5.50 **Low High Voltage Inoperative Circuit Verification**

___ 5.50.1. IF low high voltage inoperative trip circuit was calibrated OR AS FOUND OPER. HV recorded on Attachment 1, Section 18.0 is NOT within DESIRED RANGE OR may have been affected by calibration of another component, as determined by Job Supervisor, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns AND **GO TO** Section 5.51, **Remote LCR Recorder Verification.**

___ 5.50.2. **CONNECT** DMM set to measure 600 VDC between PS21-TP1 (+) AND VR29-J2 (-).

___ 5.50.3. IF NOT done, **PLACE** SRM D front panel selector switch in OPERATE.

___ 5.50.4. IF low high voltage inoperative trip was calibrated OR may have been affected by calibration of another component, slowly **ADJUST** R1 on high voltage supply to lower high voltage until INOP status lamp, on (front of SRM drawer) AND **NOTE** INOP TRIP DMM indication; OTHERWISE **RECORD** AS FOUND INOP TRIP data in AS LEFT column of Attachment 1, Section 18.0 AND **GO TO** Step 5.50.6.

___ 5.50.5. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT INOP TRIP column of Attachment 1, Section 18.0.

___ 5.50.6. **ADJUST** R1 until DMM indicates a value within CALIBRATION TOLERANCE of Attachment 1, Section 18.0 AND **RECORD** voltage in AS LEFT OPER. HV column.

___ 5.50.7. **DISCONNECT** DMM from SRM drawer.

5.51 **Remote LCR Recorder Verification**

___ 5.51.1. IF remote recorder H1SE -1SEXR-R602B-C51 (Blue) was calibrated, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 11.0 AND **GO TO** Section 5.52, **LCR Front panel Meter M1 and Computer Point B3030 Verification.**

___ 5.51.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.51.3. IF NOT done, **PLACE** SRM D front panel selector switch to TRIP TEST (LCR).

___ 5.51.4. **ADJUST** R10 in SRM D drawer until remote recorder H1SE -1SEXR-R602B-C51 (Blue) indicates INPUTS specified in Attachment 1, Section 11.0 AND **NOTE** DMM indication.

___ 5.51.5. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 11.0.

___ 5.51.6. IF Recorder H1SE -1SEXR-R602B-C51 was removed for calibration, **VERIFY** with RO, the indication of other pens on recorder are consistent with plant conditions.

5.52 **LCR Front panel Meter M1 and Computer Point B3030 Verification**

___ 5.52.1. IF LCR front panel meter M1 was calibrated, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 10.0 AND **GO TO** Section 5.53, **Period Front panel Meter M2 and Computer Point B3004 Verification.**

___ 5.52.2. IF NOT done, **CONNECT** DMM between AR23-J1 (+) AND VR29-J2 (-).

___ 5.52.3. IF NOT done, **PLACE** SRM D selector switch to TRIP TEST (LCR).

___ 5.52.4. **ADJUST** R10 until LCR front panel meter M1 indicates each INPUT specified in Attachment 1, Section 10.0 AND **NOTE** indication on DMM.

___ 5.52.5. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 10.0.

___ 5.52.6. **ADJUST** R10 until DMM indicates each INPUT specified in Attachment 1, Section 12.0 AND **NOTE** computer indication for computer point B3030, SRM CH D COUNT RATE.

___ 5.52.7. IF alignment/calibration was successful in correcting data (OR maintaining affected data, as applicable) to within its CALIBRATION TOLERANCE, **RECORD** new data in AS LEFT columns of Attachment 1, Section 12.0.

___ 5.52.8. IF computer point B3030 requires calibration,IFNOT done, **INITIATE** a Notification to Digital Systems Group that PIU potentiometer for B3030 may require adjustment AND/OR B3030 requires calibration AND **NOTE** in COMMENTS section of ADMINISTRATIVE DATA PACKAGE.

5.53 **Period Front panel Meter M2 and Computer Point B3004 Verification**

___ 5.53.1. IF Period front panel meter M2 was calibrated, **PERFORM** remaining steps of this section; OTHERWISE **RECORD** AS FOUND data in AS LEFT columns of Attachment 1, Section 16.0 AND **GO TO** Section 5.54, **Return to Service**.

