# Reference 9

S0123-II-11.152 "Circuit Device Tests and Overall Functional Test"

# REFERENCE: SO123-VI-1.0.1 TEMPORARY CHANGE NOTICE (PERMANENT WHEN FINAL APPROVED)

Page 1 of 4	
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LOG NUMBER: AR 960900719-06, AR 970500562-08, AR 970701378-03, AR 980402336-01, AR 980600084-04, AR 980900065-01, AR 98100795-01

#### **PROCEDURE FACT SHEET**

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WRITER: ERIC GORDON (print name)

# A. TEAM MEMBERS

- 1. Jon Aubuchon, Test Supervisor
- 2. John Cessna, Test Supervisor
- 3. Tom Harney, Test 'A'
- 4. Rich Edgell, NE&C Test

#### B. **REFERENCES**

- 1. Calculation E4C-017 Revision 15, 125 Volt Battery System Sizing Support.
- 2. Calculation E4C-098 Revision 1, CCN-20, 4kV Switchgear Protective Relay Setting.
- 3. AR 960900719-06, Revise Agastat 7032 double headed relay acceptance criteria.
- 4. AR 970500562-08, Specify M&TE for LOVS timers (Calculation E4C-098, Rev. 1, CCN-20).
- 5. AR 970701378-03, Revise degraded voltage test voltage from 102 to 100 VDC (Calculation E4C-017, Rev. 15).
- 6. AR 980402336-01, Add LOVS timer relay acceptance criteria to procedure.
- 7. AR 980600084-04, Revise degraded voltage test voltage from 102 to 100 VDC (Calculation E4C-017, Rev. 15).
- 8. AR 980900065-01, Revise step 6.3.5 to clarify switch testing.
- 9. AR 981000795-01, Add Fire Isolation switches and clarify switch testing.

### C. **PROCEDURE CHANGES**

4.

5.

- AR 960900719-06, Revise Agastat 7032 double headed relay acceptance criteria.
   a. Step 6.6.5.2, Added Agastat model 7032 acceptance criteria.
- 2. AR 970500562-08, Specify M&TE for LOVS timers (Calculation E4C-098, Rev. 1, CCN-20).
  - a. Step 6.6.5.4 NOTE, Added NOTE for M&TE requirements
  - b. Step 6.6.8.4 NOTE, Added NOTE for M&TE requirements
  - c. Attachment 1, Added Calculation reference.
  - d. Attachment 2, Added Attachment listing M&TE requirements
- 3. AR 970701378-03 and AR 980600084-04, Revise degraded voltage test voltage from 102 to 100 VDC (Calculation E4C-017, Rev. 15).
  - a. Step 6.5.6, Revised test voltage
  - b. Step 6.6.9, Revised test voltage
  - c. Attachment 1, Added Calculation reference.
  - AR 980402336-01, Add LOVS timer relay acceptance criteria to procedure.
    - a. Step 6 6.5.1, Added timer relay acceptance criteria tables.
  - AR 980900065-01, Revise step 6.3.5 to clarify switch testing.
    - Section 6.3, Re-titled section and resequenced steps to clarify intent to test all Roto and 4kV pallet switches.
    - b. Step 6.3.5, Moved to section 6.11, Functional Test
    - c. Step 6.3.4, Revised to clarify when section 6.3 is not applicable.

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#### C. PROCEDURE CHANGES (Continued)

6. AR 981000795-01, Add Fire Isolation switches and clarify switch testing.

- a. Step 6.11.4.1, Add step to record testing of Fire Isolation switches.
  - b. Add data table to Data Record.
- 7. Step 6.11.2, Revised to clarify testing of circuit blocking functions.
- 8. Steps 6.11.4.2 and 7.3, Added steps to "yellow-line" drawings and attach to data record.
- 9. Attachment 2, Added Special Tools attachment per current boilerplate.
- 10. Editorial Corrections
  - a. Step 3.3, Deleted per current boilerplate not required.
  - b. Step 6.1.2, Deleted per current boilerplate not required.
  - c. Step 6.1.6, Moved from 6.15.4 per current boilerplate.
  - d. Step 6.3.3.1, Added "correct" to clarify performance.
  - e. Steps 6.6.4 and 6.6.8, Revised title for clarity.
  - f. Step 6.11.5, Revised to clarify verification requirements.
  - g. Step 7.4, Deleted per current boilerplate not required.
  - h. Attachment 3, Revised title to clarify which pallet switches are effected

For Tom Harney Døte

(AR 980600084-04)

Dor AUSOCH

Jon Aubuchon Date/ (AR 960900719-06, AR 980900065-01)

Rich Edael Date

(AR 970701378-03)

John Cessna Date (AR 980402336-01, AR 981000795-01)

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4. Reduce the required level of approval for a plant activity?		5
5. Alter processes for handling, processing, monitoring, or releasing licensed radioactive material <u>not</u> contained in plant systems?		J
6. Conflict with Technical Specification (TS)/Licensee Controlled Specification (LCS)/Offsite Dose Calculation Manual (DDCM) numerical data or TS/LCS/DDCM provisions? <u>If</u> YES. <u>then</u> redraft procedure/contact Licensing/contact Chemistry.		5
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NUCLEAR ORGANIZATION UNITS 1, 2, AND 3 EFFECTIVE DATE \_\_\_\_\_\_ TEST PROCEDURE **REVISION 5** TCN 5-1

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# CIRCUIT DEVICE TESTS AND **OVERALL FUNCTIONAL TEST**

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#### **QA PROGRAM AFFECTING**

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# CIRCUIT DEVICE TESTS AND OVERALL FUNCTIONAL TEST

# 1.0 OBJECTIVES

1.1 This Procedure provides instructions to verify newly installed and/or existing circuitry has been installed/exists as designed and performs its required functions.

### 2.0 REFERENCES

## 2.1 NRC Commitments

- 2.1.1 San Onofre 2 & 3 Updated FSAR, Section 3.11.6.1
- 2.1.2 RCTS 9107017, HGA DC Auxiliary Relay testing at less than 105 VDC

### 2.2 Procedure Information

2.2.1 See Procedure Resource List, Attachment 1.

### 3.0 PREREQUISITES

- 3.1 Before starting work the user SHALL verify this procedure is current by referring to Nuclear Document Management System (NDMS) or one of the other methods listed in SO123-I-1.3.
- 3.2 As a minimum, record the following information on the Data Record prior to the performance of this procedure:
  - 3.2.1 MO Number, Unit designator, and the Equipment ID .
  - 3.2.2 Drawing(s), Technical Manual(s), Acceptance Criteria, and setpoint data, as applicable, SHOULD BE entered in the appropriate designated area of the Data Record or Work Done Section of the MO, prior to the performance of any step requiring them.

