ATTACHMENT 3

Factory Acceptance Testing Report on Square-D PZ4 Rx Trip Switchgear, FAT-Report-06910327-1, dated August 2009

FACTORY ACCEPTANCE TESTING REPORT ON SQUARE-D PZ4 RX TRIP SWITCHGEAR

FAT-REPORT-06910327-1
Revision 0
August 2009

APPROVAL
FOR
FACTORY ACCEPTANCE TESTING REPORT
ON SQUARE-D PZ4 RX TRIP SWITCHGEAR

This test report has been prepared in accordance with the NLI Quality Assurance Program.

Prepared by: _____ date 8/3/09

Verified by: _____ date 8/4/09

Approved by: _____ date 8/7/09

REVISION HISTORY

Revision	Description	Date
0	Original Issue	8/7/09

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1.0 SUMMARY OF RESULTS

This report addresses the factory acceptance testing performed by NLI on the Rx Trip Switchgear to be installed at the Exelon – Three Mile Island Nuclear Plant. Testing and acceptance criteria were in accordance with TMI approved NLI Verification Plan VP-PZ4, Rev. 6 and TMI purchase order 00428587, dated 11/29/07 [7.2].

The purpose of the testing was to verify proper operation of the switchgear. The switchgear met all acceptance criteria as outlined in the TMI approved test plan and functioned properly during the testing except as noted in the discrepancy reports contained in Appendix B and discussed in section 4.1 of this report.

There were four discrepancy reports recorded during the testing. A brief description of the four discrepancy reports is as follows:

1) The instrument sections of the switchgear did not have the same amount of indicating lights as listed on the test plan.
2) The test plan incorrectly listed the wrong light should extinguish during specific steps of the testing.
3) The test plan stated to remove fuses from the switchgear during testing, however the fuses were not removed.
4) The test plan stated to remove the 90VAC applied to the UV circuit (MN coil and 27 relay) to trip the breakers. The 90VAC was not removed during testing.

These discrepancies are discussed in detail in Section 4.1 of this report and documented in discrepancy reports DR-210005-04 through -07 contained in Appendix C.

All fuses are considered Class 1E. The fuses installed in the switchgear were dedicated by NLI prior to installation. The installed fuses passed all testing as outlined in the NLI test plans prepared in accordance with the NLI QA program. The fuse test data is contained in Appendix B. All fuse testing was performed at the NLI facility in Fort Worth, TX.

The switchgear factory acceptance test data is contained in Appendix A. All switchgear testing was performed at the Square-D facility in West Chester, OH.

2.0 EQUIPMENT IDENTIFICATION

2.1 RX Control Rod Drive Breaker Cabinet and Breakers

The supplied unit is as a Square-D PZ-4 series low-voltage switchgear. The unit consists of two (2) 20" wide vertical sections with two (2) circuit breakers (the breakers are Square-D Masterpact NT, 800A frame, p/n: NT08NA) installed in each vertical section, associated instrumentation devices and doors are as identified in NLI design drawing 06910327-LD-1, (latest revision) and below.

The switchgear and circuit breaker ratings are as follows:

- Nominal operating voltage: 480Vac.
- Rated current: 800A
- Interrupt Rating: 42,000A @ 508Vac
- Nominal control voltage: 125VDC
- UV voltage range: 42 – 84Vac
- Shunt trip voltage range: 70 – 140Vdc
- Trip Unit: None
- Nominal Control voltage (charging and closing): 120VAC

2.2 Function

The safety function of the switchgear is to provide power to safety related loads and interrupt power on a trip signal.

3.0 EVALUATION OF RESULTS

3.1 Discrepancy Reports

There were four discrepancy reports documented during the factory acceptance testing. A detailed discussion of the discrepancy reports are as follows:

DR-06910327-04 – The breaker instrument sections of the switchgear did not have the same amount of indicating lights as listed on the test plan. The VP incorrectly states that the breaker instrument sections have 6 white lights. The instrument sections for each breaker have 5 white lights. The sixth white light is a global 'trip confirm status' light for Train A or Train B for the switchgear and is located on the instrument door for each vertical section, not each breaker.

The switchgear configuration is correct with 5 indicating lights per breaker instrument section and is acceptable.

DR-06910327-05 – The test plan incorrectly listed the wrong light should extinguish during specific steps of the testing. The VP incorrectly states which light will extinguish. The proper operation is for the 'Shunt Trip Signal Present' light to extinguish. The VP test data sheets list the correct light. The switchgear operated properly and the correct expected light sequence was achieved and is acceptable.

DR-06910327-06 – The test plan stated to remove fuses from the switchgear during testing, however the fuses were not removed. The VP incorrectly states to remove the fuses. The fuses must remain so that the UV coil has power applied to allow the circuit breakers to close for this testing. The test procedure was modified as documented in DR-06910327-07.

The use of the fuses for testing is acceptable and the gear operated as expected according to the procedure as documented in DR-06910327-07.

DR-06910327-07 – The test plan stated to remove the 90VAC applied to the UV circuit (MN coil and 27 relay) to trip the breakers. The 90VAC was not removed during testing. The VP states to remove the power applied to the UV circuit of the breaker (both the MN coil in the breaker and the external undervoltage relay). The purpose of this particular test is to perform breaker main pole opening timing after loss of AC power using the external (27) relay actuating the shunt trip coil of the breaker. In order to perform this test correctly, the AC power must remain applied to the breaker installed MN (UV) coil to ensure that the 27 relay/shunt trip combination trips the breaker and does not race the breaker installed MN UV coil to trip the breaker.

It was determined that the power would be applied to the MN coil installed in the breaker and the breaker test switch would be moved to the 'Shunt Trip' position. The movement of the test switch to the shunt trip position allows the AC voltage to remain applied to the MN coil in the breaker, but removes the AC voltage sensed by the external 27 UV relay. The 27 relay then actuates and closes a contact in series with the shunt trip coil thus tripping the breaker and

producing the correct circuit progression to measure a valid opening time of the breaker due to loss of voltage on the 27 relay and shunt tripping.

TMI engineering representatives on-site during the FAT testing concurred with the test setup. The change in procedure is acceptable and produced acceptable test results.

3.2 Modifications

There were no modifications made to the production units as a result of FAT testing.

3.3 FAT Open Items

There were no open items at the completion of the FAT testing.

3.4 Results and Conclusions

Based on successful completion of the FAT per the TMI approved NLI Verification Plan, VP-PZ4, Rev. 6, and acceptable resolutions to the discrepancy reports discussed in section 4.1, the switchgear is acceptable for use at the Three Mile Island Nuclear Plant.

4.0 QUALITY ASSURANCE

Project activities were performed in accordance with the NLI Quality Assurance Program which meets the requirements of 10CFR50 Appendix B, 10CFR21 and ASME NQA-1 [7.1].

5.0 MEASUREMENT & TEST EQUIPMENT

Measurement & Test Equipment which were used is controlled by the NLI M&TE program (procedure NLI-QUAL-05, latest revision). The test data sheets identify the M&TE that was used. All M&TE used during testing is traceable to NIST standards.

6.0 DOCUMENTATION

This FAT report is prepared to summarize the testing and present the results of the testing. Test data sheets and any other relevant data is included in this report.

7.0 REFERENCES

7.1 NLI Quality Assurance Manual, Rev. 8, 12/14/07 including applicable Supplements.

7.2 TMI purchase order 00428587.

7.3 TMI Technical Specification SP-1101-11-250, Rev. 0.

Appendix A

Switchgear Factory Acceptance Test Data

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Dimensions & Configuration CC#1	100%	**Note: All dimensions are nominal unless noted**	1,3	
		Sections will line-up and bolt together with other sections of switchgear based on measured dimensions.		Measure dimensions to all mating mount holes on the switchgear sections including ground bus.
		Height = 93.20″ (floor to top of wireway trough) Width = 20.0″ (per section) Depth = 63.23″ (back to front of wireway trough)		Measure and record the switchgear dimensions. (see latest revision of switchgear layout drawing for measurement location).
		Switchgear has 2 vertical sections, 4 cubicles high.		Visual Inspection.
		Each vertical section has 2 cubicles for breakers and 2 cubicles for instrumentation.		Visual Inspection
		Instrument sections have the following: a) Breaker test switch with a key lock b) UV relay c) 6 white indicating lights d) Auxiliary relays		Visual Inspection that devices are as follows: a) Electroswitch Series 20K. b) ABB cat# 411R0175 c) Square-D type ZB5AVBG1 d) Square-D type XUD080V63, Square-D type XO1200V02 and XO80V02.
		Layout of components/conduit entrance location and size are in accordance with NLI design drawings.		Visual Inspection
		Channel A breaker door is painted Red		Visual Inspection

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Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Dimensions & Configuration CC#1 (con't.)		Channel B breaker door is painted Green		Visual Inspection
		Channel C breaker door is painted Yellow		Visual Inspection
		Channel D breaker door is painted Blue		Visual Inspection
		Control wiring is Rockbestos, SIS, 90°C wire.		Visual Inspection
		Each vertical section has a 15kVA CPT.		Visual Inspection that CPT is Square-D Cat#15S40F.
		Verify insulated ring tongue lugs are used on control wiring to terminal blocks.		Visual Inspection
		Ground bus is tin or silver plated.		Visual Inspection
		Circuit breakers have operation counter installed.		Visual Inspection
		Circuit breakers have contact indicators.		Visual Inspection
		A means of locking the circuit breakers in place while in the CONNECTED or DISCONNECTED positions is installed on the switchgear.		Visual Inspection
		All indicating lights are LED type.		Visual Inspection

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Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Dimensions & Configuration CC#1 (con't.)		Safety-related wiring has a minimum of 6"separation from the other safety-related channels. Safety-related wiring is fed in thermosleve and is color coded to distinguish it from Non-safety related wiring.		Visual Inspection Visual Inspection
Wiring Check CC#2	100%	Switchgear sections are wired per the latest approved design drawings. Yellow line drawings for inclusion in test data package.	1	NLI QC to perform point-to-point wiring check on switchgear using the latest revisions of the design drawings.
Circuit breaker Fit-up CC#3	100%	Breaker fits into breaker compartment without any binding. Compartment door closes without excessive gap. Door mounted components do not interfere with removal of the breaker from the switchgear cell.	1,3	Insert each circuit breaker into their respective breaker compartment. Close compartment door and check door fit. Remove breakers from switchgear. Verify that door mounted components do not interfere with removal of the breaker.
Proper Operation of Close Circuit CC#4a	100%	The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C.	1,3	Place all breaker test switches in 'NORMAL'. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).

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Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Close circuit CC#4a (con't)		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A and C. 'Shunt Trip Power' light extinguishes for Channel A & C.		Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 (channel A & C) in section 1.
		The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D.		Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).
		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. 'Shunt Trip Power' light extinguishes for Channel B & D.		Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2 (channel B & D). Reset the 27A, B, C & D relays. Apply a jumper across points TB5-6 & TB5-7. Apply 90VAC across points TB5-1 & TB5-2.
		Breakers A, B, C, & D charge.		Apply 90VAC control power to points TB40-1 & TB40-4 in section 1 for Channel A & C and TB41-1 and TB41-4 for Channel B & D.
		Channel A breaker closes when jumper is applied.		Apply a jumper across points TBA3-3 & TBA3-4.

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Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Close circuit CC#4a (con't)		Channel C breaker closes when jumper is applied. Channel B breaker closes when jumper is applied. Channel D breaker closes when jumper is applied.		Apply a jumper across points TBC3-3 & TBC3-4. Apply a jumper across points TBB3-3 & TBB3-4. Apply a jumper across points TBD3-3 & TBD3-4.
Proper Operation of Under-voltage circuit CC#4b	100%	The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C.	1,3	Place all breaker test switches in 'NORMAL' Apply a jumper across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Apply a jumper across points TB5-6 & TB5-7. Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).

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Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
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Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Under-voltage circuit CC#4b (con't)		'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A and C. 'Shunt Trip Power' light extinguishes for Channel A & C.		Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1. Rev. 6
		The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D.		Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).
		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. 'Shunt Trip Power' light extinguishes for Channel B & D.		Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Rev. 6
				Reset the 27A, B, C & D relays.
				Close all breakers.
		'Shunt Trip Power' light for Channel A is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel A.		Place the breaker test switch for Channel A in the 'UV Trip' position.
		Channel A breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel A.		Remove the 90VAC power applied to points TBA1-1 & TBA1-2 and verify Channel A breaker trips.
		Verify that the 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel A.		Return the breaker test switch for Channel A to the 'Normal' position.

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Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Under-voltage circuit CC#4b (con't)		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A.		Apply 90VAC power to points TBA1-1 & TBA1-2.
		'Shunt Trip Power' light for Channel B is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel B.		Place the breaker test switch for Channel B in the 'UV Trip' position.
		Channel B breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel B.		Remove the 90VAC power applied to points TBB1-1 & TBB1-2 and verify Channel B breaker trips.
		Verify that the 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel B.		Return the breaker test switch for Channel B to the 'Normal' position.
		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B.		Apply 90VAC power to points TBB1-1 & TBB1-2.
		'Shunt Trip Power' light for Channel C is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel C.		Place the breaker test switch for Channel C in the 'UV Trip' position.
		Channel C breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel C.		Remove the 90VAC power applied to points TBC1-1 & TBC1-2 and verify Channel C breaker trips.
		Verify that the 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel C.		Return the breaker test switch for Channel C to the 'Normal' position.

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Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Under-voltage circuit CC#4b (con't)		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel C. 'Shunt Trip Power' light for Channel D is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel D. Channel D breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel D. Verify that the 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel D.		Apply 90VAC power to points TBC1-1 & TBC1-2. Place the breaker test switch for Channel D in the 'UV Trip' position. Remove the 90VAC power applied to points TBD1-1 & TBD1-2 and verify Channel D breaker trips. Return the breaker test switch for Channel D to the 'Normal' position. Reset the target on the 27A, B, C & D relays. Remove all control power. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Remove jumpers across points TB5-6 & TB5-7.

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Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Under-voltage circuit CC#4b (con't)				
Proper Operation of Shunt Trip circuit CC#4c	100%	The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C.	1,3	Place all breaker test switches in 'NORMAL' Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Apply a jumper across points TB5-6 & TB5-7. Apply 90VAC across points TB5-1 & TB5-2. Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).

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Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Shunt Trip circuit CC#4c (con't)		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A and C. 'Shunt Trip Power' light extinguishes for Channel A & C. The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. 'Shunt Trip Power' light extinguishes for Channel B & D. 'UV Trip Power' light for Channel A is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel A. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27A relay drops out. 'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel A. 'Shunt Trip Signal Present' light is not illuminated for Channel A.		Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1. Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D). Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Reset the 27A, B, C & D relays. Close all breakers. Place the breaker test switch for Channel A in the 'Shunt Trip' position. Return the breaker test switch for Channel A to the 'Normal' position and reset the target on the 27A relay.

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Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Shunt Trip circuit CC#4c (con't)		Breaker for Channel A closes. 'UV Trip Power' light for Channel B is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel B. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27B relay drops out. 'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel B. 'Shunt Trip Signal Present' light is not illuminated for Channel B. Breaker for Channel B closes. 'UV Trip Power' light for Channel C is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel C. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27C relay drops out. 'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel C. 'Shunt Trip Signal Present' light is not illuminated for Channel C.		Close the breaker for Channel A. Place the breaker test switch for Channel B in the 'Shunt Trip' position. Return the breaker test switch for Channel B to the 'Normal' position and reset the target on the 27B relay. Close the breaker for Channel B. Place the breaker test switch for Channel C in the 'Shunt Trip' position. Return the breaker test switch for Channel C to the 'Normal' position and reset the target on the 27C relay.

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Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Shunt Trip circuit CC#4c (con't)		Breaker for Channel C closes. 'UV Trip Power' light for Channel D is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel D. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27D relay drops out. 'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel D. 'Shunt Trip Signal Present' light is not illuminated for Channel D. Breaker for Channel D closes.		Close the breaker for Channel C. Place the breaker test switch for Channel D in the 'Shunt Trip' position. Return the breaker test switch for Channel D to the 'Normal' position and reset the target on the 27D relay. Close the breaker for Channel D. Remove all control power. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4.

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Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of UV trip timing CC#4d	100%		1,3	Place all breaker test switches to the UV TRIP position. Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Place a jumper across points TB5-6 & TB5-7. Apply 90VAC across points TB5-1 & TB5-2. Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C). Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1. Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D). Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2.

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Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of UV trip timing CC#4d (con't)		The opening time for the breakers main poles is < 50ms after removal of the 90VAC. Verify that the 'UV Trip Power' and 'UV Device Energized' lights are not illuminated.		Ensure the 27A, B, C & D relays are reset. Close all breakers. Remove the 90VAC control power applied to points TBA1-1 & TBA1-2 (channel A) and TBC1-1 & TBC1-2 (channel C) in section 1 and TBB1-1 & TBB1-2 (channel B) and TBD1-1 & TBD1-2 (channel D) in section 2. Measure the time required for the breakers main poles to open after removal of the 90VAC. **Note: This test can be performed on one breaker at a time.** Remove all control power. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Remove the jumper across points TB5-6 & TB5-7.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of 27 relay and shunt trip timing CC#4e	100%		1,3	Place all breaker test switches in the NORMAL position. Remove fuse F3 & F7 in section 1 and F13 & F17 in section 2. Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Place a jumper across points TB5-6 & TB5-7. Apply 90VAC across points TB5-1 & TB5-2. Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C). Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1. Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of 27 relay and shunt trip timing CC#4e (con't)		The opening time for the breakers main poles is < 64ms after removal of the 90VAC. Verify that the 'Shunt Trip Signal Present' lights are illuminated.		Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Apply 90VAC across secondary disconnect points D1 and D2 on all breakers. Ensure the 27A, B, C & D relays are reset. Close all breakers. Remove the 90VAC control power applied to points TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1 and TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Measure the time required for the breakers main poles to open after removal of the 90VAC. **Note: This test can be performed on one breaker at a time.** Remove all control power. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Remove a jumper across points TB5-6 & TB5-7.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of 27 relay and shunt trip timing CC#4e (con't)				Replace fuse F3 & F7 in section 1 and F13 & F17 in section 2.
Proper Operation of Shunt Trip signal from TMR control system CC#4f	100%		1,3	Place all breaker test switches in the NORMAL position. Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Place a jumper across points TB5-6 & TB5-7. Apply 90VAC across points TB5-1 & TB5-2. Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C). Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1. Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Shunt Trip signal from TMR control system CC#4f (con't)				Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Ensure the 27A, B, C & D relays are reset. Close all breakers.
		Verify that Channel A breaker trips and the 'Shunt Trip Signal Present' light is illuminated. Verify that the KB-A relay is picked-up and that the KB-B, KB-C and KB-D relays are not picked-up.		Place a jumper across points TBA2-1 & TBA2-2 in section 1 for Channel A. Remove the jumper across points TBA2-1 & TBA2-2.
		Verify that Channel C breaker trips and the 'Shunt Trip Signal Present' light is illuminated. Verify that the KB-C relay is picked-up and that the KB-A, KB-B and KB-D relays are not picked-up.		Place a jumper across points TBC2-1 & TBC2-2 in section 1 for Channel C. Remove the jumper across points TBC2-1 and TBC2-2.
		Verify that Channel B breaker trips and the 'Shunt Trip Signal Present' light is illuminated. Verify that the KB-B relay is picked-up and that the KB-A, KB-C and KB-D relays are not picked-up.		Place a jumper across points TBB2-1 & TBB2-2 in section 2 for Channel B.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Shunt Trip signal from TMR control system CC#4f (con't)		Verify that Channel D breaker trips and the 'Shunt Trip Signal Present' light is illuminated. Verify that the KB-D relay is picked-up and that the KB-A, KB-B and KB-C relays are not picked-up.		Remove the jumper across points TBB2-1 and TB2-2. Place a jumper across points TBD2-1 & TBD2-2 in section 2 for Channel D. Remove the jumper across points TBD2-1 and TBD2-2. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Remove jumper across points TB5-6 & TB5-7. Remove all control power.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Trip Free Operation CC#5 **Perform this CC on all breakers.**	100%	Breaker A (B, C, D) should not close.	1,3	Apply 125VDC and 120VAC control power to the switchgear and charge all breakers. Depress the push to trip button and hold-in on Channel A breaker. Depress the push to close button on Channel A breaker. Repeat for all breakers.
Anti-pump Operation CC#6 **Perform this CC on all breakers.**	100%	Breaker closes when close signal is applied. Breaker trips when trip signal is applied and does not re-close. Breaker closes when close signal is reapplied.	1,3	Apply 125VDC and 120VAC control power to the switchgear and charge the breakers. Apply and maintain a close signal on the Channel A breaker. Apply a momentary trip signal to the Channel A breaker while maintaining the close signal. Release the close signal and then re-apply the close signal. Repeat for all breakers.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Breaker Interlocks CC#7 **Perform this CC on all breakers.**	100%	Breaker racking tool cannot be inserted into the breaker unless TRIP button is pushed.	1,3	Rack the breaker for Channel A to the TEST position. Close the breaker. Attempt to rack the breaker to the CONNECT position. Repeat for all breakers.
Breaker UV Trip Voltage CC#8 **Perform this CC on all breakers.**	100%	Verify breaker tripped in the voltage range of 42 to 84Vac.	1,3	Apply 125VDC and 120VAC control power to the switchgear. Charge and close breaker for Channel A. Reduce the AC control voltage until the breaker trips. Record the voltage at which the breaker trips. Repeat for all breakers.
Remote Close Test CC#9	100%		1,3	Place all breaker test switches in the NORMAL position. Apply 90VAC across points TB5-1 & TB5-2.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Remote Close Test CC#9 (con't)				Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C). Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1. Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D). Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Ensure the 27A, B, C & D relays are reset.
		Breakers should not close.		Attempt to close all breakers. Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4.
		Breakers should not close.		Attempt to close all breakers electrically. Place a jumper across points TB5-6 & TB5-7.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Remote Close Test CC#9 (con't)		All breakers should close.		Close all breakers electrically. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Remove jumper across points TB5-6 & TB5-7. Remove all control power.
Proper Operation of Trip Confirm Circuit CC#10	100%		1,3	Place all breaker test switches in the NORMAL position. Apply 90VAC across points TB5-1 & TB5-2 and TB1-1 & TB1-2. Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C). Apply 90VAC to TBA1-1& TBA1-2 and TBC1-1 & TBC1-2 in section 1. Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10 (con't)				Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Ensure the 27A, B, C & D relays are reset. Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Place a jumper across points TB5-6 & TB5-7. Place a jumper across points TB1-3 & TB1-4 and TB1-3 & TB1-5. Close breaker A. Open breaker A. Close breaker C. Close breakers A & C. Open breakers A & C. Close breaker B. Open breaker B.
		Verify that the 'Train A Trip Confirm Status' light is not illuminated. Verify that the 'Train A Trip Confirm Status' light is not illuminated. Verify that the 'Train A Trip Confirm Status' light is not illuminated. Verify that the 'Train A Trip Confirm Status' light is illuminated. Verify that the 'Train A Trip Confirm Status' light is not illuminated.		