___ 5.53.2. IF NOT done, **CONNECT** DMM between AR14-J1 (+) AND VR29-J2 (-).

___ 5.53.3. IF NOT done, **PLACE** SRM D selector switch to TRIP TEST (PER).

NOTE

With selector switch in TRIP TEST (PER), test circuit will saturate after a period of time, depending on adjustment of R10. Placing the RESET switch in RAMP for approximately 5 seconds will reset ramp circuit.

___ 5.53.4. **ADJUST** R10 in SRM D drawer until PERIOD front panel meter M2 indicates each INPUT specified in Attachment 1, Section 16.0 AND **NOTE** indication on DMM.

___ 5.53.5. IF alignment/calibration was successful in correcting data to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 16.0.

___ 5.53.6. **ADJUST** R10 until DMM indicates each INPUT specified in Attachment 1, Section 17.0 AND **NOTE** computer indication for computer point B3004, SRM CHANNEL D PERIOD.

___ 5.53.7. IF alignment/calibration was successful in correcting data (OR maintaining affected data, as applicable) to within CALIBRATION TOLERANCE, **RECORD** data in AS LEFT columns of Attachment 1, Section 17.0.

___ 5.53.8. IF computer point B3004 requires calibration, IF NOT done, **INITIATE** a Notification to Digital Systems Group that PIU potentiometer for B3004 may require adjustment AND/OR B3004 requires calibration AND **NOTE** in COMMENTS section of ADMINISTRATIVE DATA PACKAGE.

5.54 **Return to Service**

___ 5.54.1. **DISCONNECT** all test equipment from SRM D drawer.

___ 5.54.2. IF NOT done, **REMOVE** Pre-Regulator module AND plug-in adapter AND **INSTALL** Pre-Regulator module in SRM D drawer.

5.54.3. IF RPS MODE SWITCH was in RUN AND Step 5.1.13 was performed to prepare SRM for OPERATIONAL CONDITION 1 testing, **PERFORM** the following:

___ ♦ **REMOVE** jumper installed between terminals AA-57 AND AA-63. (panel H21-P008)

___ ♦ **REMOVE** SRM Test Relay from K17 socket in TRIP AUX UNIT D AND **INSTALL** K17 (panel 10C636)

___ ♦ **REMOVE** jumper connected between terminal TB4-10 (TRIP AUX UNIT D) AND terminal BB-71 (panel 10C636)

5.54.4. **VERIFY** each of the following modules is installed in SRM D drawer:

___ ♦ Voltage Regulator module (VR29)

___ ♦ LCR amplifier module (AR23)

___ ♦ Period amplifier module (AR14)

___ ♦ Signal Generator module (Z24)

5.54.5. IF NOT done, **PLACE** each of the following SRM D switches in the stated position.

___ ♦ Front panel selector switch in OPERATE.

___ ♦ INOP INHIBIT switch released AND clamp removed.

5.54.6. Independently **VERIFY** the following:

___ IV A. Plug-in adapter removed AND Pre-Regulator module installed in SRM D drawer.

B. Each of the following modules installed in SRM D drawer:

___ IV ♦ Voltage Regulator module (VR29)

___ IV ♦ LCR Amplifier module (AR23)

___ IV ♦ Period Amplifier module (AR14)

___ IV ♦ Signal Generator module (Z24)

C. The following SRM D switches in the stated position.

___ IV ♦ Front panel selector switch in OPERATE.

___ IV ♦ INOP INHIBIT switch released AND clamp removed.

D. IF RPS MODE SWITCH was in RUN AND Step 5.1.13 was performed to prepare SRM for OPERATIONAL CONDITION 1 testing, **PERFORM** the following IV's:

___ IV ♦ Jumper removed from terminals AA-57 AND AA-63. (panel H21-P008)

___ IV ♦ SRM Test Relay removed from K17 socket in TRIP AUX UNIT D AND relay K17 installed. (panel 10C636)

___ IV ♦ Jumper removed from terminals TB4-10 (TRIP AUX UNIT D) AND terminal BB-71 (panel 10C636)

___ RO ___ 5.54.7. **REQUEST** RO to verify SRM D detector is correctly positioned for present plant operating condition.

___ 5.54.8. **VERIFY** LCR meter reading on front of SRM D drawer is consistent with value recorded in Step 5.1.10 AND/OR present plant conditions.

___ 5.54.9. **REQUEST** RO to **PLACE** IRM RANGE SELECT, CHANNEL B Range Switch in desired range position for present plant operating condition.