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#### 4.0 PRECAUTIONS

4.1 During the performance of this procedure, a potential exists for causing a Unit TRIP. Exercise extreme caution and ensure your actions will NOT cause an unplanned Unit TRIP. Exercise all necessary precautions while working on or near components identified with a TRIP HAZARD LABEL (an example of the TRIP HAZARD LABEL is shown below).



- 4.2 Do not open series or parallel paths in active (*in-service*) control circuits without approval of the electrical test supervisor.
- 4.3 Prior to functioning any time delay relay, block or jumper contacts, as necessary, to prevent operation or isolation of other plant equipment.
- 4.4 DO NOT MEGGER ANY SOLID STATE DEVICE.
- 4.5 Use insulated tools to protect circuitry from shorts or grounding conditions.

## 5.0 CHECKLIST(S)

- 5.1 Record all work performed on the Data Record, Attachment 5. If multiple pages of one section are needed, they may be added to the work package and re-paginated where indicated.
- 5.2 Record the following information on the Maintenance Order (MO):
  - 5.2.1 Discrepancies discovered during the performance of this Test/Calibration procedure.

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### 6.0 PROCEDURE

### 6.1 Procedure Management

- 6.1.1 Discrepancies discovered SHALL BE reported to the responsible Supervisor at the time of discovery. This supervisor SHALL ensure these discrepancies are properly documented according to SO123-I-1.3.
- 6.1.2 Complete appropriate portions of SO123-II-15.3 Form, as required. Document alterations AS devices are modified. Alterations required to perform functional testing SHOULD BE documented.
- 6.1.3 Complete the Data Record as devices are tested during the performance of this procedure. Record As-Found data prior to adjusting or cleaning. Ensure As-Left data is within Acceptance Criteria listed.
- 6.1.4 Inspect, adjust, calibrate, record values and functionally check all circuit devices within the scheme or circuit under test, using the following sections, as applicable, or those called out by an MO. On the Data Record, mark the "N/A" box for each subsection not used or not called out.
- 6.1.5 Record all replacement part information according to SO123-I-1.3.
- 6.1.6 All personnel signing/initialing performed by or verified by steps in this procedure **SHOULD** enter their signature/initials and print their name on the Data Record.

Equipment.

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#### 6.2 Electrical and Mechanical Inspection

- **NOTES:** 1. Major deficiencies **SHOULD BE** brought to the attention of the responsible Test Supervisor.
  - 2. This section applies only to Sections 6.3, 6.4, 6.5, 6.6 and 6.9.
  - 3. Any terminations needing repair or replacement SHOULD BE repaired/replaced per Procedure SO123-I-4.59.
  - 4. Documentation of all replacement parts SHOULD be according to SO123-I-1.3.

 Do Not Open Series or Parallel Paths in Active (In-service) Control Circuits

 Without Approval of the Electrical Test Supervisor.

 Prior to Checking Physical Integrity of Wiring or Devices, Block or Jumper Contacts, as Necessary, to Prevent Operation or Isolation of Other Plant

- 6.2.1 Perform an electrical and mechanical inspection of the circuit and components, including a visual inspection for wiring hamesses putting undue strain on terminals and relay studs, and correct as necessary.
- 6.2.2 Enter verification of inspection (*Insp Sat*), for the appropriate Section 6.3, 6.4, 6.5, 6.6, and/or 6.9. on the Data Record as applicable.

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NOTES:	1.	Sections 6.3 through 6.8 may be performed in any order.
	2.	Defective Devices in Sections 6.3 through 6.8 may be replaced, under the following conditions:
	A.	The NCR process is NOT circumvented.
	В.	Replacement parts/materials used are recorded according to SO123-I-1.3, along with reason for replacement.
	С.	Any documentation required per SO123-I-1.3 (e.g., Instruments Found Outside Specified Acceptance Criteria form) has been generated

6.3.1 Roto-test switches

NOTE: SONGS has experienced broken studs on several Roto-test switches. RCTS 9401035 and MESS 11309301 have directed an enhanced inspection of all Roto-test switches.

Some Roto-test switches (especially in differential relay circuits) are connected in CT circuits which are fed by bus-side CT's. The Bus may be still energized when the load is cleared.

- .1 Isolate each Roto-test switch as necessary. Short and ground any CT circuits to a Roto-test switch which may remain energized (e.g., Bus side CT's on an energized Bus). Document any jumpers or lifted leads per SO123-II-15.3.
- .2 On each Roto-test switch, tug each wire and stud to ensure the stud has not failed (head of stud broken off or loose inside switch). Enter verification(s) on the Data Record.
- .3 Restore any modified circuits per SO123-II-15.3.
- 6.3.2 Auxiliary (Pallet) Switches

Do Not Open Series or Parallel Paths in Active (*In-service*) Control Circuits Without Approval of The Electrical Test Supervisor.

Prior to Functioning Any Pallet Switch, Block or Jumper Contacts, as Necessary, to Prevent Operation or Isolation of Other Plant Equipment.

.1 Inspect 4 kV breaker auxiliary (*pallet*) switches, looking especially for any signs of cracking, chipping, or misalignment. If any of the above has occurred, the switch may be repaired/replaced in accordance with Section 6.4.

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# 6.3.3 For new, added or replacement switches only:

.1 Verify that contact continuity and contact configuration, including spares when shown, are correct per the applicable drawing(s). Record the drawings used on the Data Record.

NOTE: According to NRC Information Notice 91-53, stop screws have been found missing in the Electro-Switch rotary switches.

- .2 Verify by visual inspection, that stop screws are properly installed in the stop plate of Electro-Switch rotary switches, as required, dependent upon application.
- .3 Verify proper operation of the switch and enter verification on the Data Record.
- 6.3.4
- Mark section 6.3 on the Data Record "N/A" if the circuit contains no Roto-test switches or 4kV pallet switches, nor any new, added or replacement switches.

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# 6.4 Pallet Switch Repair/Replacement

NOTE: This section SHOULD BE used when pallet switches have been found to be in need of repair. Refer to Attachment 2. Mark Section 6.4 "N/A" on the Data Record if repair is NOT needed.