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10 (con't)		Verify that the 'Train A Trip Confirm Status' light is not illuminated.		Close breaker D.
		Verify that the 'Train A Trip Confirm Status' light is illuminated.		Close breakers B & D.
				Open breakers B & D.
				Remove jumpers across points TB1-3 & TB1-4 and TB1-3 & TB1-5.
				Place a jumper across points TB5-3 & TB5-4 and TB5-3 & TB5-5.
		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Close breaker A.
		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Open breaker A.
		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Close breaker C.
		Verify that the 'Train B Trip Confirm Status' light is illuminated.		Close breakers A & C.
				Open breakers A & C.
		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Close breaker B.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10 (con't)				Open breaker B.
		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Close breaker D.
		Verify that the 'Train B Trip Confirm Status' light is illuminated.		Close breakers B & D.
				Place a jumper across points TB1-3 & TB1-4 and TB1-3 & TB1-5.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close all breakers.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Open breakers A & B.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close breakers A & B.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Open breakers A & D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close breakers A & D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Open breakers C & B.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10 (con't)		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close breakers C & B.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Open breakers C & D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close breakers C & D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Remove jumper from TB1-3 & TB1-4 and TB5-3 & TB5-4. Open breaker B.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Replace jumper across TB1-3 & TB1-4 and TB5-3 & TB5-4. Close breaker B.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Remove jumper from TB1-3 & TB1-4 and TB5-3 & TB5-4. Open breaker D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Replace jumper across TB1-3 & TB1-4 and TB5-3 & TB5-4. Close breaker D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Remove jumper from TB1-3 & TB1-5 and TB5-3 & TB5-5. Open breaker A.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Replace jumper across TB1-3 & TB1-5 and TB5-3 & TB5-5. Close breaker A.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10 (con't)		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated. Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated. Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated. Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated. Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated. Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated. Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated. Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Remove jumper from TB1-3 & TB1-5 and TB5-3 & TB5-5. Open breaker C. Replace jumper across TB1-3 & TB1-5 and TB5-3 & TB5-5. Close breaker C. Remove jumper from TB1-3 & TB1-4, TB5-3 & TB5-4, TB1-3 & TB1-5 and TB5-3 & TB5-5. Replace jumper from TB1-3 & TB1-4, TB5-3 & TB5-4, TB1-3 & TB1-5 and TB5-3 & TB5-5. Open breaker A. Close breaker A. Open breaker B. Close breaker B. Open breaker C. Close breaker C. Open breaker D.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10 (con't)				Open all breakers. Remove all control power. Remove all jumpers.
CPT Operation CC#11	100%	CPT secondary voltage = 120VAC ± 5%	1,3	Apply 480VAC to the primary side (H1 & H2) of the CPT's in both section 1 & 2. Measure CPT secondary voltage at points TBA3-1 & TBA3-2, TBC3-1 & TBC3-2 and TB10-1 & TB10-2 in section 1 and TBB3-1 & TBB3-2, TBD3-1 & TBD3-2 and TB11-1 & TB11-2 in section 2.
Hi-Pot Testing (Switchgear Assembly) CC#12	100%	The Hi-Pot testing was performed on the switchgear per the applicable Square-D document. NLI to review Form 87-0816R, step 19 for conformance.	2	Perform or verify that AC High Pot. testing was performed in accordance with Square-D procedure Form 87-0816R for "Low Voltage Switchgear."
Megger Test (Switchgear Control Wiring) CC#12a	100%	AC/DC Control circuit @ 1250Vdc: R > 12.5 MΩ	N/A	Control circuit to ground. Apply 1250VDC and megger as follows: • Control circuit (DC) of switchgear. • Control circuit (AC) of switchgear.

Verification Plan

Verification Plan # **VP-PZ4, REV. 6**
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
AC Hi-pot Testing (Circuit breakers) CC#13 **Perform this CC on all breakers. Breakers should be removed from cell.**	100%	Note: This is a pass/fail test. No insulation breakdown after 1 minute	N/A	With the breakers in the closed position, apply a voltage of 2200Vac using an AC high-pot between each phase and ground for a period of 1 minute. With the breaker in the closed position, apply 2200VAC using an AC high-pot between phases With the breaker in the open position, apply 2200VAC and hi-pot between phase line-to-load.

References:

1. NLI 069-10327 set of design drawings for PZ4 switchgear.
2. Square-D "Low Voltage Switchgear Test Inspection Report" Form 87-0816R.
3. AmerGen technical specification SP-1101-11-250.

VP Approval Prepared: 7/7/09 date Reviewed: 7/7/09 date Approved: 7/7/09 date

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NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 1 Dimensions & Configuration CC#_____

CC#_____ CC#_____

Critical characteristic (CC#)	CC# 1	CC# 1	CC# 1
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	N/A	N/A
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Sections will line-up and bolt together with other sections of switchgear based on measured dimensions. ☑ Yes ☐ No Height = 93 " Width = 20 " Depth = 63 " Switchgear has 2 vertical sections, 4 cubicles high. ☑ Yes ☐ No Each vertical section has 2 cubicles for breakers and 2 cubicles for instrumentation. ☑ Yes ☐ No PASS CT 7/22/09	Instrument sections have the following: a) 1 - Electroswitch Series 20K b) 1 - ABB relay cat#411R0715 c) 6 -Square-D light ZB5AVBG1 d) Square-D XUD080V63, XO1200V02, XO80V02 ☐ Yes ☑ No * SEE DR-06910327-04 Layout of components/conduit entrance location and size are in accordance with NLI design drawings. ☑ Yes ☐ No Channel A breaker door is painted Red ☑ Yes ☐ No Channel B breaker door is painted Green ☑ Yes ☐ No PASS CT 7/22/09	Channel C breaker door is painted Yellow ☑ Yes ☐ No Channel D breaker door is painted Blue ☑ Yes ☐ No Control wiring is Rockbestos, SIS, 90°C wire. ☑ Yes ☐ No Each vertical section has a 15kVA CPT. ☑ Yes ☐ No (CAT # 15540F) Verify insulated ring tongue lugs are used on control wiring to terminal blocks. ☑ Yes ☐ No Ground bus is tin or silver plated. ☑ Yes ☐ No PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests: ☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 1 Dimensions & Configuration CC#_____

CC# 2 Wiring Check CC#_____

Critical characteristic (CC#)	CC# 1	CC# 1	CC# 2
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	N/A	N/A	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Circuit breakers have operation counter installed. ☑ Yes ☐ No Circuit breakers have contact indicators. ☑ Yes ☐ No A means of locking the circuit breakers in place while in the CONNECTED or DISCONNECTED positions is installed on the switchgear. ☑ Yes ☐ No All indicating lights are LED type. ☑ Yes ☐ No PASS CT 7/22/09	Safety-related wiring has a minimum of 6"separation from the other safety-related channels. ☑ Yes ☐ No Safety-related wiring is fed in thermosleve and is color coded to distinguish it from Non-safety related wiring. ☑ Yes ☐ No PASS CT 7/22/09	Switchgear sections are wired per the latest approved design drawings. ☑ Yes ☐ No Yellow line drawings for inclusion in test data package. ☑ Yes ☐ No QC / TDM 7/30/09 PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 3 Circuit Breaker Fit-up CC#_____

CC# 4a Proper Operation of Close Circuit CC#_____

Critical characteristic (CC#)	CC# 3	CC# 4a	CC# 4a
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Breaker fits into breaker compartment without any binding. ☑ Yes ☐ No Compartment door closes without excessive gap. ☑ Yes ☐ No Door mounted components do not interfere with removal of the breaker from the switchgear cell. ☑ Yes ☐ No PASS CT 7/22/09	Voltage applied = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C). The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C. ☑ Yes ☐ No Voltage applied = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 (channel A & C) in section 1. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A and C. 'Shunt Trip Signal Present' light extinguishes for A & C. ☑ Yes * ☐ No * SEE DR-06910327-05 CT 7/22/09	Voltage applied = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D). The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D. ☑ Yes ☐ No Voltage applied = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2 (channel B & D). The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. 'Shunt Trip Signal Present' light extinguishes for B & D. ☑ Yes * ☐ No * SEE DR-06910327-05 CT 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4a Proper Operation of Close Circuit CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 4a	CC# 4a	CC# 4a
Test Temperature	N/A	N/A	
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	
S/N: 25570-001-00001	Jumpers across points TB5-6 & TB5-7? ☑ Yes ☐ No Voltage applied = 90 VAC across points TB5-1 & TB5-2. ☑ Yes ☐ No Voltage applied = 90 VAC across points TB40-1 & TB40-4 and TB41-1 & TB41-4. ☑ Yes ☐ No A, B, C & D breakers charge? ☑ Yes ☐ No Jumper across points TBA3-3 & TBA3-4. Channel A breaker closes when jumper is applied? ☑ Yes ☐ No	Jumper across points TBC3-3 & TBC3-4. Channel C breaker closes when jumper is applied? ☑ Yes ☐ No Jumper across points TBB3-3 & TBB3-4. Channel B breaker closes when jumper is applied? ☑ Yes ☐ No Jumper across points TBD3-3 & TBD3-4. Channel D breaker closes when jumper is applied? ☑ Yes ☐ No PASS CT 7/22/09	

PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☑ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: D69-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 3 Circuit Breaker Fit-up CC# 4b Proper Operation of UV Circuit

CC# 4a Proper Operation of Close Circuit CC#_____ _____

Critical characteristic (CC#)	CC# 4b	CC# 4b	CC# 4b
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	All breaker test switches in 'NORMAL' ☑ Yes ☐ No Jumper across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. ☑ Yes ☐ No Jumper across points TB5-6 & TB5-7. ☑ Yes ☐ No Voltage applied = 90 VAC to points TB40-1 & TB40-4, TB40-2 & TB40-5, TB41-1 & TB41-4 and TB41-2 & TB41-5. PASS CT 7/22/09	Voltage applied = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2. The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C. ☑ Yes ☐ No Voltage applied = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for A & C. 'Shunt Trip Signal Present' extinguishes for A & C. ☑ Yes * ☐ No	Voltage applied = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2. The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D. ☑ Yes ☐ No Voltage applied = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for B & D. 'Shunt Trip Signal Present' extinguishes for B & D. ☑ Yes * ☐ No * SEE DR-0610327-05

SEE DR-0610327-05

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PI-4

CC# 4b Proper Operation of UV Circuit CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 4b	CC# 4b	CC# 4b
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Breaker test switch for Channel A in the 'UV Trip' position. 'Shunt Trip Power' light for Channel A is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel A. ☑ Yes ☐ No 90VAC power applied to points TBA1-1 & TBA1-2 is removed. Channel A breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel A. ☑ Yes ☐ No PASS CT 7/22/09	Breaker test switch for Channel A in the 'Normal' position. The 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel A. ☑ Yes ☐ No 90VAC power applied to points TBA1-1 & TBA1-2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A. ☑ Yes ☐ No PASS CT 7/22/09	Breaker test switch for Channel B in the 'UV Trip' position. 'Shunt Trip Power' light for Channel B is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel B. ☑ Yes ☐ No 90VAC power applied to points TBB1-1 & TBB1-2 is removed. Channel B breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel B. ☑ Yes ☐ No PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☐ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4b Proper Operation of UV Circuit CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 4b	CC# 4b	CC# 4b
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Breaker test switch for Channel B in the 'Normal' position. The 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel B. ☑ Yes ☐ No 90VAC power applied to points TBB1-1 & TBB1-2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B. ☑ Yes ☐ No Breaker test switch for Channel C in the 'UV Trip' position. 'Shunt Trip Power' light for Channel C is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel C. ☑ Yes ☐ No	90VAC power applied to points TBC1-1 & TBC1-2 is removed. Channel C breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel C. ☑ Yes ☐ No Breaker test switch for Channel C in the 'Normal' position. The 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel C. ☑ Yes ☐ No 90VAC power applied to points TBC1-1 & TBC1-2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel C. ☑ Yes ☐ No	Breaker test switch for Channel D in the 'UV Trip' position. 'Shunt Trip Power' light for Channel D is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel D. ☑ Yes ☐ No 90VAC power applied to points TBD1-1 & TBD1-2 is removed. Channel D breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel D. ☑ Yes ☐ No Breaker test switch for Channel D in the 'Normal' position. The 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel D. ☑ Yes ☐ No
	PASS CT 7/22/09	PASS CT 7/22/09	PASS 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 0609-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4b Proper Operation of UV Circuit CC#_____

CC# 4c Proper Operation of Shunt Trip Circuit CC#_____

Critical characteristic (CC#)	CC# 4b	CC# 4c	CC# 4c
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-02001	Target reset on the 27A, B, C & D relays? ☑ Yes ☐ No Jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4, TBD3-3 & TBD3-4 and TB5-6 & TB5-7 are removed. ☑ Yes ☐ No PASS CT 7/22/09	All breaker test switches in 'NORMAL' ☑ Yes ☐ No Jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. ☑ Yes ☐ No Jumper across points TB5-6 & TB5-7. ☑ Yes ☐ No Voltage applied = 90 VAC across points TB5-1 & TB5-2. Voltage applied = 90 VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5, TB41-1 & TB41-4 and TB41-2 & TB41-5. PASS CT 7/22/09	Voltage applied = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2. The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C. ☑ Yes ☐ No Applied voltage = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A and C. The 'Shunt Trip Signal Present' light extinguishes for A & C. ☑ Yes* ☐ No *SEE DR-0609103327-05 CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4c Proper Operation of Shunt Trip Circuit CC#_____

CC#_____ CC#_____

Critical characteristic (CC#)	CC# 4c	CC# 4c	CC# 4c
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-0000 (	Voltage applied = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2. The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D. ☑ Yes ☐ No Voltage applied = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. The 'Shunt Trip Signal Present' light extinguishes for B & D. ☑ Yes ☐ No	Breaker test switch for Channel A in the 'Shunt Trip' position. ☑ Yes ☐ No 'UV Trip Power' light for Channel A is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel A. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27A relay drops out. ☑ Yes ☐ No Breaker test switch for Channel A in the 'Normal' position and reset the target on the 27A relay. ☑ Yes ☐ No PASS 7/22/09	'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel A. 'Shunt Trip Signal Present' light is not illuminated for Channel A. ☑ Yes ☐ No Close the breaker for Channel A. Breaker A closes? ☑ Yes ☐ No Breaker test switch for Channel B in the 'Shunt Trip' position. ☑ Yes ☐ No PASS 7/22/09

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* SEE DR-06910327-05 CT 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4c Proper Operation of Shunt Trip Circuit CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 4c	CC# 4c	CC# 4c
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	'UV Trip Power' light for Channel B is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel B. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27B relay drops out. ☑ Yes ☐ No Breaker test switch for Channel B in the 'Normal' position and reset the target on the 27B relay. ☑ Yes ☐ No PASS CT 7/22/09	'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel B. 'Shunt Trip Signal Present' light is not illuminated for Channel B. ☑ Yes ☐ No Close the breaker for Channel B. Breaker B closes? ☑ Yes ☐ No Breaker test switch for Channel C in the 'Shunt Trip' position. ☑ Yes ☐ No PASS 7/22/09 CT	'UV Trip Power' light for Channel C is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel C. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27C relay drops out. ☑ Yes ☐ No Breaker test switch for Channel C in the 'Normal' position and reset the target on the 27C relay. ☑ Yes ☐ No 'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel C. 'Shunt Trip Signal Present' light is not illuminated for Channel C. ☑ Yes ☐ No PASS 7/22/09 CT

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4c Proper Operation of Shunt Trip Circuit CC#_____

CC# 4d Proper Operation of UV Timing CC#_____

Critical characteristic (CC#)	CC# 4c	CC# 4c	CC# 4d
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 26510-001-00001	Close the breaker for Channel C. Breaker C closes? ☑ Yes ☐ No Breaker test switch for Channel D in the 'Shunt Trip' position. ☑ Yes ☐ No 'UV Trip Power' light for Channel D is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel D. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27D relay drops out. ☑ Yes ☐ No PASS CT 7/22/09	Breaker test switch for Channel D in the 'Normal' position and reset the target on the 27D relay. ☑ Yes ☐ No 'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel D. 'Shunt Trip Signal Present' light is not illuminated for Channel D. ☑ Yes ☐ No Close the breaker for Channel D. Breaker D closes? ☑ Yes ☐ No PASS CT 7/22/09	All breaker test switches to the UV TRIP position. ☑ Yes ☐ No Jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. ☑ Yes ☐ No Jumper across points TB5-6 & TB5-7. ☑ Yes ☐ No Applied voltage = 90 VAC across points TB5-1 & TB5-2. Applied voltage = 90 VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. PASS 7/22/09 CT

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER _____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4d Proper Operation of UV Timing CC# _____

CC# 4e Proper Operation of 27 relay and shunt trip timing CC# _____

Critical characteristic (CC#)	CC# 4d	CC# 4d	CC# 4e
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25510-001-00001	Applied voltage = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C). Applied voltage = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1. Applied voltage = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D). Applied voltage = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. PASS CT 7/22/09	27A, B, C & D relays are reset? ☑ Yes ☐ No All breakers closed? ☑ Yes ☐ No 90VAC control power removed from points TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 and TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2. UV Trip Power & UV Device Energized lights are not illuminated. ☑ Yes ☐ No Time required for the breakers main poles to open after removal of the 90VAC. (A, B, C) Time = 7.0, 7.0, 7.1 ms (Breaker A) Time = 14.6, 14.2, 14.6 ms (Breaker B) Time = 12.9, 11.6, 12.8 ms (Breaker C) Time = 7.0, 6.2, 7.5 ms (Breaker D) PASS 7/22/09 CT	All breaker test switches in the NORMAL position. ☑ Yes ☐ No Fuse F3 & F7 and F13 & F17 removed? ☐ Yes ☑ No* SEE DR-06910327-06 Jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. ☑ Yes ☐ No Jumper across points TB5-6 & TB5-7. ☑ Yes ☐ No Applied voltage = 90 VAC across points TB5-1 & TB5-2. CT PASS 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4e Proper Operation of 27 relay and shunt trip timing CC#_____

CC#_____ CC#_____

Critical characteristic (CC#)	CC# 4e	CC# 4e	CC# 4e
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Applied voltage = 90 VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 and TB41-1 & TB41-4 and TB41-2 & TB41-5. Applied voltage = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2. Applied voltage = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2. Applied voltage = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2. Applied voltage = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2. PASS CT 7/22/09	Applied voltage = 90 VAC across secondary disconnect points D1 and D2 on all breakers. The 27A, B, C & D relays are reset? ☑ Yes ☐ No All breakers closed? ☑ Yes ☐ No 90VAC control power removed from points TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 and TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2. ☐ Yes ☒ No† † SEE DR-06910327-07 CT 7/22/09	Time required for the breakers main poles to open after removal of the 90VAC. (A, B, C) Time = 15.9, 16.0, 16.0 ms (Breaker A) Time = 16.0, 16.6, 16.7 ms (Breaker B) Time = 16.3, 15.1, 16.2 ms (Breaker C) Time = 14.8, 14.1, 15.5 ms (Breaker D) Fuse F3 & F7 and F13 & F17 replaced? ☐ Yes ☒ No* * SEE DR-06910327-06 CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4f Proper Operation of Shunt Trip Signal from TMR CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 4f	CC# 4f	CC# 4f
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	All breaker test switches in the NORMAL position. ☑ Yes ☐ No Jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. ☑ Yes ☐ No Jumper across points TB5-6 & TB5-7. ☑ Yes ☐ No Applied voltage = 90 VAC across points TB5-1 & TB5-2. Applied voltage = 90 VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 and TB41-1 & TB41-4 and TB41-2 & TB41-5.	Applied voltage = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2. Applied voltage = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2. Applied voltage = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2. Applied voltage = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2. The 27A, B, C & D relays are reset? ☑ Yes ☐ No All breakers closed? ☑ Yes ☐ No	Jumper across points TBA2-1 & TBA2-2. ☑ Yes ☐ No Channel A breaker trips and the 'Shunt Trip Signal Present' light is illuminated. The KB-A relay is picked-up and the KB-B, KB-C and KB-D relays are not picked-up. ☑ Yes ☐ No Jumper across points TBC2-1 & TBC2-2. ☑ Yes ☐ No Channel C breaker trips and the 'Shunt Trip Signal Present' light is illuminated. The KB-C relay is picked-up and the KB-A, KB-B and KB-D relays are not picked-up. ☑ Yes ☐ No
	PASS CT 7/22/09	PASS 7/22/09 CT	PASS 7/22/09 CT