___ 5.54.10. Momentarily **PLACE** RESET switch on front of SRM D drawer in TRIP.

___ 5.54.11. **REQUEST** RO to remove SRM channel D from bypass.

___ 5.54.12. **NOTIFY** RO that channel has been returned to service.

___ 5.54.13. **NOTIFY** SM/CRS this test has been completed AND channel returned to service OR committed to rework.

END OF PROCEDURE SECTION

6.0 RECORDS

RETAIN entire procedure

7.0 REFERENCES

7.1 Technical Specifications

- 4.3.6, Control Rod Block Instrumentation
- 4.3.7.6, Source Range Monitors
- 4.9.2, Refueling Operations

7.2 Drawings

- Startup Range Neutron Monitor System, PN1-C51-1070-0021, 791E410AC(GE), Sheets 2, 4, 5, 10 - 13
- Startup Range Det Drive Cont Sys, PN1-C51-1050-0020, 791E412AC(GE) Sheets 1 - 3
- Reactor Manual Control System, PN1-C11-1050-0095, 791E406AC(GE) Sheets 14, 24
- Overhead Annunciator System, J-3000-1, Sheets 10, 12
- Panel Arrangement 10C650 - Main Vertical Boards Legends; J-0650-1, Sheet 9.
- Panel Arrangement 10C651 - Unit Operators Console Legends; J-0651-1, Sheets 6, 7.

7.3 Manuals

- GEK-73632C, Source Range Monitor Bechtel SDR# PN1-A41-8010-0049

7.4 Notifications/Orders

- 80074146, Ripple Voltage
- 70044093-0040, HVPS jumper configuration for 350 - 600 VDC operation
- 70046169, IRM CHANNEL CAL PROCEDURES UNSAT (Correct Purpose Section)
- CRCA 70027972, Unexpected Half-Scram During IRM Testing

7.5 Others

- Computer Input/Output Summary for the Hope Creek Generating Station; J-0625-0
- Setpoint Calculation # SC-SE-0001
- DCP 4EC-1082 package # 08

7.6 Cross- References

- MA-AA-716-009, Use of Maintenance Procedures
- HC.IC-DC.ZZ-0348(Q), Honeywell Minitrend Recorder Calibration

8.0 REFERENCE DRAWINGS

8.1 VOLTAGE REGULATOR

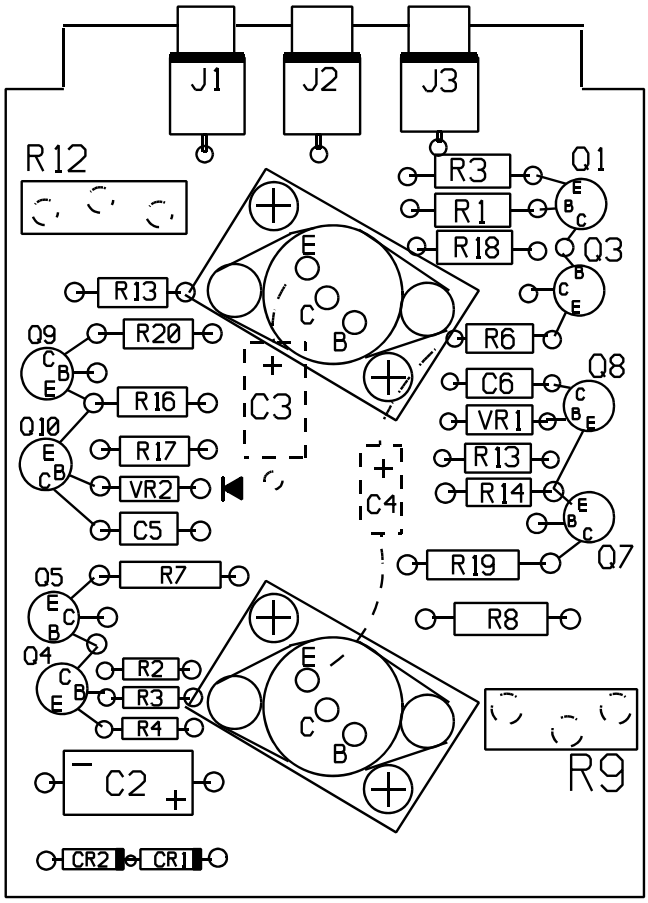
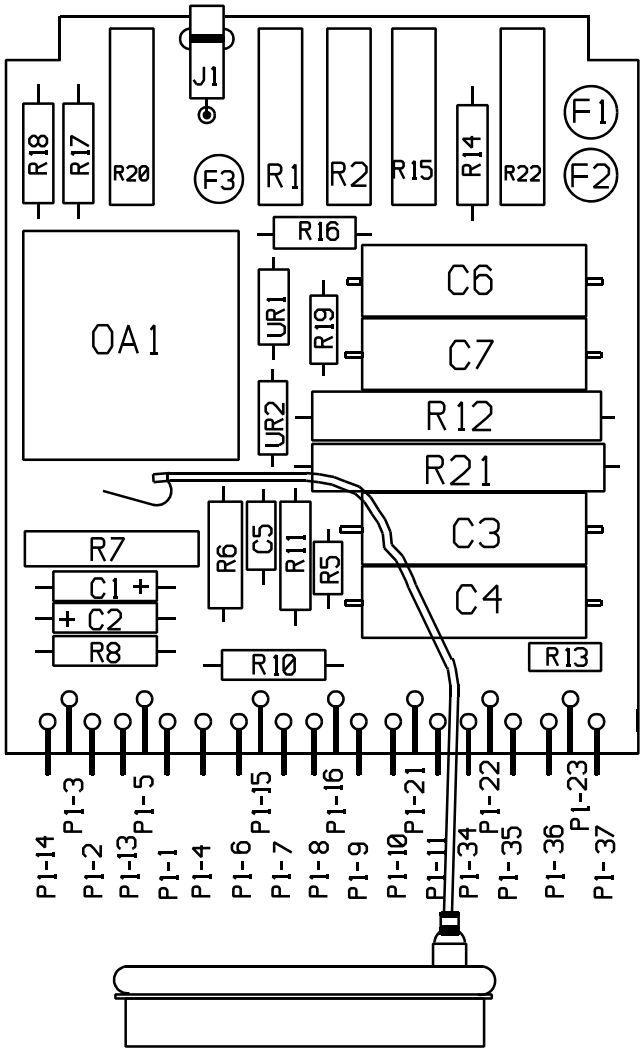