# 6.4.1 Rotating Contact Assembly

- .1 Record all leads going to the switch on the SO123-II-15.3 Form, and determinate them.
- .2 Perform an electrical and mechanical inspection of the rotating contact assembly and repair or replace as necessary. Refer to attachment #2 for disassembly.

Before Removing the Rotating Contact Assemblies from the Shaft, Make a Sketch Showing the Position of the Centerline of the Contacts Relative to the Diagonals of the Shaft and Position of the Operating Crank as Shown in Attachment 2 for ITE switches. This Is Important If a Contact Removed as an "A" or "B" Contact Is to Be Replaced after Disassembly in its Correct Position on the Shaft as an "A" or "B" Contact.

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- .3 Starting with the contact assembly at the end of the shaft opposite the operating crank, sketch the position of each contact, on the Data Record, then remove it. Refer to attachment #2 for disassembly of ITE switches.
- .4 After repair, re-assemble per drawing, verifying each contact for proper alignment. Refer to attachment #2 for assembly of ITE switches.

# 6.4.2 Movable and Stationary Contacts

NOTE: Care must be taken when removing the contacts to prevent loss of the contact spring.

- .1 Perform an electrical and mechanical inspection of the moving and stationary contacts and repair or replace as necessary. Refer to attachment #2 for disassembly and assembly of ITE switches.
- .2 Re-terminate all leads lifted in Step 6.4.1, and complete appropriate sections of the SO123-II-15.3 Form .

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#### 6.5 Auxiliary Relays

Do Not Open Series or Parallel Paths in Active (In-service) Control Circuits Without Approval of the Electrical Test Supervisor.

CAULON

Prior to Functioning Any Auxiliary Relay, Block, or Jumper Relay Contacts, as Necessary, to Prevent Operation or Isolation of Other Plant Equipment.

- 6.5.1 Isolate relay, as necessary, to prevent hazards to personnel or damage to equipment and to facilitate testing.
- 6.5.2 For new, added or replacement relays only, verify against the Elementary drawing, that the relay coils are of the correct voltage and type, AC or DC. Record the relay type or model and coil voltage rating on the Data Record.
- 6.5.3 Perform Electrical and Mechanical Inspections .
  - .1 For new, added or replacement MDR relays only, verify that all terminals are tapped. If not, then tap using a 5-40 starter tap and 5-40 bottom tap.
  - .2 For HFA relays only (to be performed during each routine maintenance check) verify coil and core assembly alignment. For other relay types, mark this block on the Data Record "N/A."
  - .3 Enter verifications on the Data Record
- 6.5.4 For new, added or replacement relays only, measure and record coil resistance(s), for baseline data.

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NOTES:	1.	Some auxiliary tripping relays, such as Type HEA, require 8 to 9 amp DC power supplies and should only be energized momentarily.
	2.	Coils are usually equipped with transient suppressors; thus polarity must be observed during testing.
	3.	The step-up method <b>SHOULD BE</b> used to obtain MDR relay pick-up values, which is defined as setting the test voltage below the point at which the relay picks up, then applying the test voltage to the relay. If pick-up is <b>NOT</b> attained, the test voltage is removed, increased, then re-applied to the relay.

6.5.5 For new, added or replacement relays only, using a test power source, measure and record the pickup and dropout voltages. Verify these values are within manufacturers' specifications, if available. (Mfr values for some relays are listed in Attachment 4.)

- .1 Acceptance criteria for auxiliary relay pickup is:
- .1.1 Manufacturer's Specifications, if available (see Attachment 4), or
- .1.2 55 85 % of nominal circuit voltage (tested with any series devices), if manufacturer's data is not available.
- .1.3 On the Data Record, record the acceptance criteria and the source.
- 6.5.6 Verify class 1-E DC relays operate at less than or equal to 100 VDC.
- 6.5.7 For new, added or replacement relays only, check the lockup voltage of the auxiliary tripping relay, if applicable. If lockup circuit is not used, mark this block on the Data Record "N/A." Adjust lockup resistor as necessary to provide a lockup voltage of 85% to 100% of the auxiliary relay rated coil voltage. Record values on the Data Record.
- 6.5.8 For new, added or replacement relays only, verify continuity of all contacts.
  - .1 Verify the contact configuration, including spares, when shown, is per the applicable drawings. Record the drawings used on the Data Record.

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#### 6.6 Time Delay Relays

Do Not Open Series or Parallel Paths in Active (In-service) Control Circuits Without Approval of the Electrical Test Supervisor.

CAUTION

Prior to Functioning Any Time Delay Relay, Block or Jumper Relay Contacts, as Necessary, to Prevent Operation or Isolation of Other Plant Equipment.

- 6.6.1 Isolate the relay, as necessary, to facilitate safe testing of the relay.
- 6.6.2 On new, added or replaced relays only, verify the following against the drawings:
  - .1 Verify relay coils are of the correct voltage rating and type, AC or DC, and record relay type or model and coil voltage rating on the Data Record.
  - .2 Verify the type of timer relay: TDE Time Delay Energized relay; TDD Time Delay De-energized relay.
  - .3 Verify each type contact: TDO Time Delay Open contact; TDC Time Delay Close contact; Inst. Instantaneous contact that operates in conjunction with the energization or de-energization of the timer with no time delay.
- 6.6.3 On new, added or replaced relays only, measure and record coil resistance(s), for baseline data.

**NOTE:** Pneumatic or mechanical time delay relays must be tested in the same physical orientation in which they are (*or are to be*) installed, i.e., if one is to be installed vertically, it must be tested in a vertical position. Failure to do so may lead to erroneous test results, and improper timing in service.

- 6.6.4 As-Found Timing
  - .1 Temperature stabilization SHOULD be performed on all agastat relays with a time delay equal to or greater than 20 seconds.
  - .1.1 Normally de-energized agastats allow at least 5 minutes cool down time between tests. (Energized time should be kept to a minimum between tests.)
  - .1.2 Normally energized agastats energize for at least 5 minutes before testing. (De-energized time should be kept to a minimum between tests.)

NOTE: Use only Wilmar model SC-101 electronic timer, or equivalent, for calibration of 162D, 162S and 162T time delay relays used in LOVS Degraded Voltage circuits. See Special Tools, Attachment 3.

- .2 Energize or de-energize the time delay relay, as appropriate, and measure and record the As-Found time delay on the Data Record.
- .3 Contact Technical Division if any unexplained discrepancies are found during testing.