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4f Proper Operation of Shunt Trip Signal from TMR CC#_____

CC# 5 Trip Free Operation CC#_____

Critical characteristic (CC#)	**CC# 4f**	**CC# 4f**	**CC# 5**
Test Temperature			
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)			
S/N: 25570-001-00001	Jumper across points TBB2-1 & TBB2-2. ☑ Yes ☐ No Channel B breaker trips and the 'Shunt Trip Signal Present' light is illuminated. The KB-B relay is picked-up and the KB-A, KB-C and KB-D relays are not picked-up. ☑ Yes ☐ No Jumper across points TBD2-1 & TBD2-2. ☑ Yes ☐ No	Channel D breaker trips and the 'Shunt Trip Signal Present' light is illuminated. The KB-D relay is picked-up and the KB-A, KB-B and KB-C relays are not picked-up. ☑ Yes ☐ No	Applied voltage = 125 VDC and 120 VAC control power to the switchgear. All breakers charged? ☑ Yes ☐ No Depress the push to trip button and hold-in on Channel A breaker. Depress the push to close button on Channel A breaker. Breaker A does not close. ☑ True ☐ False Breaker B does not close? ☑ True ☐ False Breaker C does not close? ☑ True ☐ False Breaker D does not close? ☑ True ☐ False
	PASS CT 7/22/09	PASS CT 7/22/09	PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: ~~PE~~ CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 6 Anti-Pump Operation CC#_____

CC# 7 Breaker Interlocks CC#_____

Critical characteristic (CC#)	CC# 6	CC# 6	CC# 7
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 75570-001-00001	Applied voltage = 125 VDC and 120 VAC control power to the switchgear. All breakers charged? ☑ Yes ☐ No Applied and maintained a close signal on the Channel A breaker and breaker A closed ☑ Yes ☐ No Applied a momentary trip signal to the Channel A breaker while maintaining the close signal and breaker tripped when trip signal was applied and did not re-close. ☑ Yes ☐ No	Released the close signal and then re-apply the close signal and the breaker closed when close signal was reapplied. ☑ Yes ☐ No Breaker B operates the same? ☑ True ☐ False Breaker C operates the same? ☑ True ☐ False Breaker D operates the same? ☑ True ☐ False	Breaker for Channel A racked to the TEST position and closed. Attempted to rack the breaker to the CONNECT position. Breaker racking tool cannot be inserted into the breaker unless TRIP button is pushed. ☑ True ☐ False Breaker B operates the same? ☑ True ☐ False Breaker C operates the same? ☑ True ☐ False Breaker D operates the same? ☑ True ☐ False
	PASS CT 7/22/09	PASS CT 7/22/09	PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 8 Breaker UV Trip Voltage CC#_____

CC# 9 Remote close test CC#_____

Critical characteristic (CC#)	CC# 8	CC# 9	CC# 9
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Applied voltage = 125 VDC and 120 VAC control power to the switchgear. Breaker A charged and closed? ☑ Yes ☐ No Breaker A trips at 49.4 VAC Breaker B trips at 50.6 VAC Breaker C trips at 49.5 VAC Breaker D trips at 49.3 VAC	All breaker test switches in the NORMAL position. ☑ Yes ☐ No Applied voltage = 90 VAC across points TB5-1 & TB5-2. Applied voltage = 90 VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5, TB41-1 & TB41-4 and TB41-2 & TB41-5. Applied voltage = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2. Applied voltage = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2. Applied voltage = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2.	Applied voltage = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2. The 27A, B, C & D relays are reset? ☑ Yes ☐ No Attempt to close all breakers. No breakers closed? ☑ True ☐ False Jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. ☑ Yes ☐ No Attempt to close all breakers electrically. No breakers closed? ☑ True ☐ False
	PASS CT 7/22/09	PASS CT 7/22/09	PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 9 Remote close test CC#_____

CC# 10 Proper Operation of Trip Confirm Circuit CC#_____

Critical characteristic (CC#)	CC# 9	CC# 10	CC# 10
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 26570-001-00001	Jumper across points TB5-6 & TB5-7. ☑ Yes ☐ No Close all breakers electrically. All breakers closed? ☑ True ☐ False	All breaker test switches in the NORMAL position. ☑ Yes ☐ No Applied voltage = 90 VAC across points TB5-1 & TB5-2 and TB1-1 & TB1-2. Applied voltage = 90 VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5, TB41-1 & TB41-4 and TB41-2 & TB41-5. Applied voltage = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2. Applied voltage = 90 VAC to TBA1-1& TBA1-2 and TBC1-1 & TBC1-2 Applied voltage = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2.	Applied voltage = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2. The 27A, B, C & D relays are reset? ☑ Yes ☐ No Jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. ☑ Yes ☐ No Jumper across points TB5-6 & TB5-7. ☑ Yes ☐ No Jumper across points TB1-3 & TB1-4 and TB1-3 & TB1-5. ☑ Yes ☐ No
	PASS 7/22/09 CT	PASS CT 7/22/09	PASS CT 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 10 Proper Operation of Trip Confirm Circuit CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 10	CC# 10	CC# 10
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Breaker A closed? ☑ Yes ☐ No 'Train A Trip Confirm Status' light is not illuminated. ☑ True ☐ False Breaker A open? ☑ Yes ☐ No Breaker C closed? ☑ Yes ☐ No 'Train A Trip Confirm Status' light is not illuminated. ☑ True ☐ False Breaker A & C closed? ☑ Yes ☐ No	'Train A Trip Confirm Status' light is illuminated. ☑ True ☐ False Breaker B closed? ☑ Yes ☐ No 'Train A Trip Confirm Status' light is not illuminated. ☑ True ☐ False Breaker B open? ☑ Yes ☐ No Breaker D closed? ☑ Yes ☐ No 'Train A Trip Confirm Status' light is not illuminated. ☑ True ☐ False	Breaker B & D closed? ☑ Yes ☐ No 'Train A Trip Confirm Status' light is illuminated. ☑ True ☐ False Jumper across points TB1-3 & TB1-4 and TB1-3 & TB1-5. ☑ Yes ☐ No Jumper across points TB5-3 & TB5-4 and TB5-3 & TB5-5. ☑ Yes ☐ No Breaker A closed? ☑ Yes ☐ No 'Train B Trip Confirm Status' light is not illuminated. ☑ True ☐ False
	PASS CT 7/22/09	PASS 7/22/09 CT	PASS 7/22/09 CT

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 10 Proper Operation of Trip Confirm Circuit CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 10	CC# 10	CC# 10
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Breaker A open? ☑ Yes ☐ No Breaker C closed? ☑ Yes ☐ No 'Train B Trip Confirm Status' light is not illuminated. ☑ True ☐ False Breaker A & C closed? ☑ Yes ☐ No 'Train B Trip Confirm Status' light is illuminated. ☑ True ☐ False Breaker B closed? ☑ Yes ☐ No	'Train B Trip Confirm Status' light is not illuminated. ☑ True ☐ False Breaker B open? Breaker D Closed? ☑ Yes ☐ No 'Train B Trip Confirm Status' light is not illuminated. ☑ True ☐ False Breaker B & D closed? ☑ Yes ☐ No 'Train B Trip Confirm Status' light is illuminated. ☑ True ☐ False Jumper across points TB1-3 & TB1-4 and TB1-3 & TB1-5. ☑ Yes ☐ No	All breakers closed? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False Breakers A & B open? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are not illuminated. ☑ True ☐ False Breakers A & B closed? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False

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PASS CT 7/22/09 PASS CT 7/22/09 PASS 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 10 Proper Operation of Trip Confirm Circuit CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 10	CC# 10	CC# 10
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Breakers A & D open? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are not illuminated. ☑ True ☐ False Breakers A & D closed? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False	Breakers C & B open? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are not illuminated. ☑ True ☐ False Breakers C & B closed? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False	Breakers C & D open? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are not illuminated. ☑ True ☐ False Breakers C & D closed? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False
	PASS CT 7/22/09	PASS CT 7/22/09	PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☐ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 10 Proper Operation of Trip Confirm Circuit CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 10	CC# 10	CC# 10
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 2557o-001-00001	Jumper removed from TB1-3 & TB1-4 and TB5-3 & TB5-4. ☑ Yes ☐ No Breaker B Open? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are not illuminated. ☑ True ☐ False Jumper across TB1-3 & TB1-4 and TB5-3 & TB5-4. ☑ Yes ☐ No Breaker B closed? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False	Jumper removed from TB1-3 & TB1-4 and TB5-3 & TB5-4. ☑ Yes ☐ No Breaker D open? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are not illuminated. ☑ True ☐ False Jumper across TB1-3 & TB1-4 and TB5-3 & TB5-4. ☑ Yes ☐ No Breaker D closed? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False	Jumper removed from TB1-3 & TB1-5 and TB5-3 & TB5-5. ☑ Yes ☐ No Breaker A open? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are not illuminated. ☑ True ☐ False Jumper across TB1-3 & TB1-5 and TB5-3 & TB5-5. ☑ Yes ☐ No Breaker A closed? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False
	PASS CT 7/22/09	PASS CT 7/22/09	PASS CT 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 009-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 10 Proper Operation of Trip Confirm Circuit CC#_____ _____

CC#_____ _____ CC#_____ _____

Critical characteristic (CC#)	CC# 10	CC# 10	CC# 10
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Jumper removed from TB1-3 & TB1-5 and TB5-3 & TB5-5. ☑Yes ☐No Breaker C open? ☑Yes ☐No 'Train A & B Trip Confirm Status' lights are not illuminated. ☑True ☐False Jumper across TB1-3 & TB1-5 and TB5-3 & TB5-5. ☑Yes ☐No Breaker C closed? ☑Yes ☐No 'Train A & B Trip Confirm Status' lights are illuminated. ☑True ☐False	Jumper removed from TB1-3 & TB1-4, TB5-3 & TB5-4, TB1-3 & TB1-5 and TB5-3 & TB5-5. ☑Yes ☐No 'Train A & B Trip Confirm Status' lights are not illuminated. ☑True ☐False Jumper across TB1-3 & TB1-4, TB5-3 & TB5-4, TB1-3 & TB1-5 and TB5-3 & TB5-5. ☑Yes ☐No 'Train A & B Trip Confirm Status' lights are illuminated. ☑True ☐False Breaker A open? ☑Yes ☐No	'Train A & B Trip Confirm Status' lights are illuminated. ☑True ☐False Breaker A closed? ☑Yes ☐No Breaker B open? ☑Yes ☐No 'Train A & B Trip Confirm Status' lights are illuminated. ☑True ☐False Breaker B closed? ☑Yes ☐No PASS CT 7/22/09
	PASS CT 7/22/09	PASS CT 7/22/09	

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 10 Proper Operation of Trip Confirm Circuit CC# 12 Hi-Pot Testing (Switchgear Assembly)

CC# 11 CPT Operation CC#_____ _____

Critical characteristic (CC#)	CC# 10	CC# 11	CC# 12
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Breaker C open? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False Breaker C closed? ☑ Yes ☐ No Breaker D open? ☑ Yes ☐ No 'Train A & B Trip Confirm Status' lights are illuminated. ☑ True ☐ False	Applied voltage to primary of CPT = 480 VAC in section 1. Applied voltage to primary of CPT = 480 VAC in section 2. Secondary voltage = 119.4 VAC at points TBA3-1 & TBA3-2. Secondary voltage = 119.4 VAC at points TBC3-1 & TBC3-2. Secondary voltage = 119.4 VAC at points TB10-1 & TB10-2. Secondary voltage = 119.5 VAC at points TBB3-1 & TBB3-2. Secondary voltage = 119.5 VAC at points TBD3-1 & TBD3-2. Secondary voltage = 119.5 VAC at points TB11-1 & TB11-2.	Verify that AC High Pot. testing was performed in accordance with Square-D procedure Form 87-0816R for "Low Voltage Switchgear." ☑ Yes ☐ No
	PASS CT 7/22/09	PASS CT 7/22/09	PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI
NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 12a Megger Testing (Switchgear control wiring) CC#_____

CC# 13 AC Hi-Pot Testing (Circuit Breakers) CC#_____

Critical characteristic (CC#)	CC# 12a	CC# 13	CC#_____
Test Temperature	N/A	N/A	N/A
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	N/A	N/A	N/A
S/N: 25570-001-00001	Voltage Applied = 1250 VDC Control circuit (DC) of switchgear. R ≥ 1840 MΩ Control circuit (AC) of switchgear. R ≥ 1840 MΩ PASS CT 7/22/09	Voltage Applied = 2200 VAC **Breaker Closed** Phase to Ground Pass/Fail: PASS Phase to Phase Pass/Fail: PASS **Breaker Open** ΦA Line to ΦA Load Pass/Fail: PASS ΦB Line to ΦB Load Pass/Fail: PASS ΦC Line to ΦC Load Pass/Fail: PASS PASS 7/22/09 CT	

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

NLI NUCLEAR LOGISTICS INC

TEST DATA SHEET

Check off appropriate tests:
☐ PRE-SEISMIC ☐ POST-SEISMIC ☒ VERIFICATION ☐ OTHER_____

TEST DATA FOR: VP-PZ4 Rev: 6 Job #: 069-10327 P.E: CT Cat ID#: N/A

Item Description: , 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

Provide Summary of Test Results

Check appropriate boxes:
☐ All Items Passed. Discrepancy Report(s): If yes, identify below: ☒ Yes ☐ No ☐ N/A
List S/N or ID passed below. Qty passed: Φ
S/n: 25570-001-00001

S/Ns or ID#	CC#	DR#			
VP-PZ4, Rev. 6	1	06910327-04	☒ Acceptable ☐ Not Acceptable	Initials/Date by PE:	CT 7/22/09
VP-PZ4, Rev. 6	4g, 4b, 4c	06910327-05	☒ Acceptable ☐ Not Acceptable	Initials/Date by PE:	CT 7/22/09
VP-PZ4, Rev. 6	4e	06910327-06	☒ Acceptable ☐ Not Acceptable	Initials/Date by PE:	CT 7/22/09
VP-PZ4, Rev. 6	4e	06910327-07	☒ Acceptable ☐ Not Acceptable	Initials/Date by PE:	CT 7/22/09
			☐ Acceptable ☐ Not Acceptable	Initials/Date by PE:	

Other (where applicable)

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Record All M&TE Used:

NLI MTE#	Description	Cal. Due Date	NLI MTE#	Description	Cal. Due Date
HIPO-NUK	AC HI-POT	2/5/10			
1176	STOPWATCH	12/1/9			
MEG-NUK	MEGGER	6/28/10			
256	DMM	5/7/10			
526	DMM	2/27/10			

☑ Update M&TE log on computer CT 7/22/09
Initials & Date

NOTES:

Performed By: _____ Date: 7/22/09

Verified by: _____ Date: 7/28/09

Approved by: _____ Date: 8/9/9

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

SQUARE D
Schneider Electric

CERTIFICATE OF FACTORY TESTS
Low Voltage Switchgear

Purchased By: N.L.I. / TMI **P.O. Number:** N.L.I.# 0025570

Job Name: Three Mile Island Reactor Trip Switchgear **Factory Order Number:** 24769954-003

Job Location: Three Mile Island Nuclear Generating Station, Pennsylvania

Unit Description: 2 Section – 4 Non-Auto Switches – 600V Switchgear

Designation: Reactor Trip Switchgear

Description of Tests	Tested and Accepted By	Date
1. Inspection of Switchgear	Gary Ragle	07/23/09
2. Factory/Production tests as required by applicable NEMA and UL standards		
A. Dielectric Test	Gary Ragle	07/23/09
B. Mechanical Operation	Gary Ragle	07/23/09
C. Electrical Operation/ Control Wiring Tests	Gary Ragle	07/23/09
D. Ground Fault Protection	N/A	

* I hereby certify that the above tests have been performed on the equipment noted on the above factory order (F.O.) number, and that this equipment successfully met the acceptance criteria of these tests.

Gary Ragle
Signature

July 23, 2009
Date

Sr. Mechanical Engineer
Title

Respectfully submitted,

SQUARE D COMPANY/
SCHNEIDER ELECTRIC NORTH AMERICA
WEST CHESTER, OH

SQUARE D COMPANY
Schneider Electric

Power Zone 4
Test Inspection Report

Factory Order: 24769954 Line Item: 003 Date: 07/23/2009
Total Sections 2 Total Cells/Prepared/Unprepared 4

Instructions
General Instructions:
• For detailed instructions, see procedure for inspection of switchgear (**DCP 4.9-300** and **4.9-300-B**).
• DCP are located in the local **Document Control directory**
• Mark every item on this form.
• Use job drawings and documents, as well as design engineering documents, bills and specifications as inspection guides. Place a red check mark on each symbol or description on the drawing or document as each item is inspected.
• If additional inspection procedures are required, attach a copy to this inspection report.

	Prerequisites	Approved (Y,N or N/A)
1.	**In-Process Inspection:**	
	Assembly in-process inspection sheets have been completed.	N/A
	Assembly point-to-point wiring check sheets have been completed.	Y

	Enclosure	
2.	**General:**	
	Number and location of shipping splits agree with record drawings.	Y
	Provision for rolling, jacking, lifting enclosure provided per Bulletin 80298-002 series and agree with record drawings.	Y
	Enclosure type, overall dimensions, layout agrees with record drawings.	Y
	Conduit entrance location/size agrees with record drawings.	Y
	Seismic requirements comply with site specific requirements.	Qualified
	Record drawing general notes have been verified as complete.	Y
3.	**Paint:**	
	General appearance (complete coverage, no scratches, no dents, orange peal in visible areas).	Y
	Paint color agrees with record drawings.	Y
4.	**Traveling Lifter:**	
	Device and crank function properly.	N/A
	Traveling lifter rails included.	N/A
5.	**Cell/Rear Doors:**	
	Fit and open/close smoothly. Check doors for squareness.	Y
	Door latches work properly. Latches with locks are located on correct compartment(s).	Y
	Rear doors fit and operate smoothly. Latches with locks are located on correct section(s). Padlock provisions are located on the correct section.	N/A
6.	**Labels:**	
	Switchgear rating nameplate data (enclosure type, electrical rating information) agrees with drawing.	Y
	Special markings (customer nameplates, mimic bus, etc.) attached and located per order records.	Y
	UL Standard or Service Entrance label attached and information is verified when inspection is complete. All features are in accordance with latest UL procedures and standards.	N/A
	General DANGER label and other DANGER, CAUTION, and WARNING labels attached per 80298-032-R1.	Y
	UL labels are affixed only to applicable switchgear sections.	N/A
	Instruction labels are affixed per 80298-009-R1.	Y
	Handling labels affixed per 80298-009-R1.	Y
	Multiple Source Disconnect label affixed per 80298-009-R1.	N/A
	Hazard labels attached to all removable panels that permit access to energized parts per 80298-009-R1.	Y
	All labels installed straight.	Y

		Approved (Y,N or N/A)
7.	**Barriers:**	
	UL Service Entrance barriers installed per record drawings.	N/A
	Rodent barriers installed per record drawings.	N/A
	Other internal barriers installed per record drawings.	N/A
	IWR Barriers, if necessary, are installed and painted black per 80287-DS-001	N/A
8.	**Circuit Breaker Cells:**	
	Quantity and location of circuit breaker cells agrees with record drawings.	Y
	6 disconnect rule: Certain customer jobs will utilize the six disconnect rule described in NEC. Record drawings shall show blank cells for any breaker cells over 6.	N/A
9.	**Prepared Space:**	
	Quantity and location of prepared circuit breaker cells agrees with record drawings.	N/A
	Plate is installed in the breaker escutcheon cut-out of the breaker cell door with Hazard label.	N/A
10.	**Gasketing:**	
	Quantity and location correct per enclosure type and standard records.	N/A
	Securely glued or otherwise attached.	N/A
11.	**Blank/Instrument Cells:**	
	Quantity and location agrees with record drawings.	Y
12.	**Circuit Monitors, Metering, Other Components:**	
	Circuit monitors located per record drawings.	N/A
	Other devices (transformers, pilot lights, etc) location agrees with record drawings.	Y
	All other metering located per record drawings.	Y
	Devices are mounted such that proper electrical spacing are maintained per Table 1 or 2 below.	Y

Inspected By: Gary Ragle – Sr. Mechanical Engineer Date: 07/10/2009

Table 1.
US Minimum Acceptable Spacing

Voltage	Live Parts of Opposite Polarity	Live Parts of Opposite Polarity	Live Parts to Ground
	Through-Air (in.)	**Over Surface (in.)**	**(in.)**
≤ 125	½	¾	½
126 - 250	¾	1 ¼	½
251 - 600	1	2	1*

*A through-air spacing of not less than ½ inch is acceptable:

1. at a circuit breaker or a switch (excluding a snap switch).
2. uninsulated live parts of a meter-mounting base and grounded dead metal.
3. between grounded dead metal and the neutral of a 277/480 volt, 3-phase, 4-wire switchboard.