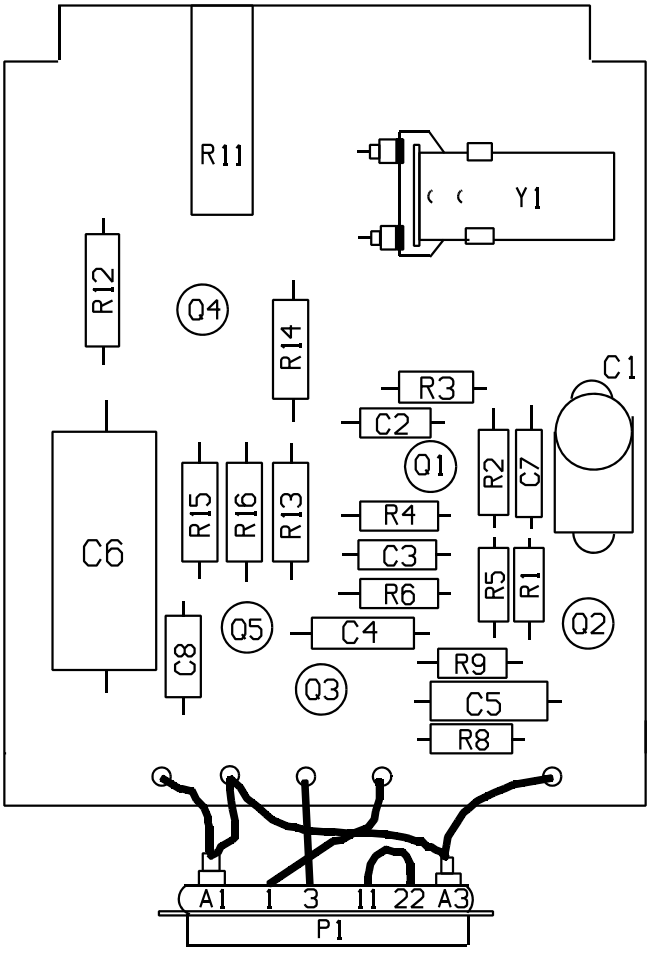
FIGURE 1
VOLTAGE REGULATOR MODULE
CIRCUIT BOARD LAYOUT