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# 6.6.5 Acceptance criteria for time delay relay set points are:

.1 Design document tolerances as called out in specific procedures, e.g., LOVS system timers in SO2-II-11.1A, SO2-II-11.1B, SO3-II-11.1A and SO3-II-11.1B, listed in the tables below, or

LOVS Timers				
Relay	As Found Time (Seconds)	As Left Time (Seconds)		
162A	5.0 ± 0.5 (4.5 to 5.5)	$5.0 \pm 0.5$ (4.5 to 5.5)		
162D	110 ± 16.4% (92-128) <sup>1</sup>	110 ± 2 (108-112)		
162F	4.0 ± 0.4 (3.6 to 4.4)	$4.0 \pm 0.4$ (3.6 to 4.4)		
162S	4.3 ± 3.3% (4.16-4.44)	4.3 ± 0.05 (4.25-4.35)		
162T	1.25 ± 29.9% (0.88-1.62)	1.25 ± 0.05 (1.20-1.30)		
127DC	5.0 ± 0.5 (4.5 to 5.5)	5.0 ± 0.5 (4.5 to 5.5)		

LOVS Sequencing Timers					
Location (Breaker)	Relay ID	Time Setpoint (Accept, Crit.)			
	UNIT 2 TRAIN A (2A04)				
2A0403	162	10 (9.5 to 10.5) Seconds			
2A0404	162	30 (29.0 to 30.5) Seconds			
2A0405	162	15 (14.5 to 15.5) Seconds			
2A0406	162	15 (14.5 to 15.5) Seconds			
2A0407	162	5 (4.5 to 5.5) Seconds			
2A0410	162	20 (19.5 to 21.0) Seconds			
2A0411	162	20 (19.5 to 21.0) Seconds			
2A0412	162	35 (34.5 to 35.5) Seconds			
2B0418	62	5 (4.5 to 5.5) Seconds			
2B0419	62	5 (4.5 to 5.5) Seconds			
2BD12	62-1	15 (14.5 to 15.5) Seconds			
2BD13	62-1	15 (14.5 to 15.5) Seconds			
28D21	62	10 (9.5 to 10.5) Seconds			
28D22	62	10 (9.5 to 10.5) Seconds			
	UNF	F 2 TRAIN B (2A06)			
2A0603	162	30 (29.0 to 30.5) Seconds			
2A0604	162	10 (9.5 to 10.5) Seconds			
2A0605	162	15 (14.5 to 15.5) Seconds			

Range listed is the allowable value per Calculation E4C-098 Rev.1, CCN-20. Manufacturer's operating tolerance is  $\pm$  10% of setpoint for the 162T relays. If As-Left time delay cannot be adjusted to be within manufacturer's tolerance, the relay **SHOULD BE** replaced.

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Location (Breaker)	Relay ID	Time Setpoint (Accept. Crit.)
2A0606	162	15 (14.5 to 15.5) Seconds
2A0607	162	5 (4.5 to 5.5) Seconds
2A0610	162	20 (19.5 to 21.0) Seconds
2A0611	162	20 (19.5 to 21.0) Seconds
2A0612	162	35 (34.5 to 35.5) Seconds
2B0615	62	5 (4.5 to 5.5) Seconds
2B0619	62	5 (4.5 to 5.5) Seconds
2BH06	62	10 (9.5 to 10.5) Seconds
2BH07	62	10 (9.5 to 10.5) Seconds
2BH11	62-1	15 (14.5 to 15.5) Seconds
2BH12	62-1	15 (14.5 to 15.5) Seconds
	UNI	T 3 TRAIN A (3A04)
3A0402	162	35 (34.5 - 35.5) Seconds
3A0403	162	10 (9.5 - 10.5) Seconds
3A0404	162	30 (29.0 - 30.5) Seconds
3A0405	162	15 (14.5 - 15.5) Seconds
3A0406	162	15 (14.5 - 15.5) Seconds
3A0407	162	5 (4.5 - 5.5) Seconds
3A0410	162	20 (19.5 - 21.0) Seconds
3A0411	162	20 (19.5 - 21.0) Seconds
380418	62	5 (4.5 - 5.5) Seconds
3B0419	62	5 (4.5 - 5.5) Seconds
38D12	62-1	15 (14.5 - 15.5) Seconds
3BD13	62-1	15 (14.5 - 15.5) Seconds
3BD21	62	10 (9.5 - 10.5) Seconds
3BD22	62	10 (9.5 - 10.5) Seconds
	UN	IT 3 TRAIN B (3A06)
3A0602	162	35 (34.5 - 35.5) Seconds
3A0604	162	10 (9.5 - 10.5) Seconds
3A0605	162	15 (14.5 - 15.5) Seconds
3A0606	162	15 (14.5 - 15.5) Seconds
3A0607	162	5 (4.5 - 5.5) Seconds
3A0610	162	20 (19.5 - 21.0) Seconds
3A0611	162	20 (19.5 - 21.0) Seconds
3A0612	162	30 (29.0 - 30.5) Seconds
3B0615	62	5 (4.5 - 5.5) Seconds
3B0619	62	5 (4.5 - 5.5) Seconds
3BH06	62	10 (9.5 - 10.5) Seconds
3BH07	62	10 (9.5 - 10.5) Seconds
3BH11	62-1	15 (14.5 - 15.5) Seconds
3BH12	62-1	15 (14.5 - 15.5) Seconds

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- 6.6.5.2 Manufacturer's Specifications, if no tolerance is specified on design documents, ± 15% of setpoint for Agastat model 7032 relays (double headed timers), or
  - .3 ± 10% of set point in the absence of both manufacturer's specifications and specific procedure tolerances.
  - .4 On the Data Record, record the acceptance criteria and the source.
- 6.6.6 Perform Electrical and Mechanical Inspections .
- 6.6.7 For new, added or replacement relays, using a test power source, measure and record the pickup and dropout voltage. Verify these values are within manufacturers' specifications.
  - .1 For Agastat relays, turn the time dial to the minimum position. Pickup and dropout values for Agastat relays are as shown in Table 1.
  - .2 New Agastat Relays only: Verify an audible click is heard at the same time as the contacts change state. (Relay Timed Out). Do not install a new relay in which audible clicking is not heard. Send such a relay to Engineering for a failure analysis.

### Table 1: Agastat Relay Pickup/Dropout Values

	DC	AC
Pickup	≤ <b>80%</b>	≤ <b>85%</b>
Dropout	≥ 5%	≥ 25%
Values are po	ercent of rated name	plate voltage

#### 6.6.8 As-Left Timing

- .1 Temperature stabilization SHOULD be performed on all agastat relays with a time delay equal to or greater than 20 seconds.
- .1.1 Normally de-energized agastats allow at least 5 minutes cool down time between tests.
- .1.2 Normally energized agastats energize for at least 5 minutes before testing. (De-energized time should be kept to a minimum between tests.)