Table 2.
Canadian Minimum Acceptable Spacing

Voltage	Live Parts of Opposite Polarity		Live Parts and grounded dead metal	
	Through-Air (in.)	**Over Surface (in.)**	**Through-Air (in.)**	**Over Surface (in.)**
0-120	1/2	¾	1/2	3/4
121 - 240	3/4	1 ¼	¾	1
241 - 480	7/8	1 ¾	7/8	1-3/8
481 - 600	1	2	1	1-1/2

Where a neutral is involved, the spacing between the neutral and other current-carrying parts may be based on the lower voltage that normally occurs between them.
The spacing from neutral to grounded metal parts is to be the same as those between the other conductors and grounded metal parts.

	Mechanical	Approved (Y,N or N/A)
13.	**Hardware:**	
	The following hardware is included and located:	
	Bus splices Qty: _____ Location: _____	N/A
	Bolts Qty: _____ Location: _____	N/A
	Frame connection bolts Qty: 15 Location: Section 1	Y
14.	**Unit Substation Transformer Connections:**	
	Connection location and phasing agree with record drawings and Unit Sub Group Coordination Sheet.	N/A
	Connections are labeled.	N/A
	Frame bolt holes are sized and located according to record drawings.	N/A
	Adapter bus and/or flexible braided connectors included (80283-DS-001).	N/A
15.	**Bus:**	
	Phase sequence, material, plating type, ampacity, configuration, location, and bracing agree with record drawings, Data Sheet and notes or as marked.	Y
	Bus spacing and clearances (Table 1 or 2) shall agree with the standards.	Y
	Lug sizing and position agree with record drawings.	Y
	Bus configuration agrees with record drawings.	Y
	Provision for bus extension and future connections (80282-DS-001) agree with record drawings.	N/A
	Insulated bus complies with 80282-DS-005.	N/A
	Busduct connection location and phasing agree with record drawings.	See pg. 8
	Bus supports are correct for AIC rating and/or per Eng Bulletin SD250.001A.01 (14 March 02)	Y
	Neutral bus connected to ground bus only in Service Entrance section only.	N/A
	Electrical joints have been torqued (60-70 ft-lbs.) and marked. Conical washers on both sides of joint. Contact area per engineering records or based on 200A per square inch if a special bussing joint.	Y
	If bus passes through a metal partition, all phase and neutral bus of the same circuit are routed through same opening (UL891 13.9.6).	N/A
	Ground bus is present and location agrees with record drawings.	Y
	If UL Service Entrance is required neutral disconnect link, main bonding jumper, grounding electrode are installed per record drawings.	N/A
	Cable bending space per UL 1558.	Y
	Bus plating is clean and is not flaking, loose, rough, or wrinkled (80065-DS-004, 005 or 008).	Y
16.	**Circuit Breakers:**	
	Rack-out/in freely.	Y
	Frame size, quantity, trip unit, and accessories agree with record drawings.	Y
	Breaker Cell Shutter Assemblies operate correctly.	Y
	General appearance is undamaged and clean.	Y
17.	**Key Interlocks:**	
	Sequence tested correctly.	N/A
	Keys located for shipping: Section _____ Cell _____	N/A
18.	**Sensors**	
	Current transformers and voltage transformers are located and oriented correctly.	N/A
	Current transformers and voltage transformers have correct ratios.	N/A
	Ground fault current transformers have correct ratios and are located and oriented correctly.	N/A

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	Electrical	Approved (Y, N or N/A)
19.	**High Potential (Dielectric) Test** : Before performing this test, disconnect all coils, transformers, pilot devices, PLC's, fuses, meters, circuit monitors, and trip units.	
	Power circuit bus insulation tested at 2500 Vac for 1 minute. Test each phase to phase, phase to neutral, and phase to ground. (ANSI C37.20,C37.51)	Y
	Neutral to ground circuit bus insulation tested at 1800 Vac for 1 minute. (ANSI C37.20,C37.51.7.4)	N/A
	Control wiring continuity test correctness verified by either: 1. Actual electrical operation of component 2. Individual circuit continuity checks (ANSI C37.51.7.4)	Y
	Polarity test: ensure meters, instrument transformers and relays are connected with the correct polarity.	Y
20.	Fuses inspected for location, rating, continuity, and labeled per UL1558.	Y
21.	Device function numbers agree with record drawings and actual device function.	Y
22.	**Metering:**	
	Door mounted electrical components over 42V to ground to be properly guarded.	N/A
	Ammeters and ammeter selector switches function properly and labeled.	N/A
	Voltmeter and voltmeter switches function properly and labeled.	N/A
	Circuit monitors and other meters function properly and labeled.	N/A
23.	**Control Circuitry:**	
	Control circuit wiring and shielded wiring are bundled separately and routed separately.	N/A
	Wire is not routed over hinged mounting areas or venting/arcing areas of the circuit breakers.	Y
	Wire strip length is correct (no exposed conductors at lug).	Y
	Crimp lugs are sized correctly for wire gauge.	Y
	Wire size agrees with standards.	Y
	Spacing agrees with UL 1558.	Y
	All control transformers have correct voltage, current, VA rating, and ratio.	Y
	Sufficient slack is present for all wiring routed on doors to permit easy door operation.	Y
	Breaker communications verified operational. Shield is grounded at one end only. If equipment is Transparent Ready, determine TRE level from order documentation (TRE-1,2,3). Retrieve TRE plant procedure document from intranet and complete appropriate TRE checklist. Attach completed checklist to test record.	N/A
	Control circuit or Automatic Transfer Scheme operation functioning properly (C37.20.1, C37.51.7.4).	N/A
	All systems requiring wire labels are covered in data sheet 80301-DS-001. Certain customers require wire labels and this will be stated on the record drawings.	Y
24.	**Ground Fault:**	
	Ground fault wiring agrees with record drawings.	N/A
	Tests shall be conducted for switchgear incorporating MDGF ground fault protection equipment to determine the system functions. (UL1558, ANSI C37.20.1, UL file E201954) Signed and dated record of the test must be made on the label inside the section door.	N/A
25.	Strip heater circuitry functioning properly (Data Sheet 51210).	N/A
26.	**Power Circuit Phasing:**	
	Verify electrical continuity and phasing of power circuits to insure that there is no phase reversal, unless specified. Power wiring continuity must exist as specified on engineering records.	Y
27.	**Circuit Breakers:**	
	Circuit breaker electrical options (charging motor, aux contacts, ring tongue lugs, etc) work properly.	Y
	Circuit breaker secondary contacts position and wiring agrees with record drawings.	Y
	Mechanical operation of the breaker and accessories (shunt trip, aux contacts, alarm contacts, indicator lights, charging/discharging) are correct.	Y
	Ir trip setting set to 1, all others set to minimum or to values specified by coordination study/customer specification.	N/A
	Circuit breakers are tagged per compartment location when required by customer specifications or shipped separately.	N/A

		Approved (Y, N or N/A)
28.	**Circuit Breaker Interlock Verification (Complete for all breakers installed in the switchgear):**	
	Place the breaker in the "Open-Discharged" position. Verify the breaker cannot be charged .	Y
	Place the breaker on extended cradle rails. Push the breaker into the "Disconnected Position".	Y
	Charge the breaker. Push the "Close" button. Verify the breaker closes.	Y
	Press the "Push To Open" button. Verify the breaker opens.	Y
	Insert the crank. Rack-in the breaker to the "Test" position.	Y
	In "Test Position, withdraw the crank. Verify the "Push To Open" button returns to the normal position.	Y
	Charge, then Close and Open the breaker and charge again.	Y
	Re-insert the crank, push in the "Release" button and rack-in the breaker to the "Connected" position.	Y
	During the travel to the Connected position, verify the breaker cannot be closed.	Y
	Crank to "Connected" position. Withdraw the crank. Verify the "Push To Open" button returns to the normal position. Close the breaker by pressing the "Push To Close" button.	Y
	Verify the crank cannot be inserted without depressing the "Push To Open" button breaker must open. Insert the crank; press the "Release" button. Charge breaker then crank the breaker to the "Test" Position.	Y
	During the travel to the "Test" position, verify the breaker cannot be closed.	Y
	In the "Test" position, withdraw the crank. Verify the "Push To Open" button returns to the normal position. Charge, Close and then Open the breaker and charge again.	Y
	Insert the crank, press the "Release" button and crank out the breaker to the "Disconnected" position.	Y
	In the "Disconnected "position, remove the crank and verify that: a) The "Push To Open" Button returns to normal position. b) The latch on the right of the cradle trim cover moves allowing the extraction of the right rail.	Y
	Press the "Push To Close" button. Verify the breaker closes. Charge it again.	Y
	Extract the breaker from the cradle. Verify the breaker opens and discharges.	Y
		Y

Inspected By: Gary Ragle – Sr. Mechanical Engineer Date: 07/23/2009

		Approved (Y,N or N/A)
	Before Shipping	
31.	All doors are closed with latches engaged, and lay flat.	Y
32.	Manuals and latest record drawings are in Customer Documentation Package and located in switchgear. Location: Section Cell .	N/A
33.	For orders with MDGF, Instruction Bulletin 80043-703-01 is included in the Customer Documentation Package.	N/A
34.	Record on page 8 all UL label serial numbers applied to this equipment.	N/A
35.	All spare parts and all parts that ship with but are not installed in the gear are present and ready to be sent to shipping.	Y
36.	**Structure**	
	All fasteners used to assemble the structure are secure.	Y
	All cover panels fit and are properly installed. Special covers to meet the requirements of access plates described in ANSI C37.20.1.6.5.	Y
	Cleanliness, clear of debris: All sections should be free of dirt, moisture, lubricants, packaging etc. before packout. Loose metal parts such as hardware and tools should never be left in a section.	Y
37.	Record on page 7 the Catalog Number and Serial Numbers of all circuit breakers and cradles to be installed in this equipment.	Y
38.	**Mechanical**	
	Verify the main bonding jumper (neutral to ground) is disconnected if the equipment is labeled as "Suitable for Use as Service Equipment".	N/A
39.	**Electrical**	
	All shorting terminal blocks have shorting pins installed.	N/A
40.	Attach copies the record drawings used to inspect this order. Attach copy of any ship short items approved by the customer.	N/A
41.	Each section shall have handling labels, per label placement drawing 80298-009-R1, affixed that gives the customer information on proper movement of the structure.	Y

Inspected By: Gary Ragle – Sr. Mechanical Engineer Date: 07/23/2009

	Packaging	
42.	**Correct size and placement of skids,wrapped**	
	When complete and covers are installed, the section must be properly packaged for shipment. Care must be used to insure multiple sections in a truck will not damage each other.	Y
43.	**Circuit Breakers**	
	All 6-pole breakers are securely mounted in their shipping crates. All 3 pole breakers are fully racked-in the cells. All breaker-charging springs are discharged, and breaker is open.	N/A

Inspected By: Gary Ragle – Sr. Mechanical Engineer Date: 07/23/2009

Circuit Breaker Model and Serial Numbers

Cell	Model Number	Serial Number	Catalog Number
1B	NT08NA	064091496104	TA2AARNNX9AFFFXCJAN
1D	NT08NA	064091496101	TA2AARNNX9AFFFXCJAN
2B	NT08NA	064091496102	TA2AARNNX9AFFFXCJAN
2D	NT08NA	064091496103	TA2AARNNX9AFFFXCJAN

Circuit Breaker Cradle Model and Serial Numbers

Cell	Model Number	Serial Number	Catalog Number
1B	NT08	064091084204	CTAAVV3BXAXXXXEFXXCNW
1D	NT08	064091084201	CTAAVV3BXAXXXXEFXXCNW
2B	NT08	064091084202	CTAAVV3BXAXXXXEFXXCNW
2D	NT08	064091084203	CTAAVV3BXAXXXXEFXXCNW

UL Labels Applied to this Factory Order Line Item

Section	UL Label Number	Section	UL Label Number	Section	UL Label Number	Section	UL Label Number

Ship Less Items Noted Below

	Description	NCR Number ❶
1.	Bus duct final design to be completed at a later date pending site measurements.	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		

Note ❶ - A NCR may be substituted with written approval from the Field Office. Attach Field Office approval to this Report.

Recorded By: Gary Ragle – Sr. Mechanical Engineer Date: _____

Verify the shutters operate without sticking or binding			
Masterpact Breaker Outside			
Record Breaker S/N: 06409149610 4	QC 8-4-09		
Verify the arc chutes mounting nut retainers are not missing and are properly installed.	QC TDM 6/11/09		
Verify the top of breaker is clean.	QC TDM 6/11/09		
Verify there are no cracks or chips in the breaker polyester case: Top, Sides, Back, Front, and Bottom.	QC TDM 6/11/09		
Verify the back insulator fins are not cracked.	QC TDM 6/11/09		
Verify the secondary block connects in test position	QC 8-4-09		
Verify the secondary block housing "Locks-out" properly in the disconnected position.	QC TDM 6/11/09		
Verify the secondary block housing springs are silver in color.	QC TDM 6/11/09		
Verify the secondary block housing springs are properly installed.	QC TDM 6/11/09		
Verify the discharge interlock is properly installed – the return spring is installed.	QC TDM 6/11/09		
Verify the rejection hardware is configured per the design drawings and properly tightened.	N/A		
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks. Verify there are no cracks or chips.	QC TDM 6/11/09		
Record grease color Red. Grease must be red (Mobilith) or white (Kluber) Isoflex.	QC TDM 6/11/09		
Verify the electrical terminations are not loose.	QC TDM 6/11/09		
Verify all visible springs in the mechanism are connected and not loose.	QC TDM 6/11/09		
Verify all accessible fasteners are hand tight.	QC TDM 6/11/09		
	Sat	**Unsat**	**Rework Satisfactory**
Remove trip unit for mechanism assembly inspection. Verify there are no cracked washers.	QC 6/12/09		
Apply NLI seal on trip unit after inspection.	QC TDM 6/12/09		
Verify the cover is replaced and the mounting screws are snug.	QC TDM 6/12/09		
Verify the breaker cover mounting holes are not stripped.	QC TDM 6/12/09		
Verify the Open/Close pushbutton covers are in place after inspection complete.	QC TDM 6/12/09		

Verify all cover plates are installed -Verify torque/tightness of fasteners.	QC TDM 6/2/07		
Verify the counter operates properly.	QC TDM 6/2/07		
Document counter reading 00182	QC RLJ 8-4-09		
Verify breaker is discharged, open	QC RLJ 8-4-09		
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision). ☐ _____ ☐ _____	QC RLJ 8-4-09		
Verify the breaker data sheets filled out and signed.	QC RLJ 8-4-09		
Verify the Data plate is installed. Record the Date of Manufacture	QC RLJ 8-4-09		
No grease on primary and secondary disconnects.	QC RLJ 8-4-09		
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	QC TDM 6/2/07		
Comments: MTE Used: _____			

Inspections Performed by: _____ QC RLJ Date: 8-4-09

Verify the shutters operate without sticking or binding			
Masterpact Breaker Outside			
Record Breaker S/N: 06409496 102	QC RLJ 6-4-09		
Verify the arc chutes mounting nut retainers are not missing and are properly installed.	QC TDM 6/1/09		
Verify the top of breaker is clean.	QC TDM 6/1/09		
Verify there are no cracks or chips in the breaker polyester case: Top, Sides, Back, Front, and Bottom.	QC TDM 6/1/09		
Verify the back insulator fins are not cracked.	QC TDM 6/1/09		
Verify the secondary block connects in test position	6/1/09		
Verify the secondary block housing "Locks-out" properly in the disconnected position.	QC TDM 6/1/09		
Verify the secondary block housing springs are silver in color.	QC TDM 6/1/09		
Verify the secondary block housing springs are properly installed.	QC TDM 6/1/09		
Verify the discharge interlock is properly installed – the return spring is installed.	QC TDM 6/1/09		
Verify the rejection hardware is configured per the design drawings and properly tightened.	N/A		
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks. Verify there are no cracks or chips.	QC TDM 6/1/09		
Record grease color Red. Grease must be red (Mobilith) or white (Kluber) Isoflex.	QC TDM 6/1/09		
Verify the electrical terminations are not loose.	QC TDM 6/1/09		
Verify all visible springs in the mechanism are connected and not loose.	TDM 6/1/09		
Verify all accessible fasteners are hand tight.	QC TDM 6/1/09		
	Sat	**Unsat**	**Rework Satisfactory**
Remove trip unit for mechanism assembly inspection. Verify there are no cracked washers.	QC TDM 6/2/09		
Apply NLI seal on trip unit after inspection.	QC TDM 6/2/09		
Verify the cover is replaced and the mounting screws are snug.	QC TDM 6/2/09		
Verify the breaker cover mounting holes are not stripped.	QC TDM 6/2/09		
Verify the Open/Close pushbutton covers are in place after inspection complete.	QC 6/2/09		

Verify all cover plates are installed -Verify torque/tightness of fasteners.	QC TDM 6/2/09		
Verify the counter operates properly.	TDM		
Document counter reading 10112	QC 8-4-09		
Verify breaker is discharged, open	RLJ 8-4-09		
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision). ☐ ☐	QC N/A		
Verify the breaker data sheets filled out and signed.	QC 8-4-09		
Verify the Data plate is installed. Record the Date of Manufacture	QC N/A		
No grease on primary and secondary disconnects.	QC N/A		
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	QC TDM 6/2/09		
Comments: MTE Used: _____			

Inspections Performed by: _____ QC RLJ Date: 8-4-09

Verify the shutters operate without sticking or binding			
Masterpact Breaker Outside	QC		
Record Breaker S/N: 064091496103			
Verify the arc chutes mounting nut retainers are not missing and are properly installed.	QC TDM		
Verify the top of breaker is clean.	TDM		
Verify there are no cracks or chips in the breaker polyester case: Top, Sides, Back, Front, and Bottom.	QC TDM		
Verify the back insulator fins are not cracked.	TDM		
Verify the secondary block connects in test position	QC		
Verify the secondary block housing "Locks-out" properly in the disconnected position.	QC TDM		
Verify the secondary block housing springs are silver in color.	QC TDM		
Verify the secondary block housing springs are properly installed.	QC TDM		
Verify the discharge interlock is properly installed – the return spring is installed.	QC TDM		
Verify the rejection hardware is configured per the design drawings and properly tightened.	N/A		
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks. Verify there are no cracks or chips.	QC		
Record grease color Red. Grease must be red (Mobilith) or white (Kluber) Isoflex.	QC TDM		
Verify the electrical terminations are not loose.	QC TDM		
Verify all visible springs in the mechanism are connected and not loose.	QC TDM		
Verify all accessible fasteners are hand tight.	TDM		
	Sat	**Unsat**	**Rework Satisfactory**
Remove trip unit for mechanism assembly inspection. Verify there are no cracked washers.	QC TDM		
Apply NLI seal on trip unit after inspection.	QC TDM		
Verify the cover is replaced and the mounting screws are snug.	QC TDM		
Verify the breaker cover mounting holes are not stripped.	QC TDM		
Verify the Open/Close pushbutton covers are in place after inspection complete.	QC		

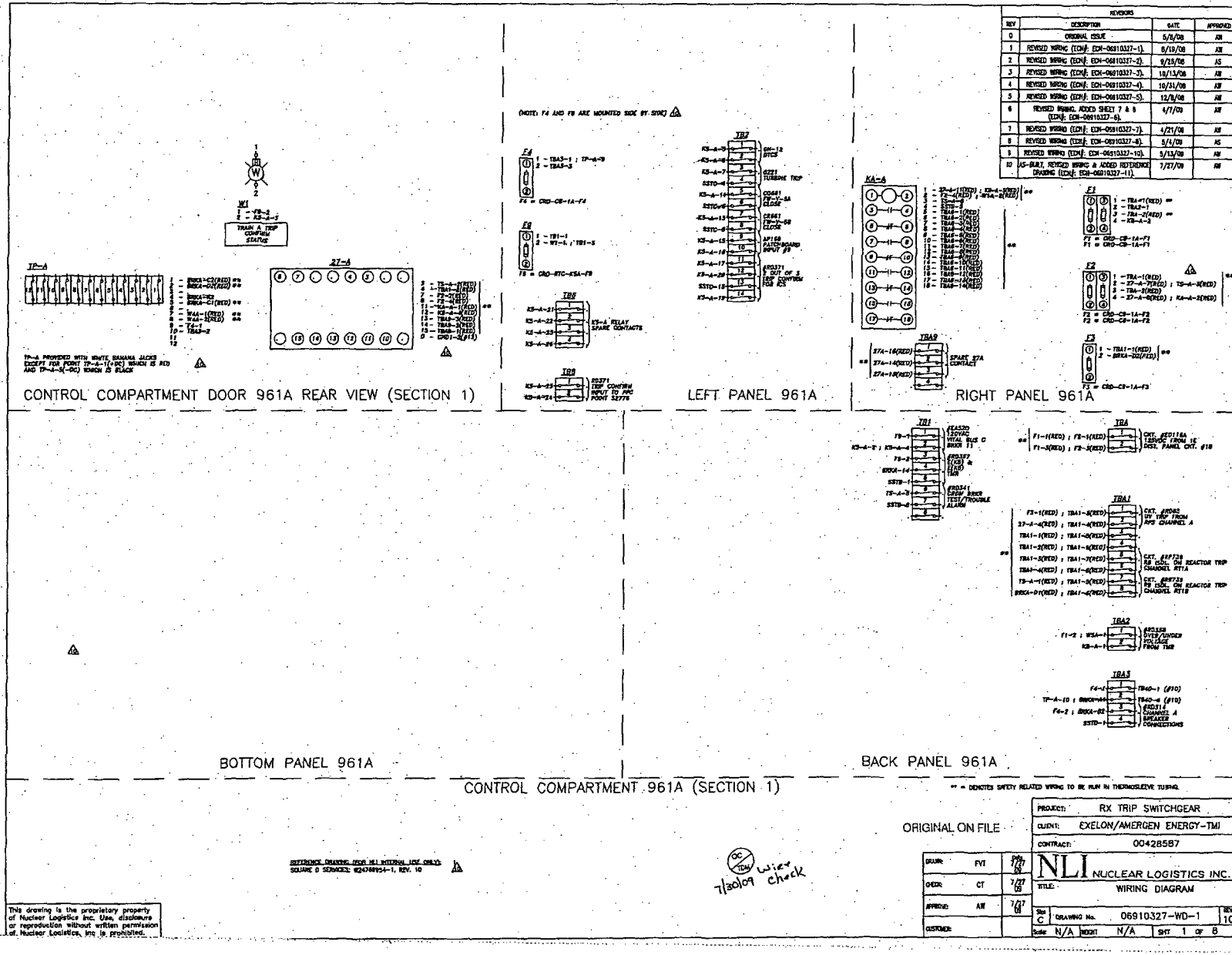
Verify all cover plates are installed -Verify torque/tightness of fasteners.	QC TDM 6/2/09		
Verify the counter operates properly.	TDM 6/2/09		
Document counter reading 00112	QC 8-4-09		
Verify breaker is discharged, open	QC BtJ 8-4-09		
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision). ☐ _____ ☐	QC NLA BtJ		
Verify the breaker data sheets filled out and signed.	8-4-09		
Verify the Data plate is installed. Record the Date of Manufacture _____	QC NLA		
No grease on primary and secondary disconnects.	QC NLA		
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	QC TDM 6/2/09		
Comments: MTE Used: _____			