8.2 **LCR Amplifier**



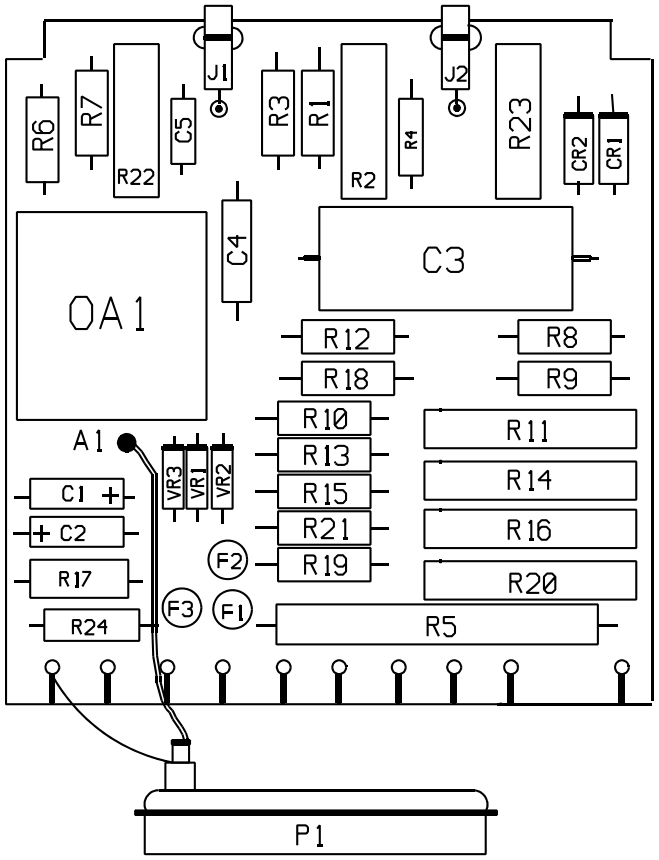
LCR AMPLIFIER MODULE
CIRCUIT BOARD LAYOUT

8.3 SIGNAL GENERATOR MODULE



SIGNAL GENERATOR MODULE
CIRCUIT BOARD LAYOUT

8.4 PERIOD GENERATOR MODULE



PERIOD AMPLIFIER MODULE
CIRCUIT BOARD LAYOUT

ATTACHMENT 1

1.0 **(Steps 5.2.2, 5.2.5) H1SE -1SEXSL-Z16SRDC51 DOWNSCALE TRIP**

TECHNICAL SPECIFICATION VALUE ACCEPTABLE VALUE is: ≥ **1.793**

	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
TRIP $	2.110	2.352		2.110	2.281	
RESET	N/A	N/A		N/A	N/A	

2.0 **(Steps 5.3.2, 5.4.8) H1SE -1SEXSHL-Z17SRDC51 UPSCALE ALARM**

TECHNICAL SPECIFICATION VALUE ACCEPTABLE VALUE is: ≤ **8.863**

	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
TRIP $	8.330	8.572		8.401	8.572	
RESET	N/A	N/A		N/A	N/A	

3.0 **(Steps 5.4.2, 5.4.5) H1SE -1SEXS-Z18SRDC51 UPSCALE TRIP**

	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
TRIP	8.760	9.244		8.831	9.173	
RESET	N/A	N/A		N/A	N/A	

ATTACHMENT 1

4.0 **(Steps 5.5.4, 5.5.11) H1SE -1SEXSHL-Z17SRD-C51 RETRACT PERMIT DOWNSCALE**

	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
TRIP	4.044	4.528		4.115	4.457	
RESET	N/A	N/A		N/A	N/A	

5.0 **(Step 5.6.6) H1SE -1SEXS-Z18SRDC51 PERIOD**

	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
TRIP	-1.717	-2.283		-1.800	-2.200	

6.0 **(Steps 5.8.3, 5.8.5) H1SE -1SEVR-27SRMDC51 VOLTAGE PRE-REGULATOR (VR27)**

DESIRED (VDC)	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
+20.000	19.800	20.200		19.800	20.200	
-20.000	-19.800	-20.200		-19.800	-20.200	

ATTACHMENT 1

7.0 **(Steps 5.9.2, 5.9.4) H1SE -1SEVR-29SRMDC51 VOLTAGE REGULATOR (VR29)**

DESIRED (VDC)	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
+15.000	14.900	15.100		14.900	15.100	
-15.000	-14.900	-15.100		-14.900	-15.100	