NOTE:	Use only Wilmar model SC-101 electronic timer, or equivalent, for calibration of 162D, 162S and 162T time delay relays used in LOVS Degraded Voltage circuits. See Special Tools, Attachment 3.
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.2 Energize or de-energize the time delay relay, as appropriate, and measure and record the As-Left time delay on the Data Record. Repeat twice more.

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- 6.6.9 Test class 1E DC relays at < 100 VDC to verify they operate acceptably. Record operating times on the Data Record.
- 6.6.10 Time delay deviation acceptance criteria: three consecutive operations within the acceptable time delay tolerance.
  - .1 Contact Technical Division if any unexplained discrepancies are found during testing.

#### 6.7 Fuses

NOTE: Section 6.7 applies only to replacement fuses. Mark Section 6.7 "N/A" on Data Record if NOT replaced.

#### 6.7.1 Check continuity.

# Some Very Low Amp Fuses, E.g., Milliamp Fuses Used on Circuit Boards, May Be Blown When Tested with a Multimeter.

- 6.7.2 Compare fuse type and size to applicable drawing and/or the Set point Lists.
- 6.7.3 Enter data and verification on the Data Record.

#### 6.8 Resistors

NOTE: Section 6.8 applies only to new, added or replaced resistors. Mark Section 6.8 "N/A" on Data Record if NOT new, added or replaced.

- 6.8.1 Verify ohmic value per applicable drawing (within MFG's specified tolerance, or ± 10% of marked value, if **NOT** specified).
  - .1 Adjustable Resistors set resistor for correct brightness on indicating lights or for correct voltage drop (± 5%) if used for another application.
- 6.8.2 Verify resistor wattage rating is correct per applicable drawing, if specified, to prevent overheating when energized.

#### 6.9 Circuit Integrity

NOTE: Section 6.9 applies only to new or modified circuits. Mark Section 6.9 "N/A" on Data Record if NOT new, added or replaced.

Do Not Open Series or Parallel Paths in Active (In-service) Control Circuits Without Approval of the Electrical Test Supervisor.

Prior to Checking Physical Integrity of Wiring or Devices, Block or Jumper Contacts, as Necessary, to Prevent Operation or Isolation of Other Plant Equipment.

- 6.9.1 Verify control circuit wiring is connected per applicable drawings.
- 6.9.2 Verify computer input from circuit is connected per applicable drawings.
- 6.9.3 Verify annunciator wiring is connected per applicable drawings.
- 6.9.4 Verify power feeders are connected per applicable drawings.
- 6.9.5 Verify elementary diagram(s) logic is correct and wiring diagram(s) have been compared to elementary diagram(s) for proper connections.
- 6.9.6 Enter verification on the Data Record.

#### 6.10 Circuit Insulation Resistance

NOTES: 1. Megger circuits rated UNDER 480 Volts with a 500 Volt megger.

Megger circuits rated OVER 480 Volts with a 1000 Volt megger.

Do Not Megger Any Solid State Devices.

- 6.10.1 Lift ground wire (*if an AC control circuit*) and megger. Use SO123-II-15.3 Form to document lifting and restoration of ground wire, if required.
- 6.10.2 Apply potential until a steady reading is obtained.
- 6.10.3 Enter data on the Data Record.

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# 6.11 Control Circuits Functional Test

NOTEC.		
NUIES:	1.	Sections 6.11 through 6.14 may be performed in any order.
	2.	Test Links used in the 6.9 kV switchgear have been found to cause the Plunger Interlock Clip to be bent, thereby causing the auxiliary switch to <b>NOT</b> change state while in the Operate position, if the Test Link was <b>NOT</b> adjusted properly during operation in the Test position.
	3.	The length of the Test Link MUST BE properly adjusted so that the depth that the rod is inserted into a recess in the Test Link provides the correct clearance between the top of the link and the bottom of the Switch Housing (See Attachment 3).
	4.	A Test Link is improperly adjusted when this clearance is insufficient to permit the plunger to travel its designed distance and causes excessive force on the plunger mechanism and bends the interlock clip.
6.1	1.1	For 6.9 kV positions, ensure the Test Link is adjusted so that the Plunger Interlock Clip does NOT become bent during operation, prior to operating in the Test position. The clearance between the Operating Rod Housing and the top of the Test Link should be approximately <sup>15</sup> / <sub>16</sub> ".
NOTES:	1.	After pre-energizing tests ( <i>circuit integrity and insulation resistance</i> ), circuits are functionally tested by energizing in the "TEST" position, if practical and available (for 4kV and 6.9kV breaker circuits this may be with the breaker out of the cell connected by an umbilical cord.
	2.	Simulate any required conditions by using jumpers, lifting wires or blocking relay contacts, etc.

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Do Not Open Series or Parallel Paths in Active (in-service) Control Circuits Without Approval of the Electrical Test Supervisor. Prior to Functioning Any Auxiliary Relay, Time Delay Relay or Pallet Switch, Block or Jumper Relay or Switch Contacts, as Necessary, to Prevent Operation or Isolation of Other Plant Equipment. Verify proper operation of each circuit/branch circuit by initiating a close/energize 6.11.2 or a trip/de-energize from each initiating device in the circuit/branch circuit, including circuit blocking or lockout functions, e.g., fire isolation switches and lockout relay contacts. Observe that all circuit devices function in accordance with circuit logic (e.g., 6.11.3 indicators light, position switches transfer position). After circuit modifications or additions, the following step should be NOTES: 1. performed as close to the initiating device as possible. During circuit PM's, it may NOT be safe nor prudent to access the 2. initiating device directly (e.g., relays located in critical ESFAS cabinets, or contacts located in difficult to get at areas). In these cases, it is acceptable to prove the circuit without challenging the mechanical or operational integrity (e.g., operating switches) by using jumpers or lifting leads.

- 6.11.4 Prove all circuit permissives, contact by contact. Block contacts open, close contacts or jumper or lift wires to simulate those conditions which cannot be set up otherwise (e.g., device contact operation is a function of a device in another circuit or a process condition). Use SO123-II-15.3 Form to document any temporary circuit modifications and restorations, if required.
  - .1 Enter switch ID in Data Table for all fire isolation switches tested in the circuit and initial satisfactory function test of each switch.
  - .2 "Yellow-Line" the applicable elementary diagram, if available, as circuit elements are tested.
- 6.11.5 Enter verification of satisfactory completion of the circuit functional test on the Data Record, when complete.