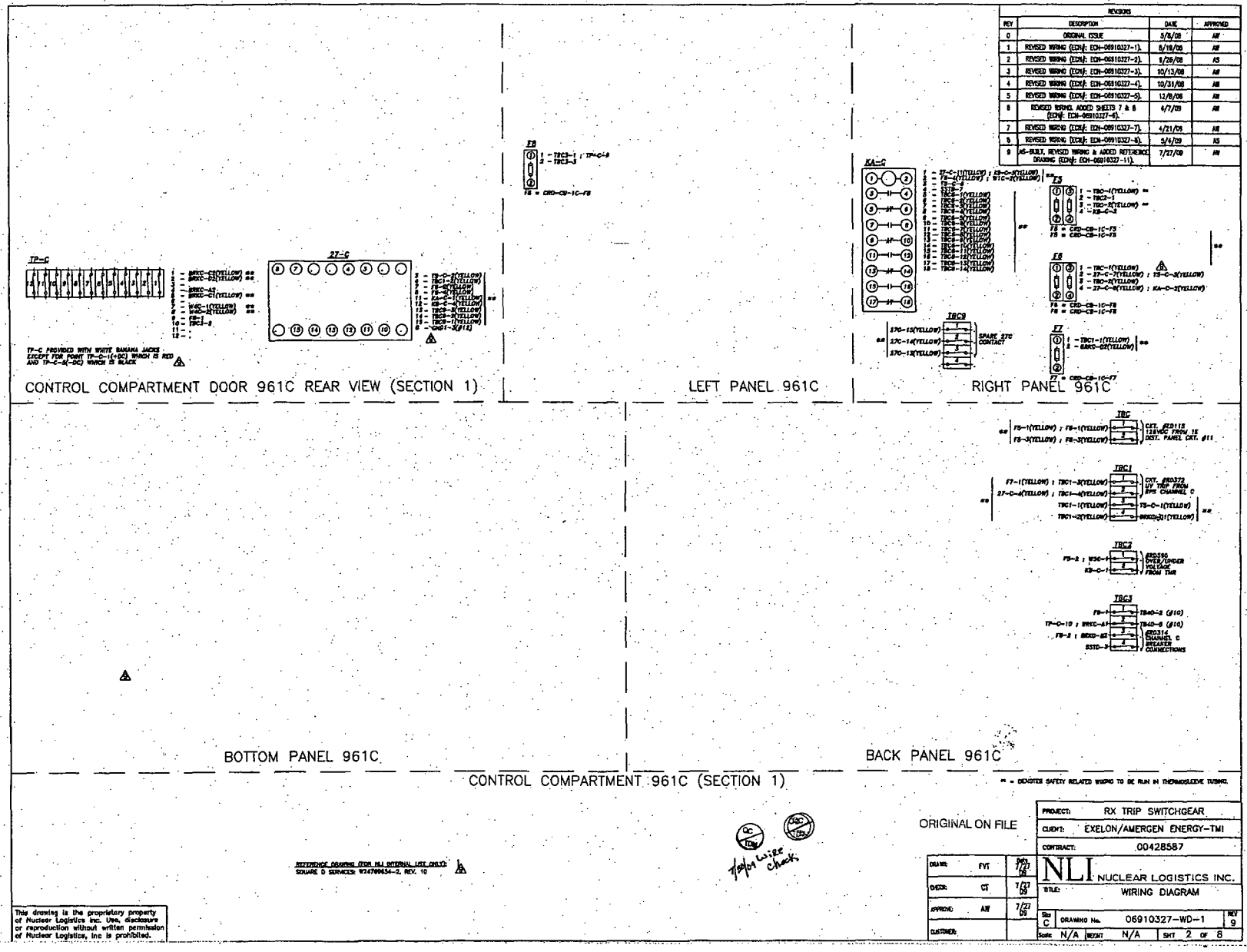
Inspections Performed by: _____ QC BtJ Date: 8-4-09

Verify the shutters operate without sticking or binding			
Masterpact Breaker Outside			
Record Breaker S/N: 06409149610ZL T.M. 6-2-09	QC 6-2-09 TDM		
Verify the arc chutes mounting nut retainers are not missing and are properly installed.	QC TDM 6/2/09		
Verify the top of breaker is clean.	QC TDM 6/2/09		
Verify there are no cracks or chips in the breaker polyester case: Top, Sides, Back, Front, and Bottom.	QC TDM 6/2/09		
Verify the back insulator fins are not cracked.	QC TDM 6/2/09		
Verify the secondary block connects in test position			
Verify the secondary block housing "Locks-out" properly in the disconnected position.	QC TDM 6/2/09		
Verify the secondary block housing springs are silver in color.	QC TDM 6/2/09		
Verify the secondary block housing springs are properly installed.	QC 6/2/09		
Verify the discharge interlock is properly installed – the return spring is installed.	QC TDM 6/2/09		
Verify the rejection hardware is configured per the design drawings and properly tightened.	N/A		
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks. Verify there are no cracks or chips.	QC 6/2/09		
Record grease color Red. Grease must be red (Mobilith) or white (Kluber) Isoflex.	TDM 6/2/09		
Verify the electrical terminations are not loose.	QC 6/2/09		
Verify all visible springs in the mechanism are connected and not loose.	QC TDM 6/2/09		
Verify all accessible fasteners are hand tight.	TDM 6/2/09		
	Sat	**Unsat**	**Rework Satisfactory**
Remove trip unit for mechanism assembly inspection. Verify there are no cracked washers.	QC 6/2/09		
Apply NLI seal on trip unit after inspection.	QC TDM 6/2/09		
Verify the cover is replaced and the mounting screws are snug.	QC 6/2/09		
Verify the breaker cover mounting holes are not stripped.	TDM 6/2/09		
Verify the Open/Close pushbutton covers are in place after inspection complete.	QC TDM 6/2/09		

Verify all cover plates are installed -Verify torque/tightness of fasteners.	QC TDM		
Verify the counter operates properly.	8-4-09		
Document counter reading 00136	QC 8-4-09		
Verify breaker is discharged, open	QC RLJ 8-4-09		
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision). ☐ _____ ☐	QC		
Verify the breaker data sheets filled out and signed.	QC RLJ 8-4-09		
Verify the Data plate is installed. Record the Date of Manufacture	QC		
No grease on primary and secondary disconnects.	QC		
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	QC TDM 8/26/09		
Comments: MTE Used: _____			

Inspections Performed by: QC RLJ Date: 8-4-09


REVISIONS
REV | DESCRIPTION | DATE | APPROVED
0 | ORIGINAL ISSUE | 5/5/08 | AM
1 | REVISED WIRING (ECN#: ECN-06910327-1). | 8/19/08 | AM
2 | REVISED WIRING (ECN#: ECN-06910327-2). | 9/25/08 | AS
3 | REVISED WIRING (ECN#: ECN-06910327-3). | 10/13/08 | AM
4 | REVISED WIRING (ECN#: ECN-06910327-4). | 10/31/08 | AM
5 | REVISED WIRING (ECN#: ECN-06910327-5). | 12/8/08 | AM
6 | REVISED WIRING, ADDED SHEET 7 & 8 (ECN#: ECN-06910327-6). | 4/7/09 | AM
7 | REVISED WIRING (ECN#: ECN-06910327-7). | 4/21/09 | AM
8 | REVISED WIRING (ECN#: ECN-06910327-8). | 5/4/09 | AS
9 | REVISED WIRING (ECN#: ECN-06910327-10). | 5/13/09 | AM
10 | AS-BUILT, REVISED WIRING & ADDED REFERENCE DRAWING (ECN#: ECN-06910327-11). | 7/27/09 | AM
CONTROL COMPARTMENT DOOR 961A REAR VIEW (SECTION 1)
LEFT PANEL 961A
RIGHT PANEL 961A
BOTTOM PANEL 961A
BACK PANEL 961A
CONTROL COMPARTMENT 961A (SECTION 1)
** = DENOTES SAFETY RELATED WIRING TO BE RUN IN THERMOSLEEVE TUBING.
ORIGINAL ON FILE
PROJECT: RX TRIP SWITCHGEAR
CLIENT: EXELON/AMERGEN ENERGY-TMI
CONTRACT: 00428587
NLI NUCLEAR LOGISTICS INC.
TITLE: WIRING DIAGRAM
Size C | DRAWING No. 06910327-WD-1 | REV 10
Scale N/A WIDTH N/A SHT 1 OF 8
DRAWN: FVI 7/27/09
CHECK: CT 7/27/09
APPROVED: AM 7/27/09
CUSTOMER:
7/30/09 wire check
This drawing is the proprietary property of Nuclear Logistics Inc. Use, disclosure or reproduction without written permission of Nuclear Logistics, Inc is prohibited.


REVISIONS
REV | DESCRIPTION | DATE | APPROVED
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1 | REVISED WIRING (ECN): ECN-06910327-1). | 5/19/08 | AW
2 | REVISED WIRING (ECN): ECN-06910327-2). | 5/29/08 | AS
3 | REVISED WIRING (ECN): ECN-06910327-3). | 10/13/08 | AW
4 | REVISED WIRING (ECN): ECN-06910327-4). | 10/31/08 | AW
5 | REVISED WIRING (ECN): ECN-06910327-5). | 12/8/08 | AW
6 | REVISED WIRING ADDED SHEETS 7 & 8 (ECN): ECN-06910327-6). | 4/7/09 | AW
7 | REVISED WIRING (ECN): ECN-06910327-7). | 4/21/09 | AW
8 | REVISED WIRING (ECN): ECN-06910327-8). | 5/4/09 | AS
9 | AS-BUILT, REVISED WIRING & ADDED REFERENCE DRAWING (ECN): ECN-06910327-11). | 7/27/09 | AW
TP-C
27-C
KA-C
F5
F6
F7
TBC9
SPARE 27C CONTACT
CONTROL COMPARTMENT DOOR 961C REAR VIEW (SECTION 1)
LEFT PANEL 961C
RIGHT PANEL 961C
TBC
TBC1
TBC2
TBC3
BOTTOM PANEL 961C
BACK PANEL 961C
CONTROL COMPARTMENT 961C (SECTION 1)
** = DENOTES SAFETY RELATED WIRING TO BE RUN IN THERMOSLEEVE TUBING.
ORIGINAL ON FILE
PROJECT: RX TRIP SWITCHGEAR
CLIENT: EXELON/AMERGEN ENERGY-TMI
CONTRACT: .00428587
NLI NUCLEAR LOGISTICS INC.
TITLE: WIRING DIAGRAM
DRAWN: FVT 7/27/09
CHECK: CT 7/27/09
APPROVE: AW 7/27/09
CUSTOMER:
Size C
DRAWING No. 06910327-WD-1
REV 9
Scale N/A WEIGHT N/A SHT 2 OF 8
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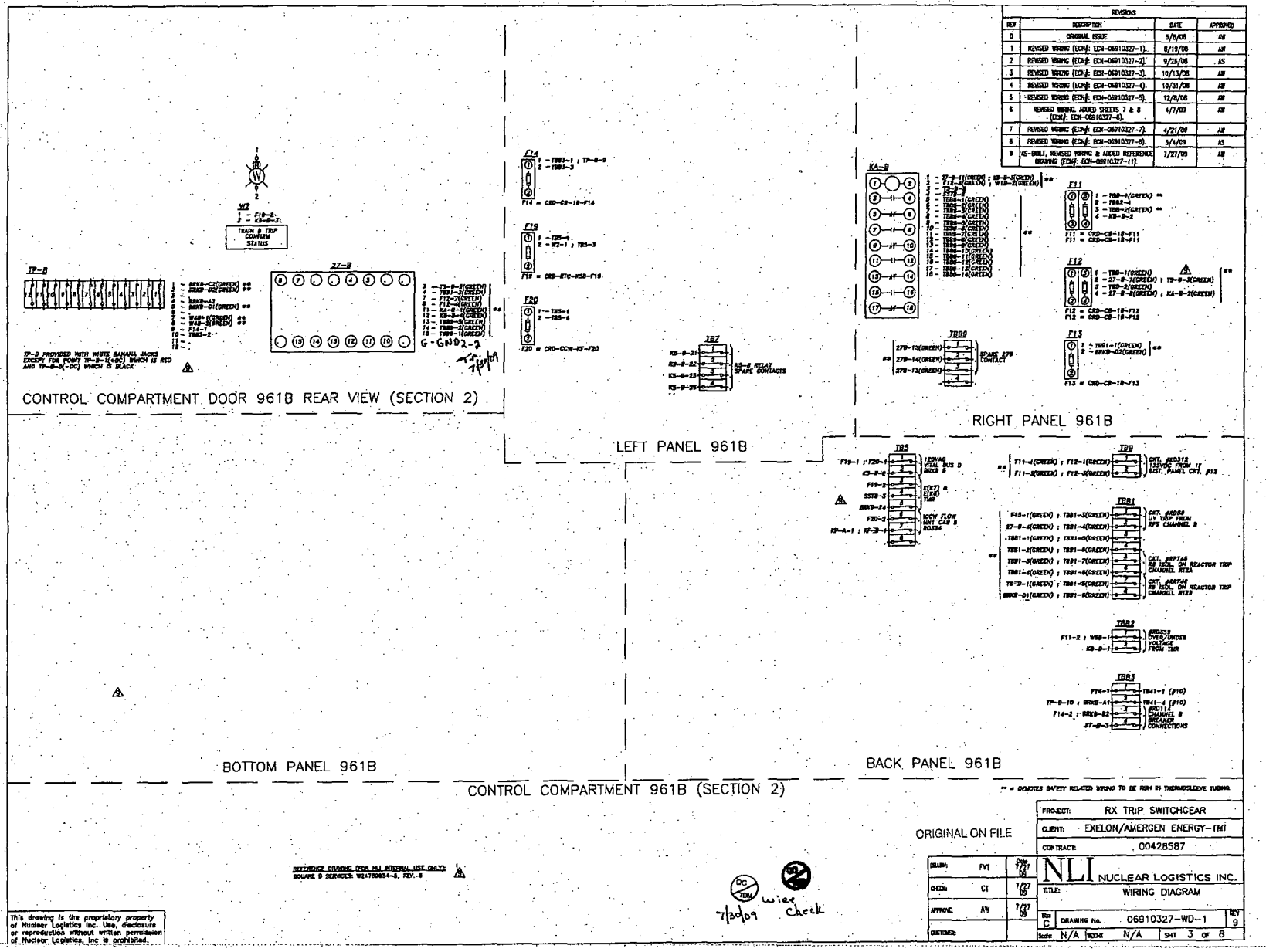
REVISIONS
REV | DESCRIPTION | DATE | APPROVED
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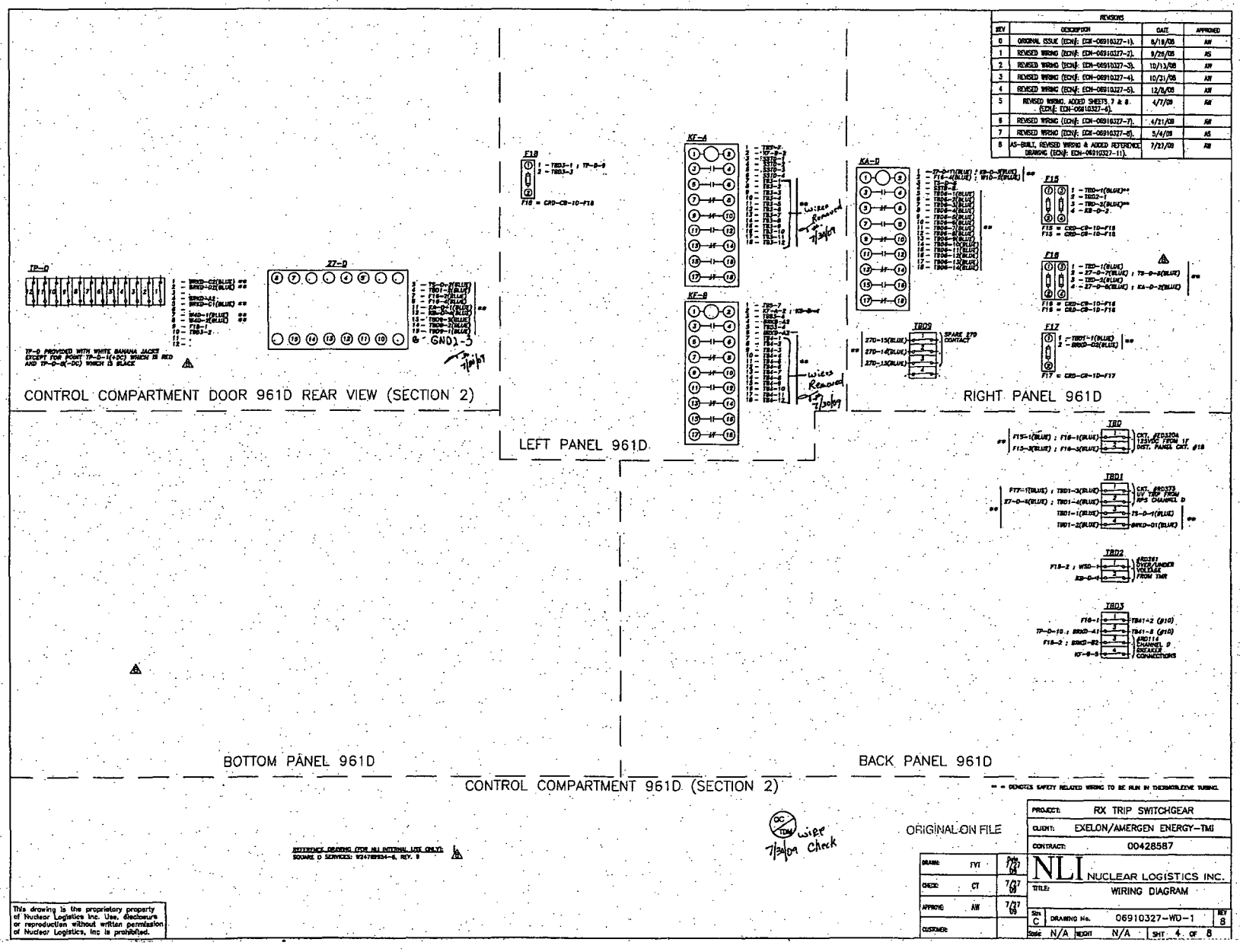
2 | REVISED WIRING (ECN#: ECN-06910327-2). | 9/25/08 | AS
3 | REVISED WIRING (ECN#: ECN-06910327-3). | 10/13/08 | AW
4 | REVISED WIRING (ECN#: ECN-06910327-4). | 10/31/08 | AW
5 | REVISED WIRING (ECN#: ECN-06910327-5). | 12/8/08 | AW
6 | REVISED WIRING, ADDED SHEETS 7 & 8 (ECN#: ECN-06910327-6). | 4/7/09 | AW
7 | REVISED WIRING (ECN#: ECN-06910327-7). | 4/21/09 | AW
8 | REVISED WIRING (ECN#: ECN-06910327-8). | 5/4/09 | AS
9 | AS-BUILT, REVISED WIRING & ADDED REFERENCE DRAWING (ECN#: ECN-06910327-11). | 7/27/09 | AW
W2
TRAIN B TRIP CONFIRM STATUS
TP-B
27-B
F14
F19
F20
KA-B
F11
F12
F13
TB7
TBB9
CONTROL COMPARTMENT DOOR 961B REAR VIEW (SECTION 2)
LEFT PANEL 961B
RIGHT PANEL 961B
TB5
TB8
TBB1
TBB2
TBB3
BOTTOM PANEL 961B
BACK PANEL 961B
CONTROL COMPARTMENT 961B (SECTION 2)
** = DENOTES SAFETY RELATED WIRING TO BE RUN IN THERMOSLEEVE TUBING.
ORIGINAL ON FILE
REFERENCE DRAWING (FOR NLI INTERNAL USE ONLY): SQUARE D SERVICES: W24780654-8, REV. 8
7/30/09 wire check
This drawing is the proprietary property of Nuclear Logistics Inc. Use, disclosure or reproduction without written permission of Nuclear Logistics, Inc is prohibited.
DRAWN: FVT 7/27/09
CHECK: CT 7/27/09
APPROVE: AW 7/27/09
CUSTOMER:
PROJECT: RX TRIP SWITCHGEAR
CLIENT: EXELON/AMERGEN ENERGY-TMI
CONTRACT: 00428587
NLI NUCLEAR LOGISTICS INC.
TITLE: WIRING DIAGRAM
Size C | DRAWING No. 06910327-WD-1 | REV 9
Scale: N/A | WEIGHT: N/A | SHT 3 OF 8



REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
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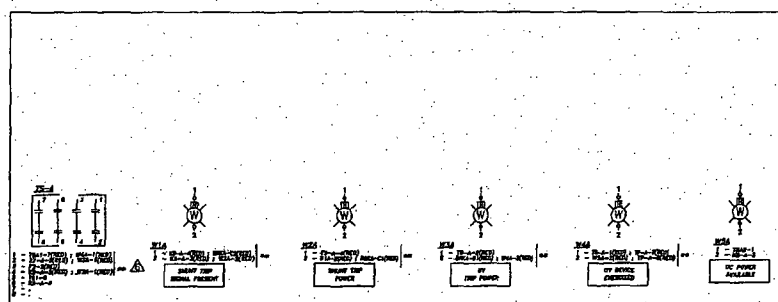
1	REVISED WIRING (ECN#: ECN-06910327-2).	9/26/08	AS
2	REVISED WIRING (ECN#: ECN-06910327-3).	10/13/08	AW
3	REVISED WIRING (ECN#: ECN-06910327-4).	10/21/08	AW
4	REVISED WIRING (ECN#: ECN-06910327-5).	12/8/08	AW
5	REVISED WIRING, ADDED SHEETS 7 & 8. (ECN#: ECN-06910327-6).	4/7/09	AW
6	REVISED WIRING (ECN#: ECN-06910327-7).	4/21/09	AW
7	REVISED WIRING (ECN#: ECN-06910327-8).	5/4/09	AS
8	AS-BUILT, REVISED WIRING & ADDED REFERENCE DRAWING (ECN#: ECN-06910327-11).	7/31/09	AW

REFERENCE DRAWING (FOR NLI INTERNAL USE ONLY): SQUARE D SERVICES: W2478MS4-4, REV. 9

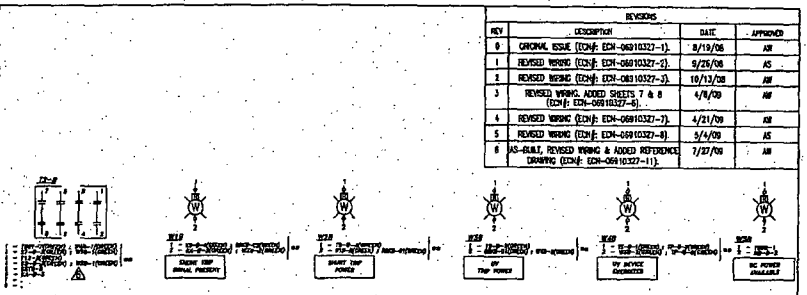
DRAWN:	FYI	7/27/09
CHECK:	CT	7/27/09
APPROVE:	AW	7/27/09
CUSTOMER:		

PROJECT:	RX TRIP SWITCHGEAR
CLIENT:	EXELON/AMERGEN ENERGY-TMI
CONTRACT:	00428587
	NLI NUCLEAR LOGISTICS INC.
TITLE:	WIRING DIAGRAM
SIZE: C	DRAWING No. 06910327-WD-1 REV 8
SCALE: N/A	WEIGHT: N/A SHT 4 OF 8

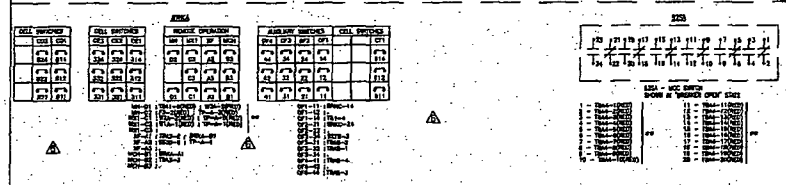
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE. (ECN#: ECN-06910327-1).	8/19/08	AW
1	REVISED WIRING. (ECN#: ECN-06910327-2).	9/26/08	AS
2	REVISED WIRING. (ECN#: ECN-06910327-3).	10/13/08	AW
3	REVISED WIRING. ADDED SHEETS 7 & 8 (ECN#: ECN-06910327-6).	4/8/09	AW
4	REVISED WIRING. (ECN#: ECN-06910327-7).	4/21/09	AW
5	REVISED WIRING. (ECN#: ECN-06910327-8).	5/4/09	AS
6	AS-BUILT, REVISED WIRING & ADDED REFERENCE DRAWING. (ECN#: ECN-06910327-11).	7/27/09	AW



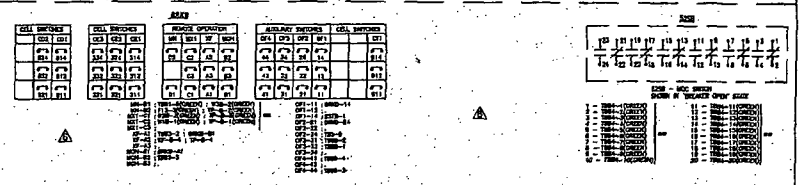
CHANNEL A BREAKER TECH STRIP REAR VIEW (SECTION 1)



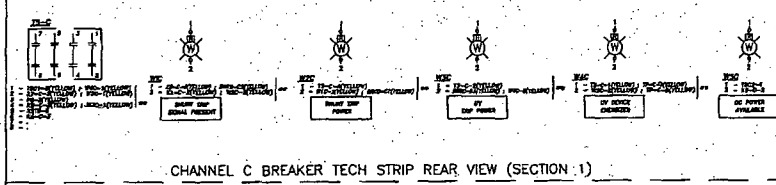
CHANNEL B BREAKER TECH STRIP REAR VIEW (SECTION 2)



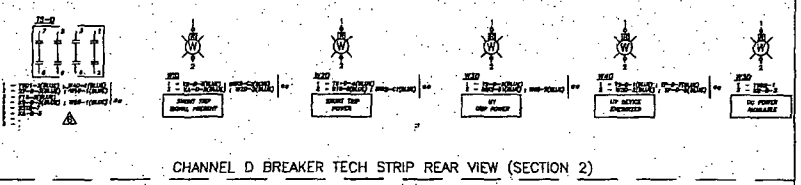
CHANNEL A BREAKER (SECTION 1)



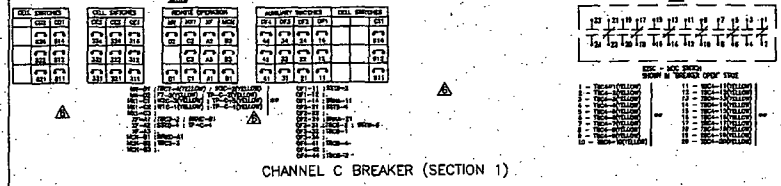
CHANNEL B BREAKER (SECTION 2)



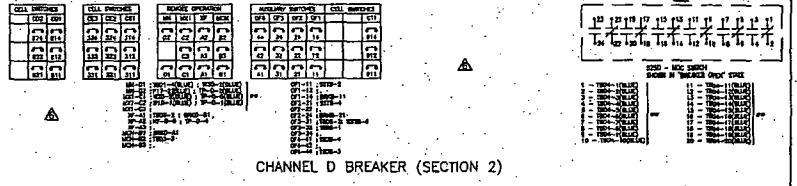
CHANNEL C BREAKER TECH STRIP REAR VIEW (SECTION 1)



CHANNEL D BREAKER TECH STRIP REAR VIEW (SECTION 2)



CHANNEL C BREAKER (SECTION 1)



CHANNEL D BREAKER (SECTION 2)

= DENOTES SAFETY RELATED WIRING TO BE RUN IN THERMOSLEEVE TUBING.

REFERENCE DRAWING (FOR NLI INTERNAL USE ONLY):
SQUARE D SERVICES: W2478T54-3, REV. 8
SQUARE D SERVICES: W2478M54-7, REV. 8

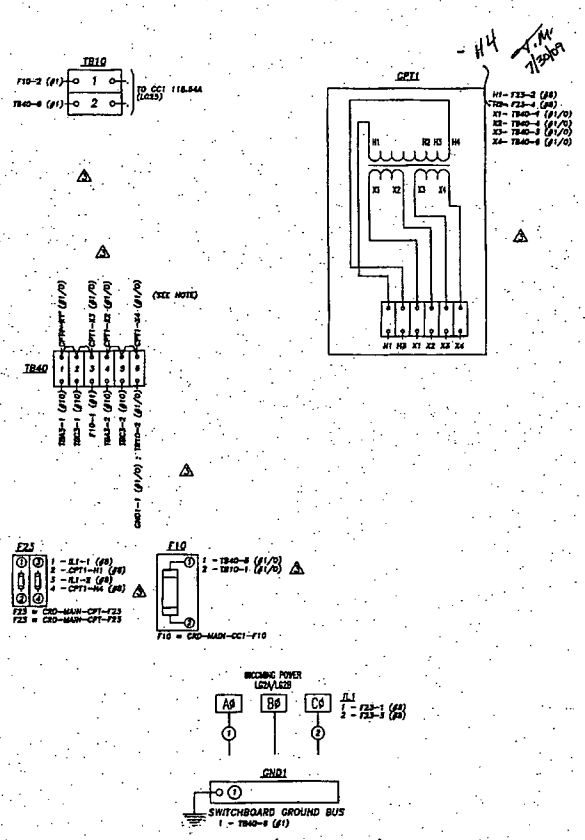
ORIGINAL ON FILE

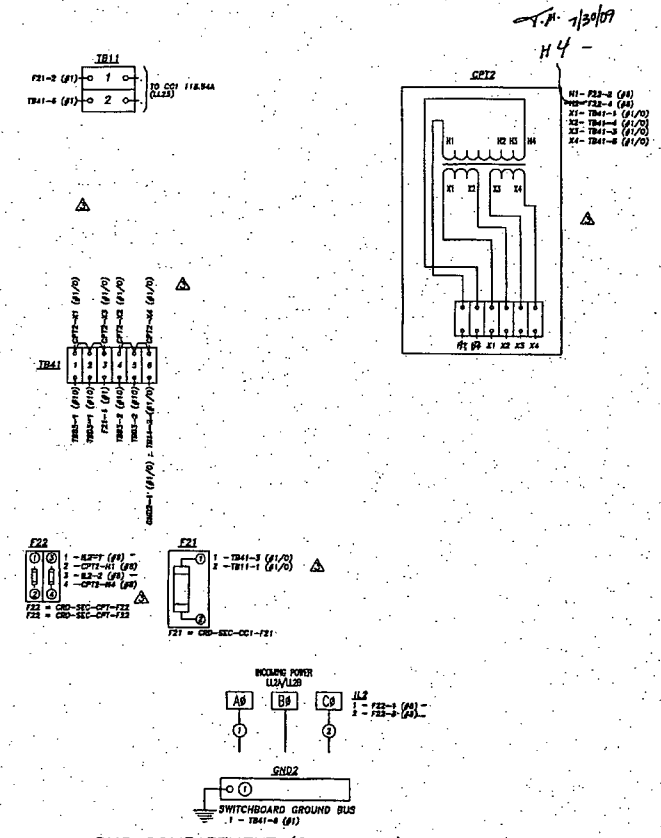
QC TEAM Apply wire check

DRAWN:	FVT	7/27/09
CHECK:	CT	7/27/09
APPROVE:	AW	7/27/09
CUSTOMER:		

PROJECT:	RX TRIP SWITCHGEAR
CLIENT:	EXELON/AMERGEN ENERGY-TMI
CONTRACT:	00428587
	NLI NUCLEAR LOGISTICS INC.
TITLE:	WIRING DIAGRAM
Size C	DRAWING No. 06910327-WD-1 REV 6
Scale: N/A	WEIGHT N/A SHT 5 OF 8

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE (ECN#: ECN-06910327-1).	8/19/08	AW
1	REVISED WIRING (ECN#: ECN-06910327-2).	9/26/08	AS
2	REVISED WIRING ADDED SHEETS 7 & 8 (ECN#: ECN-06910327-4).	4/8/09	AS
3	AS-BUILT, REVISED WIRING & ADDED REFERENCE DRAWING (ECN#: ECN-06910327-11).	7/27/09	AW





NOTE: #1/0 WIRE USED WP TO TRANSFORMER INTERNAL TERMINAL BLOCK.

REFERENCE DRAWING (FOR NLI INTERNAL USE ONLY):
SQUARE D SERVICES: W24769854-3, REV. 8
SQUARE D SERVICES: W24769854-7, REV. 5

7/30/09 wire check

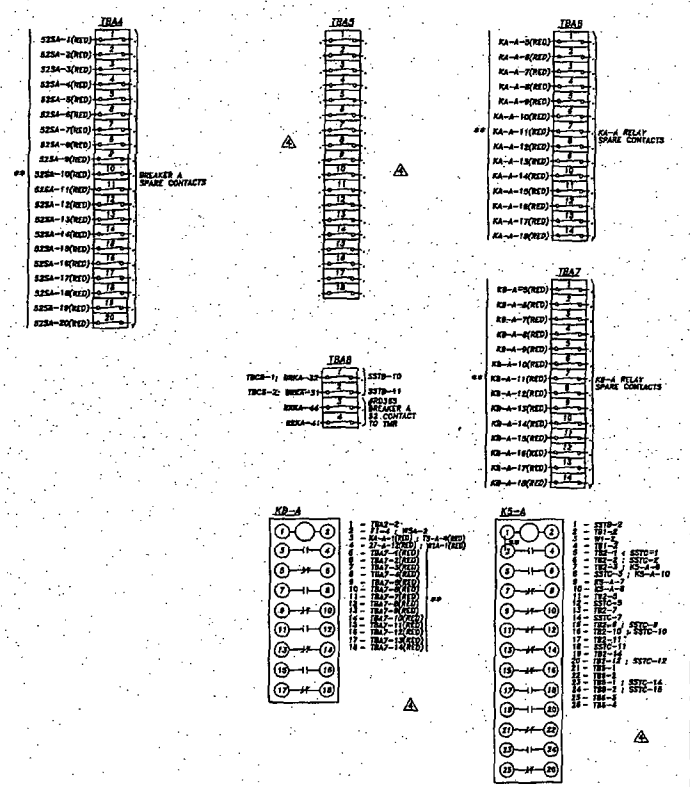
8-4-09 wire check

ORIGINAL ON FILE

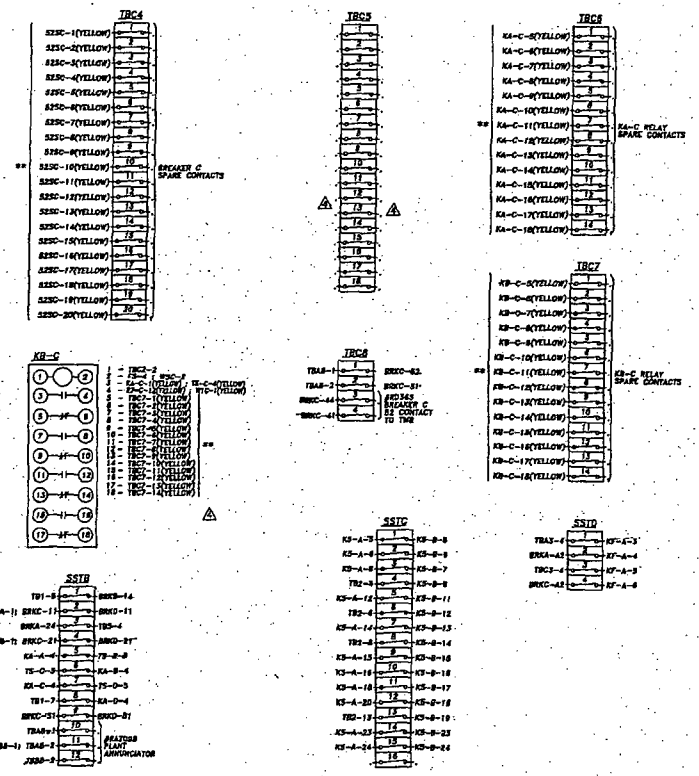
DRAWN:	FVT	7/27/09
CHECK:	CT	7/27/09
APPROVE:	AW	7/27/09

PROJECT:	RX TRIP SWITCHGEAR
CLIENT:	EXELON/AMERGEN ENERGY-TMI
CONTRACT:	00428587
	NLI NUCLEAR LOGISTICS INC.
TITLE:	WIRING DIAGRAM
Size C	DRAWING No. 06910327-WD-1. REV 3

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE (ECN#: ECN-06910327-0).	4/8/09	AM
1	REVISED WIRING (ECN#: ECN-06910327-7).	4/21/09	AM
2	REVISED WIRING (ECN#: ECN-06910327-8).	5/4/09	AS
3	REVISED WIRING (ECN#: ECN-06910327-10).	5/13/09	AM
4	AS-BUILT, REVISED WIRING & ADDED REFERENCE DRAWING (ECN#: ECN-06910327-11)	7/23/09	AM



BUS COMPARTMENT
TOP LEFT SIDE BARRIER AS VIEWED FROM THE FRONT
(SECTION 1)



BUS COMPARTMENT
TOP RIGHT SIDE BARRIER AS VIEWED FROM THE FRONT
(SECTION 1)

** = DENOTES SAFETY RELATED WIRING TO BE RUN IN THERMOSLEEVE TUBING

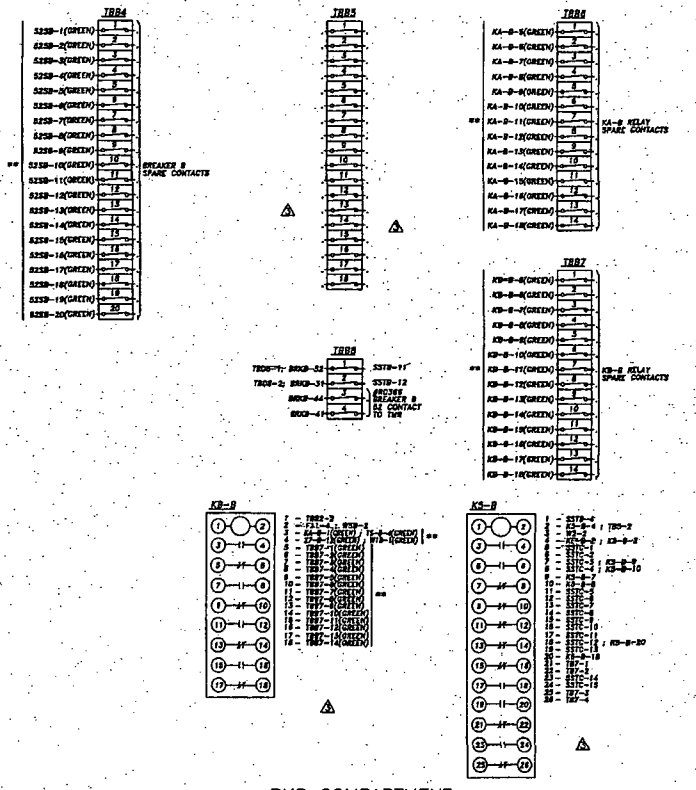
REFERENCE DRAWING (FOR NLI INTERNAL USE ONLY):
SQUARE D SERVICES: R2478B934-4, REV. 8

ORIGINAL ON FILE

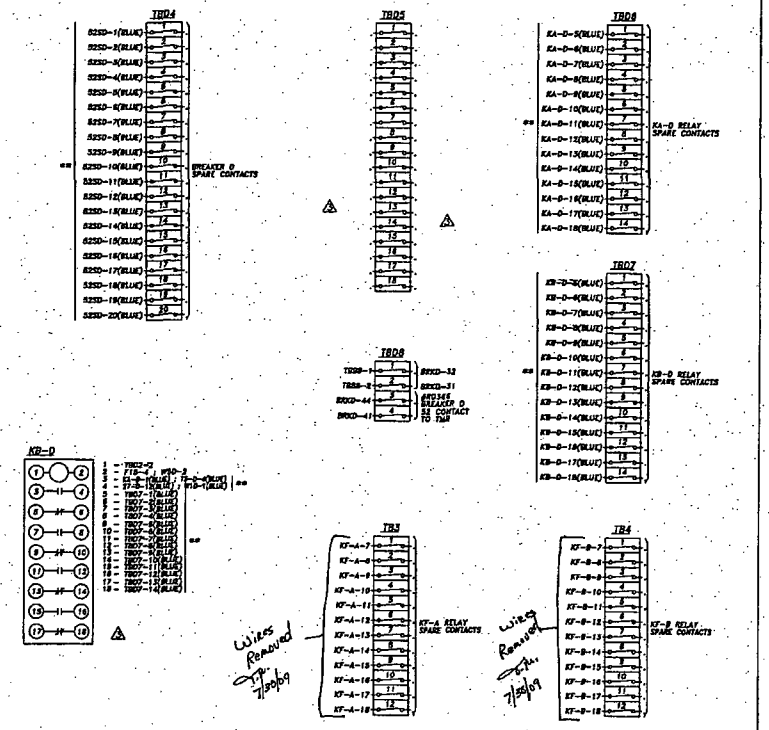
DRAWN:	FVT	7/27/09
CHECK:	CT	7/27/09
APPROV:	AM	7/27/09
CUSTOMER:		

PROJECT:	RX TRIP SWITCHGEAR
CLIENT:	EXELON/AMERGEN ENERGY-TMI
CONTRACT:	00428587
NLI	NUCLEAR LOGISTICS INC.
TITLE:	WIRING DIAGRAM
Size C	DRAWING No. 06910327-WD-1 REV 4
Scale: N/A	WEIGHT N/A SHT 7 OF 8

REVISIONS			
KEY	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE (ECN#: ECN-06910327-6).	4/8/09	AW
1	REVISED WIRING (ECN#: ECN-06910327-7).	4/21/09	AW
2	REVISED WIRING (ECN#: ECN-06910327-8).	5/4/09	AS
3	AS-BUILT, REVISED WIRING & ADDED REFERENCE DRAWING (ECN#: ECN-06910327-11).	7/27/09	AW



BUS COMPARTMENT
TOP LEFT SIDE BARRIER AS VIEWED FROM THE FRONT
(SECTION 2)



BUS COMPARTMENT
TOP RIGHT SIDE BARRIER AS VIEWED FROM THE FRONT
(SECTION 2)

** = DENOTES SAFETY RELATED WIRING TO BE RUN IN THERMOSLEEVE TUBING

REFERENCE DRAWING (FOR NLI INTERNAL USE ONLY):
SQUARE D SERVICES W24768954-8, REV. 4

ORIGINAL ON FILE

OKC TDM 7/30/09 Wire Check

DRAWN:	FVT	7/27/09
CHECK:	CT	7/27/09
APPROVE:	AW	7/27/09
CUSTOMER:		

PROJECT:	RX TRIP SWITCHGEAR
CLIENT:	EXELON/AMERGEN ENERGY-TMI
CONTRACT:	00428587
NLI	NUCLEAR LOGISTICS INC.
TITLE:	WIRING DIAGRAM
Size C	DRAWING No. 06910327-WD-1 REV 3
Scale N/A	WIDTH N/A SHT 8 OF 8

STANDARD VERIFICATION PLAN FOR
SQUARE-D MASTERPACT LGSB11 BREAKER
(LOW VOLTAGE CIRCUIT BREAKER)
FUNCTIONAL TESTING

TMI SPARE BREAKER ONLY

BREAKER S/N: 06409636 2301

ALL ELECTRICAL TESTING WAS PERFORMED IN CRADLE S/N: 25180820-002H

Document Number: SVP-102
Revision 2

Cradle S/N (on nameplate):_____

APPROVAL

STANDARD VERIFICATION PLAN FOR
SQUARE-D MASTERPACT LGSB11 BREAKER
(LOW VOLTAGE CIRCUIT BREAKER)
FUNCTIONAL TESTING

This procedure is prepared in accordance with the NLI Quality Assurance Program and its implementing procedures.