8.0 **(Steps 5.10.4, 5.10.5, 5.10.7, 5.10.8) H1SE -1SEXAM-AR23D-C51 INTERNAL 10 AND 10^5 CIRCUIT**

PARAMETER		DESIRED	DESIRED RANGE		AS FOUND	CALIBRATION TOLERANCE		AS LEFT
			FROM	TO		FROM	TO	
10 CPS	PERIOD	0.1000 SEC	0.0998	0.1002		0.0998	0.1002	
	VOLTS	2.860 VDC	2.760	2.960		2.760	2.960	
10^5 CPS	FREQ	100.0 kHz	99.8	100.2		99.8	100.2	
	VOLTS	8.570 VDC	8.470	8.670		8.470	8.670	

ATTACHMENT 1

9.0 **(Step 5.11.4) H1SE -1SEXAM-AR23D-C51 RAMP CIRCUIT**

RAMP PERIOD (seconds)	DESIRED RANGE (seconds)		AS FOUND	CALIBRATION TOLERANCE (seconds)		AS LEFT
	FROM	TO		FROM	TO	
115.0	113.0	117.0		113.0	117.0	

10.0 **(Step 5.12.2) H1SE -1SEXI-M1SRMDC51 LCR FRONT PANEL METER M1**

INPUT (CPS)	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
10^{-1}	-0.141	0.141		-0.100	0.100	
10	2.716	2.998		2.757	2.957	
10^{3}	5.573	5.855		5.614	5.814	
10^{5}	8.430	8.712		8.471	8.671	
10^{6}	9.859	10.141		9.900	10.100	
10^{5}	8.430	8.712		8.471	8.671	
10^{3}	5.573	5.855		5.614	5.814	
10	2.716	2.998		2.757	2.957	
10^{-1}	-0.141	0.141		-0.100	0.100	

ATTACHMENT 1

11.0 **(Step 5.12.3) H1SE -1SEXR-R602B-C51 (BLUE) RECORDER**

INPUT (CPS) *	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
10^{-1}	-0.070	0.070		-0.050	0.050	
10	2.787	2.927		2.807	2.907	
10^{3}	5.644	5.784		5.664	5.764	
10^{5}	8.502	8.642		8.522	8.622	
10^{6}	9.930	10.070		9.950	10.050	
10^{5}	8.502	8.642		8.522	8.622	
10^{3}	5.644	5.784		5.664	5.764	
10	2.787	2.927		2.807	2.907	
10^{-1}	-0.070	0.070		-0.050	0.050	

***** Calibrate to Numeric Display

12.0 **(Step 5.12.4) COMPUTER POINT: B3030 SRM CH D COUNT RATE**

	DESIRED RANGE (CPS[1])		AS FOUND	CALIBRATION TOLERANCE (CPS[1])		AS LEFT
	FROM	TO		FROM	TO	
0.00	0.0617	0.162		0.0617	0.162	
10.00	617000	1620000		617000	1620000	

[1] ± 3.0% Equivalent Linear Full Scale

ATTACHMENT 1

13.0 **(Step 5.13.2) H1SE -1SEXAM-AR23D-C51 LCR AMPLIFIER ZERO**

DESIRED (VDC)	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
000.0	-0.001	0.001		-0.001	0.001	

14.0 **(Step 5.13.4) H1SE -1SEXAM-AR14D-C51 PERIOD AMPLIFIER ZERO**

DESIRED (VDC)	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
000.0	-0.001	0.001		-0.001	0.001	

15.0 **(Step 5.14.4) H1SE -1SEXAM-AR14D-C51 PERIOD CIRCUIT**

PARAMETER (PERIOD)	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
10 SECONDS	-9.980	-10.020		-9.980	-10.020	

ATTACHMENT 1

16.0 **(Step 5.15.2) H1SE -1SEXI-M2SRMDC51 PERIOD FRONT PANEL METER M2**

INPUT (SECONDS)	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
	FROM	TO		FROM	TO	
-100	0.859	1.141		0.900	1.100	
INFINITY	-0.141	0.141		-0.100	0.100	
10	-9.859	-10.141		-9.900	-10.100	
INFINITY	-0.141	0.141		-0.100	0.100	
-100	0.859	1.141		0.900	1.100	