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# 6.12 Annunciator Input Functional Test

**NOTE:** Minimize alarms to the Control Room by disabling the annunciator input, as appropriate, to prevent nuisance alarms if the alarm is to be checked from multiple initiating devices.

- 6.12.1 Enable the annunciator input circuit by closing the disconnect links at annunciator input termination panels and remove metal shorting link (*new installations only*).
- 6.12.2 Notify the Control Room Operator of the incoming alarms(s).
- 6.12.3 Initiate the alarm by actuating the initiating device or simulating an alarm condition as near to the device as practical.
- 6.12.4 Verify the correct window lights, that the alarm resets after removing the alarm condition and that the window has the correct description.
- 6.12.5 Enter verification on the Data Record.

6.13 Computer input Functional Test

Do Not Megger Computer Inputs.

- 6.13.1 If the computer input is to be activated for the first time, remove the plastic screws from the input terminals and replace with metal screws. Update the computer scan mode to activate ID point. Enter ID point number into computer terminal.
- 6.13.2 Induce or initiate the alarm with the appropriate signals (*voltage, current, etc.*) into the transmitting device or as close to the transmitting device as practical and compare readouts/alarm points of the computer. Perform in conjunction with computer technician so the computer input conditioning card can be adjusted.
- 6.13.3 Clear the alarm and verify on the terminal that the alarm displays reverse video.
- 6.13.4 Enter verification on the Data Record.

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#### 6.14 Feeder Circuits

**NOTE:** Section 6.14 applies only to new or modified circuits, and may be omitted during routine retests.

- 6.14.1 Energize feeder circuits to panels, vendor packages, etc., when applicable, and check voltage, phase rotation and polarity as applicable.
- 6.14.2 Return feeder circuits to "As-Found" status, or as directed by operations.
- 6.14.3 Enter verification on the Data Record.

#### 6.15 Restoration

- 6.15.1 Restore circuits per the design documents, e.g., applicable elementary drawings, and complete SO123-II-15.3 Form(s) if used.
- 6.15.2 Verify all M&TE has been removed. Prior to next step, have a second qualified person verify and record completion on the Data Record.
- 6.15.3 Visually reinspect any Roto-Test switches to verify that there are no loose or broken studs. Enter verification on the Data Record. Mark this step "N/A," if no Roto switches are present in the circuit.

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# 7.0 RECORDS

- 7.1 On the Data Record, mark the N/A box for each subsection not needed, as appropriate.
- 7.2 Attach completed SO123-II-15.3 Form(s) to the Data Record, if used.
- 7.3 Attach "yellow-lined" elementary drawing to the Data Record, if applicable.
- 7.4 Verify all data on the Data Record of this procedure is complete, then forward the procedure and the entire work package to the responsible Test Supervisor for review and record disposition in accordance with SO123-I-1.3.

#### TEST PROCEDURE REVISION 5 ATTACHMENT 1 TCN 5-1

### Procedure Resource List

#### 1. ACTIONS

- a. NRC IE Information Notice #85-49: (Time Delay) Relay Calibration Problem.
- b. NRC Information Notice 91-53, Failure of Remote Shutdown System Instrumentation because of Incorrectly Installed Components.
- c. NRC Information Notice 91-55, Failures caused by an improperly adjusted Test Link in General Electric Switchgear.
- d. NRC Report No. 89-200, Docket Nos. 50-361 and 50-362; Page 21, Overcurrent Relay Testing (102 VDC).
- e. Root Cause Evaluation (RCE) 91-007, Red Dust.
- f. Root Cause Evaluation (RCE) 94-001, Roto-Test Switches.
- g. ISEG Failure Analysis Report 95-14, Agastat Relays Timing Failures.
- h. ISEG Failure Analysis Report 95-22, Diesel Generator 3G002 K3 Relay Failure.

#### 2. MANUFACTURER/VENDOR INFORMATION

- a. General Electric Instructions, GEH-2467: CR120 Industrial Relay
- b. General Electric Instructions, GEH-2024: Multicontact Auxiliary Relay Type HFA51.
- c. General Electric Instructions, GEK-45484: Multicontact Auxiliary Relay Type HFA151.
- d. General Electric Instructions, GEK-45486: Multicontact Auxiliary Relay Type HFA154.
- e. General Electric Instructions, GEH-1793: Instantaneous Auxiliary Relay Type HGA11.
- f. General Electric Instructions, GEI-10190: DC Auxiliary Relays Type HGA17.
- g. General Electric Instructions, GEK-28008: Auxiliary Relays HMA11.
- h. Square D Service Bulletin, 361 AS: Troubleshooting and Maintenance of MCC Equipment.
- i. Struthers-Dunn Data Bulletin, B/5219: 219 Frame Industrial Control Relays.
- i. Struthers-Dunn Data Bulletin, B/5219-S1: T219 Industrial Plug-In Time Delay Relays.
- k. Vendor Manual SO23-302-356; IB-15.3.5.7-1, ITE Switchgear Auxiliary Switches.
- I. SO23-302-1-53, GEH-1802; Indoor Metalclad Switchgear 7.2 kV 2000A.

# 3. MEETING MINUTES/TELEPHONE NOTES/OTHER CORRESPONDENCE

- a. General Electric Company letter, August 6, 1986: HFA Relays.
- b. Potter & Brumfield letter, July 22, 1988: MDR Relay Ratings and Operating Parameters.
- Meeting Minutes for Open Electrical Items Meetings, August 24, 1988, November 7, 1988 and November 29, 1988, Item 6: Calibration stickers.
- d. Documented telephone conversation dated 5/30/91, between Omi Samanta of SCE Station Technical and Ed Leszczak of Amerace Corp, re: Agastat E7000 Series Timing Relay Setpoint Repeatability.
- e. Letter from Amerace Corporation to Omi Samanta dated 9/10/91; Agastat Nuclear Qualified Time Delay Relays.
- f. MESS 10289101, General Electric Test Link.