Prepared by: _____ Date: 8/25/08

Verified by: _____ Date: 8/26/08

Approved by: _____ Date: 8/26/08

Cradle S/N (on nameplate): N/A

REVISION HISTORY

Revision No.	Item Description	Date
0	Original Issue	2/22/07
1	Added clarifications to sections 3.0, 5.8.3, 6.0 & 10.0. Removed Attachment I.	7/2/08
2	Renumbered sections 4 – 10, revised sections 2.1, 3.1.c, 4.0, 6.9.1.b, 8.1, added sections 6.9, 12.0, added attachment I & II	8/26/08

Cradle S/N (on nameplate): N/A

1.0 SCOPE

The purpose of this standard verification plan is to verify the critical characteristic and function of the Square-D Masterpact LGSB11 600A circuit breaker with cradle as a complete assembly. Some of the critical characteristics may not be applicable depending on the options and functions available on the assembly that is being verified. The following step numbers in this document identify the standard critical characteristics. The results shall be documented within each section of this SVP and on the NLI QC Inspection Checklist for Masterpact NT Breakers, MANCON-LGSB11-1 (latest revision).

This test plan is generally used for testing of the circuit breaker and cradle together (LGSB11 part number). If circuit breaker or cradle only testing is required, NLI engineering will specify what sections are to be performed for the specific part required to be tested.

2.0 PRODUCTION CONTROLS

The following production controls and procedures are to be in effect throughout the life of this project. All of the following activities will be performed.

2.1 Methodology

☐ Sat ☐ Unsat N/A QC a. SDS has been audited by NLI and is currently on the NLI Approved Vendor List. The NLI audit addressed the following:
1. All bolts, lugs, wire, nuts, etc. used for production have been dedicated for safety-related use.
2. All steel used in production of the cradles has been verified to be the correct material.

☐ Sat ☐ Unsat N/A QC b. NLI QC will implement the following production controls during construction. A separate QC inspection checklist will be used and maintained by QA. The sample size is 100%, unless a smaller sample size is documented. The QC checklist will verify the following items:
1. Dedicated parts supplied or verified by NLI are used during assembly as follows:
   a. Bolts, nuts, washer, and other fasteners.
   b. Lugs and wire.
   c. Steel.
   d. Mobil 28 grease.
   e. Primary and secondary fingers.
2. Welding as follows:
   a. Welding is performed per NLI-approved welding procedures.
   b. Welders performing welding activities have been CWI certified.
   c. Welds are inspected by a CWI.
3. Fastener tightness is verified on 100% of the accessible fasteners and terminations, including intermediate assemblies.
4. 100% of the wire and wire connections have been inspected. There shall be no kinks, cuts, nicks or splits in the wire.
5. Lubrication inspection
   a. Breakers are supplied without primary and secondary disconnect lubrication. Plant to lubricate per plant established procedures. Rev. 2
6. Inspect and verify that there are no loose or damaged parts.

Cradle S/N (on nameplate): N/A

3.0 BREAKER IDENTIFICATION

NOTE: Ensure that the correct engineering drawings are used for the specific client breakers during testing per this SVP.

3.1 Methodology

a. Record the Square D nameplate data of the cradle. The nameplate shall contain the following information:

1. Manufacturer: N/A
2. Type (Breaker & Cradle): _____
3. Cradle Serial Number: _____
4. Style: _____
5. Rated Max Voltage/Freq: _____
6. Rated Continuous Current: _____
7. Rated Short Circuit/Interrupt Current: _____
8. Control Voltage Range: Charge: _____
   Close: _____
   Trip: _____
9. Weight: _____
10. Conversion Date: _____

☑ Sat ☐ Unsat T ICM QC 8-5-9 b. Perform a detail inspection of the breaker & cradle for any chips, cracks, gouges or any other damage.

c. Record the circuit breaker specific data.

1. Circuit breaker p/n: NTO8NA
2. Circuit breaker s/n: 064096362301
3. Cradle date of manufacture: N/A
4. Circuit breaker date code: 09315
5. Micrologic trip unit s/n: 7082424 (DUMMY TRIP UNIT) (NO TRIP UNIT SUPPLIED)

Rev. 2

Cradle S/N (on nameplate): N/A

4.0 PROPER BREAKER CONFIGURATION

4.1 Methodology

This section is to be performed with the circuit breaker out of the cell.

a. Terminals tightened. Verify all terminals are tight during wire check.

☐ Sat ☐ Unsat N/A Tech b. Terminal identification. Verify the terminal points are labeled per the wiring/schematic drawing. Use the final revision of the NLI approved schematics and record discrepancies, if any. If there are any discrepancies found, do not proceed any further with the testing until the discrepancies have been resolved.

☑ Sat ☐ Unsat T JCM Tech 8-5-9 QC B.J.S. QC 8-6-09 Proper wiring. Verify wiring against the final revision of the NLI approved schematic or wiring diagram. Attach a copy of the yellow-lined wiring/schematic drawing.

NLI drawing # with revision: 054/10753-SD-1 REV. 3

☑ Sat ☐ Unsat T JCM QC 8-5-9 d. Correct programmer. Verify that the programmer, sensor plugs and rating plugs are per the design documents:

- Record the part numbers and/or rating:

  Programmer: N/A

  Rating Plug: N/A

  Sensor Plug: 800A

- Trip unit date code. Verify the trip unit date code is P05491 or later. The format of the date code is Pxxyyz, with:
  - xx = last two digits of the year.
  - yy = week.
  - z = day of the week.

  Trip Unit Date Code: P09271

☑ Sat ☐ Unsat T JCM Tech 8-5-9 e. With the breaker cover off, inspect the trip unit performer plug. The performer plug should be green. A blue performer plug is not acceptable. If a blue plug is present, replace with a green performer plug. Note: The correct green performer plug must be present during primary injection testing.

f. Trip unit is programmed for breaker type. Program the breaker type into the trip unit.

☐ Sat ☐ Unsat N/A Tech g. Trip unit battery is fully charged. Verify the battery is fully charged. Rev. 2

Cradle S/N (on nameplate): N/A

☐ Sat ☐ Unsat N/A Tech h. Verify the rejection hardware pin configuration against the final revision of the approved NLI layout drawings (if applicable).

NLI drawing # with revision:_____

Breaker pin configuration: N/A

Cradle pin configuration:_____ Rev. 2

5.0 CIRCUIT BREAKER PROPER FIT-UP & INSTALLTION

5.1 Methodology

☐ Sat ☐ Unsat N/A Tech a. Install the cradle into a typical AK-2A-25 type cell. Visually inspect that the primary disconnects, secondary disconnects and interlocks match up with the mating connectors in the cell. Verify the Truck Operated Cell Switch (TOC) flap on the cradle is aligned with the TOC switch inside the cell.

☐ Sat ☐ Unsat N/A Tech b. Ensure there is a positive ground connection between the switchgear and the cradle. Measure the continuity from the switchgear frame to the cradle frame. Maintain this continuity reading throughout this section.

☑ Sat ☐ Unsat T JCM Tech c. Install the breaker into the 'DISCONNECT' position. Verify no binding of the interlocks occurs.
8.5.9

☑ Sat ☐ Unsat JCM Tech d. Ensure that the racking crank cannot be inserted unless the "PUSH TO OPEN" button is depressed.
8.5.9

☑ Sat ☐ Unsat JCM Tech e. Rack the breaker to the 'TEST' position. To rack the breaker into the cradle to the 'TEST' position, a racking crank is required to be inserted while pressing the 'PUSH TO OPEN' button. To begin turning the racking crank the 'STOP RELEASE' button must be pushed. Turn the racking crank clockwise until the breaker reaches the 'TEST' position. When the "TEST" position is reached, the 'STOP RELEASE' button will pop out. The status of the position indicator should show that the breaker is in the "T" position.
8.5.9

☐ Sat ☐ Unsat N/A Tech f. Monitor a set of closed and open TOC switch contacts. Verify that the contacts do not change state when the breaker is racked to the 'TEST' position.

☑ Sat ☐ Unsat T JCM Tech g. Verify the primary disconnects, secondary disconnects and interlocks match up with the cradle without any interference or binding.
8.5.9

☐ Sat ☐ Unsat N/A Tech h. Verify the continuity from the switchgear frame to the cradle frame is present.

☑ Sat ☐ Unsat T JCM Tech i. Push the 'STOP RELEASE' button again to continue to turn the racking crank until the "CONNECT" position is reached. Again, the 'STOP RELEASE' button will pop out. The status of the position indicator should show that the breaker is in the "CONNECT" position.
8.5.9

Cradle S/N (on nameplate): N/A

☐ Sat ☐ Unsat N/A Tech j. Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'TEST' to the 'CONNECT' position.

k. Manually close the breaker.

l. Manually charge the breaker.

☐ Sat ☐ Unsat N/A Tech m. Verify that the cradle racking tool cannot be installed on the cradle racking mechanism and that the cradle cannot be removed from the cell.

☑ Sat ☐ Unsat T JCM Tech 8.5.9 n. Verify the primary disconnects, secondary disconnects and interlocks match up with the cradle without any interference or binding.

☐ Sat ☐ Unsat N/A Tech o. Verify the continuity from the switchgear frame to the cradle frame is present.

p. Trip the breaker.

q. Rack the breaker to the 'TEST' position.

☐ Sat ☐ Unsat N/A Tech r. Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'CONNECT' to the 'TEST' position.

s. Rack the breaker to the 'DISCONNECT' position and remove the breaker from the cradle.

t. Remove the cradle from the cell.

Cradle S/N (on nameplate): N/A

6.0 PRODUCTION TESTS

Sections 5.1, 5.2, 5.3 & 5.4 are to be performed with the circuit breaker racked into the cradle to the 'CONNECT' position but not racked into a cell.

6.1 MAIN CONTACT RESISTANCE (DUCTOR TEST)

a. This test checks the resistance of the primary current path, hinge points, wipe, connections, and quality of conductivity of the current path. Perform this test on each phase of the circuit breaker.

b. Apply 85Vdc minimum to UV trip device (if applicable). Note: UV trip device must be energized to close the breaker.

c. Connect test cables to Phase A, line & load bus or stabs.

☑ Sat ☐ Unsat T JCM Tech d. Measure the contact resistance and record in μΩ using the appropriate M&TE. Repeat for each phase. Contact resistance for each phase is < 100μΩ.

8-5-9

Phase A: 30 μΩ (Criteria is < 100μΩ)
Phase B: 30 μΩ (Criteria is < 100μΩ)
Phase C: 30 μΩ (Criteria is < 100μΩ)

e. Compare the contact resistance between each phase. Contact resistance of each phase does not vary more than ±20% from the average of all three phases.

Average all phases: 30 μΩ

See discrepancy report number: N/A (N/A if all pass)

Cradle S/N (on nameplate): N/A

6.2 INSULATION INTEGRITY (DC MEGGER TEST)

6.2.1 Control Wiring

☑ Sat ☐ Unsat T JCM Tech 8-5-9 a. Control wiring except charging motor. Isolate the charging motor from the control circuit. With the breaker in the open position, apply 1000Vdc and megger each secondary disconnect to ground for 1 minute except the charging motor disconnects. Record the lowest insulation resistance. Repeat this test with the breaker in the closed position. Rev. 2

Applied Voltage: 1000 Vdc (Criteria is 1000VDC nominal)

WITH BREAKER OPEN

Lowest insulation res.: >20,000 MΩ (Criteria is ≥ 100MΩ)

WITH BREAKER CLOSED

Lowest insulation res.: >20,000 MΩ (Criteria is ≥ 100MΩ)

Record the number of tested secondary disconnects: 26

☑ Sat ☐ Unsat T JCM Tech 8-5-9 b. Charging motor. Megger the charging motor secondary disconnects (SDA-1 & SDA-2) to ground at 500Vdc for one minute. Record the lowest insulation resistance.

Perform with the breaker open discharged:

Applied Voltage: 500 Vdc (Criteria is 500VDC nominal)

Lowest insulation res.: >20,000 M 8-5-9 MΩ(Criteria is ≥ 2MΩ)

Perform with the breaker closed and charged:

Applied Voltage: 500 Vdc (Criteria is 500VDC nominal)

Lowest insulation res.: >20,000 MΩ(Criteria is ≥ 2MΩ)

Cradle S/N (on nameplate): N/A

6.2.2 Phase-to-Phase, Phase-to-Ground, & Line-to-Load

☑ Sat ☐ Unsat T JCM Tech 8.5.9 a. With the breaker in the closed position, apply 1000VDC and megger between phases (Note: UV trip device must be energized with 85Vdc minimum to close the breaker).

APPLIED VOLTAGE: 1000 VDC (Criteria is 1000VDC)

PHASE-TO-PHASE WITH BREAKER CLOSED

Ø A To Ø B: >10,000 MΩ MΩ (Criteria is > 100MΩ)
Ø B To Ø C: >10,000 MΩ MΩ (Criteria is > 100MΩ)
Ø C To Ø A: >10,000 MΩ MΩ (Criteria is > 100MΩ)

See discrepancy report number: N/A (N/A if all pass)

☑ Sat ☐ Unsat T JCM Tech 8.5.9 b. With the breaker in the closed position, apply 1000VDC and megger between phases to ground (Note: UV trip device must be energized with 85Vdc minimum to close the breaker).

APPLIED VOLTAGE: 1000 VDC (Criteria is 1000VDC)

PHASES-TO-GROUND WITH BREAKER CLOSED

Ø A To GROUND: >10,000 MΩ MΩ (Criteria is > 100MΩ)
Ø B To GROUND: >10,000 MΩ MΩ (Criteria is > 100MΩ)
Ø C To GROUND: >10,000 MΩ MΩ (Criteria is > 100MΩ)
See discrepancy report number: N/A (N/A if all pass)

☑ Sat ☐ Unsat T JCM Tech 8.5.9 e. With the breaker in the open position, apply 1000VDC and megger between phase line-to-load.

APPLIED VOLTAGE: 1000 VDC (Criteria is 1000VDC)

PHASE LINE-TO-LOAD WITH BREAKER OPEN

Ø A LINE To LOAD: >10,000 MΩ MΩ (Criteria is > 100MΩ)
Ø B LINE To LOAD: >10,000 MΩ MΩ (Criteria is > 100MΩ)
Ø C LINE To LOAD: >10,000 MΩ MΩ (Criteria is > 100MΩ)

See discrepancy report number: N/A (N/A if all pass)

Cradle S/N (on nameplate): N/A

6.3 INSULATION INTEGRITY (AC HI-POT TEST)

CAUTION: STAND AT LEAST 6 FEET FROM THE BREAKER DURING THIS TESTING. REMOVE THE TRIP UNIT RATING PLUG PRIOR TO PERFORMING THIS TEST.

Note: This is a "pass/fail" test. Perform this test at 2200Vac for 1 minute. Acceptance criteria is no insulation breakdown after 1 minute.

6.3.1 Poles-to-Ground, Phase-to-Phase, & Line-to-Load

Methodology

☑ Sat ☐ Unsat a. All unenergized poles should be grounded for the AC hi-pot tests.

☑ Sat ☐ Unsat b. Line to load w/ breaker open. With the breaker in the open position, apply 2,200VAC and hi-pot between phase line-to-load. Acceptance Criteria is no insulation breakdown after 1 min.

Applied Voltage: 2200 Vac (Criteria is 2,200VAC nom.)

Ø A Line to Load: Pass/Fail PASS
Ø B Line to Load: Pass/Fail PASS
Ø C Line to Load: Pass/Fail PASS

☑ Sat ☐ Unsat c. Phase to ground w/ breaker closed. Close the breaker and repeat the testing between each phase-to-ground. Acceptance Criteria is no insulation breakdown after 1 min.

Applied Voltage: 2200 Vac (Criteria is 2,200VAC nom.)

ØA to Ground: Pass/Fail PASS
ØB to Ground: Pass/Fail PASS
ØC to Ground: Pass/Fail PASS

☑ Sat ☐ Unsat d. Phase to phase w/ breaker closed. With the breaker in the closed position, apply 2,200VAC and hi-pot between phases. Acceptance Criteria is no insulation breakdown after 1 min.

Applied Voltage: 2200 Vac (Criteria is 2,200VAC nom.)

ØA to ØB: Pass/Fail PASS
ØB to ØC: Pass/Fail PASS
ØC to ØA: Pass/Fail PASS

Cradle S/N (on nameplate): N/A

6.4 OPERATION AT NOMINAL/DEGRADED/OVERVOLTAGE CONDITIONS & INTERLOCK OPERATION

on 8-6-9
* BREAKER HAS AC ~~CHARGE~~ CHARGING MOTOR.

a. With the breaker installed in a cradle.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 b. Apply 125vdc to the UV trip device circuit (if applicable).

VOLTAGE APPLIED: 125 VDC
120VAC CT 8/6/09 (SEE NOTE P.20)

c. Apply ~~125Vdc~~ to the charging motor circuit.

VOLTAGE APPLIED: 120 VAC

d. Apply 70VDC to the trip circuit.

VOTLAGE APPLIED: 70 VDC

☑ Sat ☐ Unsat T JCM Tech 8-6-9 e. Rack the breaker to the "TEST" position.

f. Verify that breaker charges as the breaker is racked to the 'TEST' position.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 g. Verify status indicators indicate that breaker is open and closing spring is charged.

h. Close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 i. Verify that the closing springs recharge.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 j. Verify status indicators indicate that breaker is closed and closing spring is charged.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 k. Trip the breaker.

l. Verify status indicators indicate that breaker is open and closing spring is charged.

m. Close the breaker.

n. Attempt to rack the breaker to the 'CONNECT' or 'DISCONNECT' positions.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 o. Verify that the breaker cannot be racked to the 'CONNECT' or 'DISCONNECT' positions.

p. Trip the breaker.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 q. Verify status indicators indicate that breaker is open and the closing spring is charged.

r. Rack the breaker beyond the 'TEST' position but before the 'CONNECT' position.

s. Attempt to close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 t. Verify that the breaker cannot be closed.

Cradle S/N (on nameplate): N/A

☑ Sat ☐ Unsat T JCM Tech 8-6-9 u. Verify status indicators indicate that breaker is open and closing spring is charged.

8-6-9 v. Rack the breaker to the 'CONNECT' position.

w. Close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 x. Verify that the closing springs recharge

☑ Sat ☐ Unsat T JCM Tech 8-6-9 y. Verify status indicators indicate that breaker is closed and closing spring is charged.

8-6-9 z. Trip the breaker.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 aa. Verify status indicators indicate that breaker is open and closing spring is charged.

8-6-9 bb. Lower the control voltage to ~~90Vdc~~ 90VAC CT 8/6/09 (SEE NOTE P.20) to the charging motor circuit.

VOLTAGE APPLIED: 88 VAC

cc. Lower the UV voltage to 85Vdc.