17.0 **(Step 5.15.3) COMPUTER POINT: B3004 SRM CHANNEL D PERIOD**

INPUT (VDC)	DESIRED RANGE (SEC[1])		AS FOUND	CALIBRATION TOLERANCE (SEC[1])		AS LEFT
	FROM	TO		FROM	TO	
1.000	-75.19	-149.25		-75.19	-149.25	
-10.000	9.68	10.34		9.68	10.34	

[1] ± 3.0% Equivalent Linear Full Scale

ATTACHMENT 1

18.0 **(Step 5.16.2) HIGH VOLTAGE (HV) AND LOW HV INOPERATIVE TRIP**

PARAMETER	DESIRED (VDC)	DESIRED RANGE (VDC)		AS FOUND	CALIBRATION TOLERANCE (VDC)		AS LEFT
		FROM	TO		FROM	TO	
OPER. HV							
$ INOP TRIP							

5.1.7 The current OPER. HV (HV Setting) AND INOP TRIP (HV INOP) settings have been recorded in the DESIRED columns of Section 18.0.

W.O.# _____ _____
Job Supervisor

Section 18.0 CALCULATIONS

5.1.8.A _____ (OPER. HV) x 0.02 = _____ VDC.

5.1.8.B _____ (OPER. HV) - _____ (5.1.8.A) = _____ VDC.

5.1.8.C _____ (OPER. HV) + _____ (5.1.8.A) = _____ VDC.

5.1.9.A _____ (INOP TRIP) x 0.02 = _____ VDC.

5.1.9.B _____ (INOP TRIP) - _____ (5.1.9.A) = _____ VDC.

5.1.9.C _____ (INOP TRIP) + _____ (5.1.9.A) = _____ VDC.

5.16.9 Ripple Voltage _____ mV rms
(Tolerance $\leq$17 mV rms)

ATTACHMENT 2

ADMINISTRATIVE DATA SHEET

1.0 **M&TE DATA**

Device Name	ID No.	Cal Due Date
DMM _____		_____
DMM	_____	_____
Electronic Counter	_____	_____
Stopwatch	_____	_____

2.0 **COMMENTS** Order# _____

_____

_____

_____

_____

3.0 **INDIVIDUALS PERFORMING WORK**

Print	Signature	Initial	Date
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

4.0 **MAINTENANCE SUPERVISOR APPROVAL**

This procedure has been reviewed for completion in accordance with MA-AA-716-009.

_____
Maintenance Supervisor / Date

EXHIBIT 1

OPERATIONS INFORMATION SHEET (1 of 2)

Procedure Title: NUCLEAR INSTRUMENTATION SYSTEM - CHANNEL D
SOURCE RANGE MONITOR C51-K600D

Order #: _____

Performer Name: _____ _____ _____
Date Time

NOTE

Jumpers installed AND modules AND a relay removed during the performance of this test, will make SRM channel D INOPERABLE.

Technical Specification ACTIONs 3.3.6.b, 3.3.7.6 AND/OR 3.9.2 apply for this test.

Annunciators

- C3 C1, SRM UPSCALE OR INOPERATIVE
- C3 D1, SRM PERIOD
- C3 E1, SRM DOWNSCALE
- C3 E2, SRM DET REMOVAL NOT PERMITTED
- C6 D3, ROD OUT MOTION BLOCK

Status Lights

MCP Location: SOURCE RANGE NEUTRON MONITORING

MONITOR STATUS SRM D

- BYPASS
- DNSC
- UPSC AL OR INOP
- UPSC TRIP
- PERIOD

MCP Location: SRM D DETECTOR SELECT

- RETRACT PERMIT
- IN
- OUT

EXHIBIT 1

OPERATIONS INFORMATION SHEET (2 of 2)

Status Lights

MCP Location: DETECTOR DRIVE (Indication)

- DRIVING IN
- DRIVE IN
- DRIVE OUT
- POWER ON
- OFF

Recorder

VCP Location: REACTOR WATER AND NEUTRON MONITORING

NEUTRON MONITORING, SRM

- H1SE -1SEXR-R602B-C51, SRM (B) power indication AND recording (Blue)

Computer Point

- B3004, SRM CHANNEL D PERIOD
- B3030, SRM CH D COUNT RATE
- C013, ROD BLOCK - REFUEL MODE
- C014, SRM DET NOT START-UP POS
- C015, SRM UPSC ALARM
- C016, SRM INOP TRIP
- C039, SRM BYPASS
- C048, ROD OUT BLOCK

Functions

- Affects SRM D Rod Block Protective Functions.