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# Procedure Resource List

#### 4. CALCULATIONS

- a. E4C-017, Revision 15
- b. E4C-098, Revision 1, CCN-20

# 125 Volt Battery DC System Sizing Support of SO23-301-2-SCE0352, section 1.3.2.2 4kV Switchgear Protective Relay Setting Calculation

### 5. **PROCEDURES**

- a. SO123-I-1.3 Work Activity Guidelines
- b. SO123-I-4.59 Wire/Cable Inspection and Termination Guide
- c. SO123-II-15.3 Temporary System Alteration and Restoration Form
- d. MPG-SO123-G-6 Maintenance Policy Guideline, Electrical Safe Work Rules

# 6. **GENERAL INFORMATION**

a. SCE Accident Prevention Manual

TEST PROCEDURE **REVISION 5** ATTACHMENT 2 TCN 5-1

# **Special Tools**

#### **REQUIRED M&TE FOR 162D Time Delay Relays** 1.

- Wilmar Model SC-101 electronic timer, or equivalent: 0-999.99 Seconds range Accuracy:
  - Dry Contacts: ±1 millisecond DC Voltage:  $\pm 1$  millisecond AC Voltage:  $\pm \frac{1}{4}$  cycle

#### REQUIRED M&TE FOR 162S and 162T Time Delay Relays 4.

- Wilmar Model SC-101 electronic timer, or equivalent: 8 0-99999 Milliseconds range
  - Dry Contacts: ±1 millisecond Accuracy: DC Voltage: ± 1 millisecond AC Voltage: ± ¼ cycle

#### 5. **RECOMMENDED M&TE**

- AC Voltmeter •
- DC Voltmeter 4
- 6 AC Ammeter
- DC Ammeter/Milliammeter .
- Digital Multimeter (DMM) .
- Contact Timer
- Megger æ
- Volt-Ohm-Milliammeter (VOM)

#### ATTACHMENT 2

TEST PROCEDURE REVISION 5 ATTACHMENT 3 TCN\_5-1

# ITE 4kV Breaker Pallet Switch Illustrations





**ATTACHMENT 3** 

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#### TEST PROCEDURE REVISION 5 ATTACHMENT 3 TCN <u>5 - 1</u>

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# ITE 4kV Breaker Pallet Switch Illustrations

Figure 4 - Sketch showing center line of contacts relative to position of Shaft and Operating Crank, viewed from end opposite the Crank Advanced Standard Contact Crank Contact Shaft Center Line of Contact 1-2 -Terminal 3-4 5-6 7-8 Number

ATTACHMENT 3

TEST PROCEDURE REVISION 5 ATTACHMENT 4 TCN 5 - 1

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# General Electric 6.9 kV Switchgear Test Link



**ATTACHMENT 4** 

#### TEST PROCEDURE REVISION 5 ATTACHMENT 5 TCN \_5 - 1\_\_\_

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### Vendor Information for Auxiliary Relays

				Voltage	
MFR	Model ***	Document	Rated	Pickup **	Dropout
GE	CR120	SO23-306-3A-1-24	120 VAC	≤ 102 V	* BASELINE
			AC	73 - 81 %	*BASELINE
GE		1814-AAU39-MUU16	DC	55 - 61 %	*BASELINE
			AC	50 - 80 %	N/A
GE	HFA54/154 Heset	1814-AAU39-MUU15	DC	50 - 75 %	N/A
			AC	70 -80 %	*BASELINE
GE	HGA11	SO23-302-3-35	DC	50 - 60 %	*BASELINE
			AC	40% ± 5%	*BASELINE
GE	HGA17A, B, C	SO23-302-1-46	DC	30% ± 5%	*BASELINE
			AC	80% ± 5%	*BASELINE
GE	HGA17D, E, F, H	SO23-302-1-46	DC	60% ± 5%	*BASELINE
			115 VAC	≤ 92 V	*BASELINE
GE	HMA	SO23-302-3-35	125 VDC	≤ 75 V	*BASELINE
GEC	CAA	SO23-401-A-26	ADC	*BASELINE	*BASELINE
GEC	VAA	SO23-401-A-26	VDC	≤ 50 %	*BASELINE
0.00	VAJC Operate	0000 404 4 00	VDC	≤ <b>8</b> 0 %	*BASELINE
GEC	VAJC Reset	- SU23-401-A-23	VDC	≤ <b>8</b> 0 %	*BASELINE
050	VAJX Operate		VDC	≤ <b>5</b> 3 %	*BASELINE
GEC	VAJX Reset	- SO23-401-A-23	VDC	≤ <b>8</b> 0 %	*BASELINE
GEC	VAJZ	SO23-401-A-23	VDC	< 53 %	*BASELINE
GEC	VAX	SO23-401-A-24	VDC	≤ <b>8</b> 0 %	*BASELINE
P&B	MDR-67-2-SCE	SO23-306-7-267	115VAC	< 92 V	< 92 V
P&B	MDR-131-1-SCE	SO23-306-7-268	115 VAC	< 92 V	> 12 V
P&B	MDR-134-1-SCE	SO23-306-7-269	115 VAC	< 92 V	> 12 V
P&B	MDR-135-1-SCE	SO23-306-7-270	28 VDC	< 18 V	> 2.8 V
P&B	MDR-136-1-SCE	SO23-306-7-271	28 VDC	< 19 V	> 2.8 V

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MER	Model ***	Document		Voltage	
		Document	Rated	Pickup **	Dropout
P&B	MDR-137-8-SCE	SO23-306-7-272	125 VDC	< 82 V	> 12.5 V
P&B	MDR-138-8-SCE	SO23-306-7-273	125 VDC	< 82 V	> 12.5 V
P&B	MDR-141-1-SCE	SO23-306-7-289	115 VAC	< 92 V	> 12 V
P&B	MDR-163-1-SCE	SO23-306-7-275	115 VAC	< 92 V	> 12 V
P&B	MDR-170-1-SCE	SO23-306-7-288	115 VAC	< 92 V	> 12 V
P&B	MDR-4076-SCE	SO23-306-7-277	115 VAC	< 92 V	< 92 V
P&B	MDR-5061-SCE	SO23-306-7-278	125 VDC	< 82 V	< 82 V
P&B	MDR-5076-SCE	1810-AE479-M0001	125 VDC	<72 V	> 12.5 V
P&B	MDR-5095-SCE	SO23-306-7-283	125 VDC	< 82 V	< 82 V
P&B	MDR-5137-SCE	SO23-306-7-279	125 VDC	< 82 V	< 82 V
P&B	MDR-7032-SCE	SO23-306-7-280	28 VDC	< 19 V	>2.0 V
P&B	MDR-7033-SCE	SO23-306-7-281	28 VDC	< 18.6 V	> 2.8 V
P&B	MDR-7034-SCE	SO23-306-7-282	28 VDC	< 18.6 V	> 2.8 V
SQ. D	Control Relays	SO23-302-4-2-576	AC	< 85 %	*BASELINE
S-D	T219	SO23-306-3A-7-3	AC-DC	< 80 %	*BASELINE
S-D	210	SO22 206 24 7 0	120 VAC	< 102 V	*BASELINE
5-0 219		5025-300-3A-7-2	115-125 VDC	< 92 V	*BASELINE

# Vendor Information for Auxiliary Relays

No value specified by manufacturer \*\*

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% values are % of coil rating (volts or amps) Table does not yet include all relay types installed at SONGS

# Circuit Device Tests and Overall Functional Test Data Record

3.2.1 MO #	Unit	Equipment ID	· · · · ·	
Scheme or Circuit Number:				•
Circuit Description:				
Drawing	Rev	Drawing		Rev
Drawing	Rev	Drawing		Rev

6.1.6 Enter signature/initials and print name.

Signature	Initials	Print Name

#### 6.3 Switch Inspection DIN/A

Switch Designator	Description	Insp SAT (6.3.1, 6.3.2, * 6.3.3.2 )	* Contact Continuity/ Configuration (6.3.3)	<ul> <li>Switch</li> <li>Operates</li> <li>Satisfactorily</li> <li>(6.3.3.3)</li> </ul>	Performed By Initials

\*Baseline data for new, added, or replacement switches only. N/A if routine maintenance/PM.

# 6.4 Sketch Pallet Switch contact positions below (see Attachment 2). DN/A

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# Circuit Device Tests and Overall Functional Test Data Record

6.5 Auxiliary Relays D N/A

Relay ID	Relay Type/ Modei	*Coil Voltage Rating (6.5.2)	HFA Align OK (6.5.3.2)	Insp SAT (6.5.3)	*Coll Resist (6.5.4)	*PU/DO Volts (6.5.5)		*Accept Criteria (6.5.5.1)	1-E DC Operates ≤ 100 V (6.5.6)	*Lockup Volts (6.5.7)	*Con- tacts OK (8.5.8.1)	Performed By (init)
		V			Ω	V/	V	{ }		v		
		v			Ω	V/	v	{ }		v	D	
		. V			Ω	V/	v	{ }		v		
		v			Ω	<b>V</b> /	v	{ }		v		
		v			Ω	V/	v	{ }		v		
		v			Ω	V/	v	{ }		v		
		v		۵	Ω	V/ V	v	{ }		V.	D	
		v			Ω	- V/ N	v	{ }		v		
Acceptance C	riteria:	{1}	per MFG spe	ec.	(ATT 4)	<b>{2}</b> 55-85%	% of Nomir	nal Voltag	e			

\*Baseline data for new or replacement relays only. N/A if routine maintenance/PM.

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# Circuit Device Tests and Overall Functional Test Data Record

6.6 Time Delay Relays D N/A

Relay ID	Relay Type/ Model	"Coil Voltage Rating (6.6.2.1)	*Delay Type & Contacts Correct (6.6.2.2, 6.6.2.3)	*Coil Resis (6.6.2.3)	As- Found Time (6.6.4)	Insp SAT (6.6.6)	"PU/DO Volts (6.6.7)	*All Con- tacts SAT (6.6.2.3)	Time 1	As-Left (6.6.8) Time 2	Time 3	Delay Set- point	Acc Crit ** (6.6.5)	1-E DC Test @ ≤100V (Time) (6.6.9)	Devi- ation OK (6.6.19)	Per- formed By (inits)	te (
		v		Ω	S		1		S	S	S	S	{ }	S			
		v		Ω	S		1		S	S	S	S	: ( )	S			
		v		Ω	S		Î		S	S	S	S	{}	S			
		v	D	Ω	S		1		S	S	S	S	{ }	S			
		v		Ω	S		1		S.	S	S	s	{ }	S			
		v		Ω	S		1		S	S	S	S	{}	S			
		v		Ω	S		Ĵ		S	S	S	S	{ }	S			
Acceptar	nce Criteria:						{1}	per desi	gn docume	nt/procedu	re no	······	{2	}I	per MFR sp	ec.	ec.
**Insert n	number of Accep	tance Crite	ria used, in b	rackets.			<b>{3}</b> ± 109	% of setpoint			<b>{4}</b> ± 15%	of setpoi	nt for Agas	tat model 70	32 relays		

\*Baseline Data for new or replacement relays only. N/A if routine maintenance/PM.

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# Circuit Device Tests and Overall Functional Test Data Record

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#### 6.7 Fuses D N/A

Resistors

D N/A

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Designator	Description	Continuity SAT (6.7.1)	Type/Size SAT (6.7.2)
			D
			D

Performed By (Init)

Designator/Description	Design Value (6.8.1)	Fixed/ Adjust (6.8.1)	Measured Value (6.8.1)	Accept. Criteria	Design Watts (6.8.2)	Rated Watts (6.8.2)
	Ω		Ω	{ }	W	W
	Ω		Ω	{ }	W	W
	Ω		Ω	{ }	W	W
	Ω		Ω	{ }	W	W
	Ω		Ω	{ }	W	W
Acceptance Criteria:			{1} Fixed	% per Mfg	. Spec	
**Insert number of Accept brackets.	ance Criteria	used, in	<b>{2}</b> ± 10%	{;	3} Adjustabl	e: ±5%

Performed By (Init) \_\_\_\_\_

6.9 Verify wiring is per applicable drawings, for new or modified circuits only.

Performed By (Init) \_\_\_\_\_

6.10 Circuit Insulation Resistance  $M\Omega$  at VAcceptance Criteria  $\geq$  (KV + 1)  $M\Omega$  =  $M\Omega$ 

Performed By (Init) \_\_\_\_\_

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Performed By (Init) \_\_\_\_\_

Performed By (Init) \_\_\_\_\_

# Circuit Device Tests and Overall Functional Test Data Record

6.13 Computer input(s) function.

6.14 New or modified feeder circuits energized.

Computer Point(s)

≏ + E	Circuite restored	1		1	
0.10	Uncuns restored.	Performed By	Date	Verified By	Date
6.15.2	All M&TE has been removed	l Performed	/ By Date (Must be signe	/ Verified By ed off prior to next step)	Date
6.15.3	No visibly loose or broken R	oto-Test switch stu	ds. □N/A	Verified By (Init)	I
Remar	ks				

ATTACHMENT 6

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