VOLTAGE APPLIED: 85 VDC

☑ Sat ☐ Unsat T JCM Tech 8-6-9 dd. Charge, close and trip the breaker 5 times.

8-6-9 ee. Raise the control voltage to ~~140Vdc~~ 137VAC CT 8/6/09 (SEE NOTE P.20) to the charging motor circuit.

VOLTAGE APPLIED: 137 VAC

ff. Raise the UV voltage to 140Vdc.

VOLTAGE APPLIED: 140 VDC

☑ Sat ☐ Unsat T JCM Tech 8-6-9 gg. Charge, close and trip the breaker 5 times.

8-6-9 hh. Close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 ii. With the breaker closed, attempt to rack the breaker out to the 'TEST' position.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 jj. Verify that the breaker cannot be racked to the 'TEST' position.

8-6-9 kk. Trip the breaker.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 ll. Rack the breaker to the 'TEST' position. Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'CONNECT' to the 'TEST' position.

mm. Rack the breaker back to the 'CONNECT' position.

Cradle S/N (on nameplate): N/A

6.5 ANTI-PUMPING FUNCTION

PERFORM THIS TEST 3 TIMES. Record the results in the table below.

Sections 6.5, 6.6, 6.7, 6.8 & 6.9 are to be performed with the circuit breaker racked into the cradle to the 'CONNECT' position but not racked into a cell. Note: Ensure that there is 85Vdc minimum power to the UV trip device (if applicable).

a. Apply and maintain a close signal at 125Vdc nominal. Apply a momentary trip signal at 125Vdc nominal while maintaining the close signal. Verify the breaker opens and does not re-close.

b. Release the close signal and then re-apply the close signal. Verify the breaker closes.

c. Trip the breaker.

☑ Sat ☐ Unsat T JCM Tech 8.6.9

1ST Test	2nd Test	3rd Test
☑ Sat ☐ Unsat	☑ Sat ☐ Unsat	☑ Sat ☐ Unsat

6.6 MANUAL OPERATION

☑ Sat ☐ Unsat T JCM Tech a. Remove 125VDC control voltage.

8.6.9 b. Ensure that there is 85Vdc minimum power to the UV trip device (if applicable).

c. Ensure that the breaker is open and the closing springs are discharged.

d. With the breaker in the 'CONNECT' position, verify that the circuit breaker can be manually charged using the charging handle to charge the closing spring.

☑ Sat ☐ Unsat T JCM Tech e. Verify the status indicators indicate that the closing spring is charged upon completion.

8.6.9 f. Close the breaker.

g. Trip the breaker.

6.7 TIMING TESTS

6.7.1 Shunt Trip

a. Ensure that there is 85Vdc minimum power to the UV trip device (if applicable).

b. With the breaker in the closed position, apply 70Vdc to the shunt trip coil.

APPLIED VOLTAGE: 70 VDC

Cradle S/N (on nameplate): N/A

☑ Sat ☐ Unsat T JCM Tech 8.6.9 c. Using the appropriate M&TE timing equipment, record the opening time of the main and auxiliary contacts and verify that the breaker is open.

ϕA MAIN POLE OPENING TIME: 30.5 ms (Criteria is ≤ 50mS)
ϕB MAIN POLE OPENING TIME: 30.4 ms (Criteria is ≤ 50mS)
ϕC MAIN POLE OPENING TIME: 30.5 ms (Criteria is ≤ 50mS)
AUXILIARY CONTACT OPENING TIME: 35.9 ms (Criteria is ≤ 62mS)

6.7.2 UV Trip (if applicable)

PERFORM STEPS 6.7.2.d – 6.7.2.o 3 TIMES. Record the results in the table below.

a. Apply a voltage of 105Vdc to the UV coil and close the circuit breaker.

b. Reduce the voltage until the breaker trips.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 c. Verify breaker tripped in the voltage range of 43.75 to 87.5Vdc.

TRIP VOLTAGE: 48.8 VDC (Criteria is 43.75 to 87.5VDC)

d. Re-apply a voltage of 105Vdc to the UV trip.

e. Charge and close the breaker.

f. Remove power from the UV trip.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 g. Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

	1ST Test	2nd Test	3rd Test	Acceptance Criteria
ϕA	15.7 ms	17.0 ms	16.2 ms	≤ 50mS
ϕB	15.7 ms	17.0 ms	16.1 ms	≤ 50mS
ϕC	17.0 ms	18.3 ms	17.4 ms	≤ 50mS
Auxiliary Contact	24.3 ms	23.1 ms	22.5 ms	≤ 62mS

h. After the breaker trips, attempt to close the breaker.

☑ Sat ☐ Unsat T JCM Tech Verify that breaker cannot be closed.

8.6.9 j. Apply a voltage of 135Vdc to the UV trip.

k. Charge and close the breaker.

l. Remove power from the UV trip.

Cradle S/N (on nameplate): N/A

☑ Sat ☐ Unsat T JCM Tech 8.6.9 m. Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

	1ST Test	2nd Test	3rd Test	Acceptance Criteria
ϕA	14.0 ms	16.1 ms	16.7 ms	≤ 50mS
ϕB	14.9 ms	16.9 ms	17.5 ms	≤ 50mS
ϕC	13.7 ms	17.4 ms	18.1 ms	≤ 50mS
Auxiliary Contact	25.1 ms	23.5 ms	26.4 ms	≤ 62mS

n. After the breaker trips, attempt to close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 o. Verify that breaker cannot be closed.

6.7.3 Operation of Test Pushbuttons & Test Plug

6.7.3.1 Shunt Trip Test PushButton

1. Apply 90Vdc at the secondary disconnect terminals for the shunt trip circuit.
2. Apply 85Vdc minimum to the UV trip device at the secondary disconnect terminals. The UV trip device must be energized in order to close the breaker.
3. Charge and close the breaker.

☐ Sat ☐ Unsat N/A Tech 4. Verify the nameplate on top of the shunt trip test pushbutton is designated as "TEST SHUNT".

☐ Sat ☐ Unsat ____ Tech 5. Verify the TEST SHUNT pushbutton is installed with 'ORANGE' plastic disk.

6. Push the Shunt Trip Test Button.

☐ Sat ☐ Unsat ____ Tech 7. Verify that the breaker trips.

☐ Sat ☐ Unsat ____ Tech 8. Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

ϕA MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)
ϕB MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)
ϕC MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)

AUXILIARY CONTACT OPENING TIME:_____(Criteria is ≤ 62mS)

Cradle S/N (on nameplate): N/A

6.7.3.2 UV Trip Pushbutton

a. Apply 85Vdc minimum to the UV trip device at the secondary disconnect terminals. The UV trip device must be energized in order to close the breaker.

b. Charge and close the breaker.

☐ Sat ☐ Unsat N/A Tech c. Verify the nameplate on top of the UV test trip pushbutton is designated as "TEST UV".

☐ Sat ☐ Unsat _____ Tech d. Verify the TEST UV pushbutton is installed with 'BLUE' plastic disk.

e. Push the "UV TRIP" button on the front of the breaker.

☐ Sat ☐ Unsat _____ Tech f. Verify that breaker trips.

☐ Sat ☐ Unsat _____ Tech g. Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

ϕA MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)
ϕB MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)
ϕC MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)

AUXILIARY CONTACT OPENING TIME:_____(Criteria is ≤ 62mS)

6.8 AUXILIARY SWITCH / MOC SWITCH TESTS

6.8.1 Methodology

☑ Sat ☐ Unsat T JCM Tech QC RLJ QC 8-6-06 8-6-06 8-6-06 a. With the breaker in the OPEN position, verify all auxiliary contacts and MOC contacts that are accessible by secondary disconnect pins are in the correct state (closed or open). Use the final revision of the NLI approved schematics and record discrepancies, if any. Identify each contact and record contact resistance. Acceptance Criteria is >40MΩ for open contacts and <1Ω for closed contacts. Record the readings in the table below.

NLI Drawing # with revision: 054/0753-SD-1 REV. 3

Contact ID:	Resistance:	Contact ID:	Resistance:
OF1-11 TO OF1-12 (NC)	0.2Ω		
OF1-11 TO OF1-14 (NO)	>40MΩ		
OF2-21 TO OF2-22 (NC)	0.2Ω		
OF2-21 TO OF2-24 (NO)	>40MΩ		
OF3-31 TO OF3-32 (NC)	0.2Ω		
OF3-31 TO OF3-34 (NO)	>40MΩ		
OF4-41 TO OF4-42 (NC)	0.2Ω		
OF4-41 TO OF4-44 (NO)	>40MΩ		

Cradle S/N (on nameplate): N/A

☑ Sat ☐ Unsat JCM Tech RLJ QC 8-6-09 8-6-09 8-6-09

b. With the breaker in the CLOSED position, verify all auxiliary contacts and MOC contacts that are accessible by secondary disconnect pins are in the correct state (closed or open). Use the final revision of the NLI approved schematics and record discrepancies, if any. Identify each auxiliary contact and record contact resistance. Acceptance Criteria is >40MΩ for open contacts and <1Ω for closed contacts, except for the contact in series with the trip coil. It is not practical to measure the contact resistance of this switch while closed. When the breaker is closed, measuring the resistance across secondary disconnect pins will result in the shunt trip coil resistance and not the closed contact resistance. Proper closing of this switch is verified by tripping the breaker at degraded voltage conditions. The resistance across the secondary disconnect pins, while the breaker is closed, shall be recorded for informational purposes only. Rev. 2

Contact ID:	Resistance:	Contact ID:	Resistance:
OF1-11 TO OF1-12 (NC)	>40MΩ		
OF1-11 TO OF1-14 (NO)	0.2Ω		
OF2-21 TO OF2-22 (NC)	>40MΩ		
OF2-21 TO OF2-24 (NO)	0.2Ω		
OF3-31 TO OF3-32 (NC)	>40MΩ		
OF3-31 TO OF3-34 (NO)	0.2Ω		
OF4-41 TO OF4-42 (NC)	>40MΩ		
OF4-41 TO OF4-44 (NO)	0.2Ω		

6.9 TRIP UNIT / OVERCURRENT TRIP SWITCH TESTS

6.9.1 Methodology

☐ Sat ☐ Unsat N/A Tech _____ QC

a. Overcurrent trip switch configuration/contact resistance. With the breaker closed, measure the resistance of the overcurrent trip switch contacts. Only measure those switches that are being used; i.e. only measure those switches accessible via a secondary disconnect. Verify the contacts are in the proper state using the final revision of the NLI approved schematics and record discrepancies, if any. Identify each contact and record contact resistance. Acceptance Criteria is >40MΩ for open contacts and <1Ω for closed contacts.

NLI Drawing # with revision:_____

Contact ID (SDEn):	Resistance:

Cradle S/N (on nameplate): N/A

☐ Sat ☐ Unsat N/A Tech b. Overcurrent trip switch configuration/contact resistance. While the breaker is tripped from step 6.9.1.a, verify the overcurrent trip switches changed states from step 6.9.1.a. Identify each contact and record contact resistance. Acceptance Criteria is >40MΩ for open contacts and <1Ω for closed contacts. Rev. 2

Contact ID (SDEn):	Resistance:

☐ Sat ☐ Unsat N/A Tech _____ QC c. Long-time pickup point. Perform before primary injection tests per step 6.9.1.d. Apply [(long time pickup setting) x (sensor plug rating) x 1] amps of current through all three phases. Verify the breaker does not trip and that the overload (OL) signal LED on the trip unit does not come on.

Long time pickup setting:_____Applied Current:_____

Does breaker trip?_____

Does the OL signal LED light come on?_____

Apply [(long time pickup setting) x (sensor plug rating) x 1.25] amps of current through all three phases. Verify the overload signal LED light comes on. Note: This is not a trip test; it is not required to verify that the breaker trips.

Long time pickup setting:_____ Applied Current:_____

Does the OL signal LED light come on?_____

☐ Sat ☐ Unsat N/A Tech _____ QC d. Primary injection tests. Perform primary injection testing per the primary injection test table. Perform the testing at the client settings (if applicable). The current through one phase will power the trip unit. Use the following Schneider Electric trip curves to determine the acceptable trip time for each test. The curves are in Attachment I.

- Long time tests: Curve No. 0613TC0004, dated 4/2008
- Short time tests: Curve No. 0613TC0004 or 0613TC0005, dated 4/2008 depending upon the i^2t setting
- Instantaneous tests: the acceptance criteria is ≤ 0.05 seconds, (based upon Curve No. 0613TC0007, dated 4/2008) Rev. 2

Cradle S/N (on nameplate): N/A

PRIMARY INJECTION TEST TABLE

Actual trip times:

Trip Function	Pickup Setting	Time Delay Setting	i^2t on/off	Sensor plug rating	Applied current	Trip time range acceptance criteria	ØA	ØB	ØC
Long time at 200%[1]	Ir =____	tr =____	N/A						
Long time at 500%[1,5]	Ir =____	tr =____	N/A						
Short time at 200% or 170%[2,4]	Ir =____ Isd=____	tsd =____							
Instantaneous at 200%[3]	Ii =____	N/A	N/A			≤ 0.05 seconds			

Record the client-required trip setting drawing number and revision level (if not applicable, write N/A): _____

Notes:

1. Applied current for long time testing is (long time pickup) x (sensor plug rating) x (2 or 5).
2. Applied current for short time testing is (long time pickup) x (short time pickup) x (sensor plug rating) x (2 or 1.7).
3. Applied current for instantaneous testing is (instantaneous pickup) x (sensor plug rating) x 2.
4. Perform short time primary injection testing at 200% for NT type breakers and at 170% for NW type breakers.
5. When testing long time at 500%, put the short time pickup setting at the maximum value to avoid interference.

Rev. 2

Cradle S/N (on nameplate): N/A

7.0 DESIGN TESTS

All design tests in accordance with IEEE C37.50/20 for the Masterpact LGSB11 circuit breaker have been performed and documented. Copies of the test report(s) shall be provided (if required).

8.0 DEDICATION OF DOOR

Test Equipment ID:_____ SDS Tech ID:_____

8.1 Methodology

☐ Sat ☐ Unsat N/A Tech a. Verify that the dimensions on the door matches the NLI approved door drawings by measuring the overall width, length, depth, material thickness and location of the hinges and location of the hole cut-outs and size of the hole cut-outs. Visually inspect that the door is the correct color per the client required specification. Rev. 2

NLI DRAWING NUMBER:_____

☐ Sat ☐ Unsat N/A Tech b. Verify that each door has the appropriate labeling per the door drawings.

9.0 QUALITY ASSURANCE

All activities will be performed in accordance with the requirements of the NLI Quality Assurance Program and its implementing procedures. This QA program meets the requirements of 10CFR50 Appendix B, 10CFR21 and ASME NQA-1.

10.0 MEASUREMENT & TEST EQUIPMENT

All measurement and test equipment used for the testing shall be documented in the test data sheets including the calibration due dates. All M&TE shall be traceable to a NIST or equivalent industry standard, where applicable.

11.0 REFERENCES

11.1 Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 10/2003.
11.2 IEEE C37.13-90, "ANSI Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures."
11.3 C37.16-88, "ANSI Standard for Low Voltage Power Circuit Breakers & AC Power Circuit Protectors – Preferred Ratings, Related Requirements & Application Recommendations."
11.4 C37.20.1-87, "ANSI Standard for Metal Enclosed Low Voltage Power Circuit Breaker Switchgear."
11.5 IEEE C37.50-89, "ANSI Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures Test Procedures"
11.6 IEEE C37-59-91, "IEEE Standard Requirements for Conversion of Power Switchgear Equipment."
11.7 NLI QA Manual, Rev.6 dated 12/8/04.
11.8 NLI design drawings for LGSB11 Masterpact circuit breaker and doors.
11.9 NETA ATS-1999, "Acceptance Testing Specifications for Electrical Power Distribution Equipment & Systems".
11.10 EPRI TR-017218-R1, "Guideline for Sampling in Commercial-Grade Item Acceptance Process."
11.11 MANCON-LGSB11-1, latest revision, "NLI QC Checklist for Masterpact NT Breakers."
11.12 IM-LGSB11-1, (latest revision), "NLI Instruction Manual for Square-D Masterpact NT Breakers, P/N: LGSB11."

12.0 ATTACHMENTS

Attachment I – trip curves:
- Schneider Electric Curve No. 0613TC0004, dated 4/2008
- Schneider Electric Curve No. 0613TC0005, dated 4/2008
- Schneider Electric Curve No. 0613TC0007, dated 4/2008

Attachment II – Exert from Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 10/2003, page 7. Rev. 2

Prepared by: QC RLJ 8-6-09 T JCM Date: 8-5-9

Verified by: CN 8/7/09 Date: 8/6/09

Approved by: Date: 8/7/09

Client Approval: Date:

NOTE: THE TESTING OF THE CHARGE CIRCUIT WAS PERFORMED WITH AC VOLTAGE APPLIED. THE BREAKERS ARE SUPPLIED WITH AC CHARGING MOTOR. THE ACCEPTABLE RANGE IS 90-137VAC. THE TESTING PERFORMED IS ACCEPTABLE.
CT 8/6/09

TEST DATA APPROVAL / MTE LOG

Breaker S/N: 0040963622301 Cradle S/N: N/A

MTE Log

Item Description	Test Equipment ID#	Calibration Due Date
MEGGER	MEG-NUK	06-23-10
DUCTOR	DUC-140	02-09-10
HI-POT	HIPO-NUK	02-05-10
TEST SET	HCTS-007	07-01-10
MULTIMETER	MTE-256	05-07-10
STOP WATCH	MTE-1176	12-01-09
TIMER	TIME-019	06-16-10

Discrepancy Log

Discrepancy #:	SVP Section:	Check one:	PE initials and date:
		☐ Acceptable ☐ Unacceptable	
		☐ Acceptable ☐ Unacceptable	
		☐ Acceptable ☐ Unacceptable	
		☐ Acceptable ☐ Unacceptable	
		☐ Acceptable ☐ Unacceptable	

Final Cycle Counter Reading (if applicable): 00051

Client Breaker ID (if applicable): N/A

Prepared by: QC RLJ 8-6-09 T JCM 8/8/09 Date: 8-5-9

Verified by: Date: 8/6/09

Approved by: Date: 8/7/09

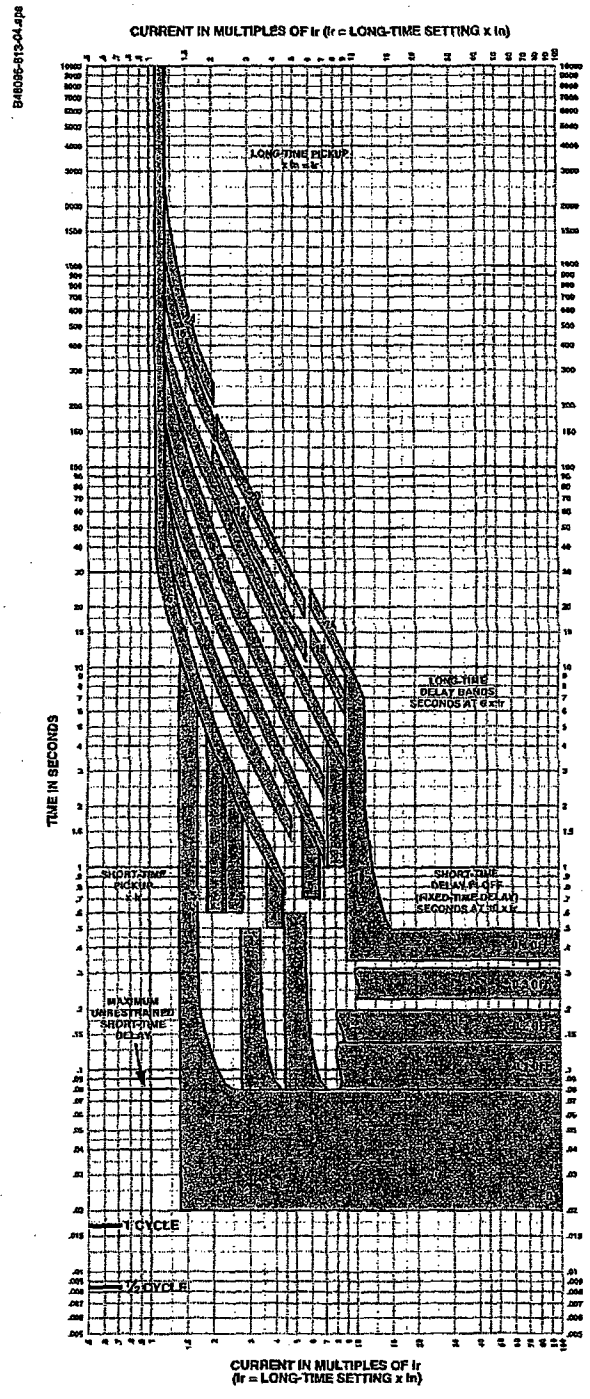
ATTACHMENT I TO SVP-102

TRIP CURVES:

- Schneider Electric Curve No. 0613TC0004, dated 4/2008
- Schneider Electric Curve No. 0613TC0005, dated 4/2008
- Schneider Electric Curve No. 0613TC0007, dated 4/2008

Micrologic 5.0/6.0 A/P/H Trip Unit

Figure 166: Micrologic 5.0/6.0 A/P/H Trip Units: Long-Time Pickup and Delay, Short-Time Pickup, and I^2t OFF Delay



Curve No. 0613TC0004
Drawing No. B48095-613-04

Micrologic 5.0/6.0 A/P/H Trip Units

Characteristic Trip Curve No. 613-4

Long-Time Pickup and Delay
Short-Time Pickup and I^2t OFF Delay

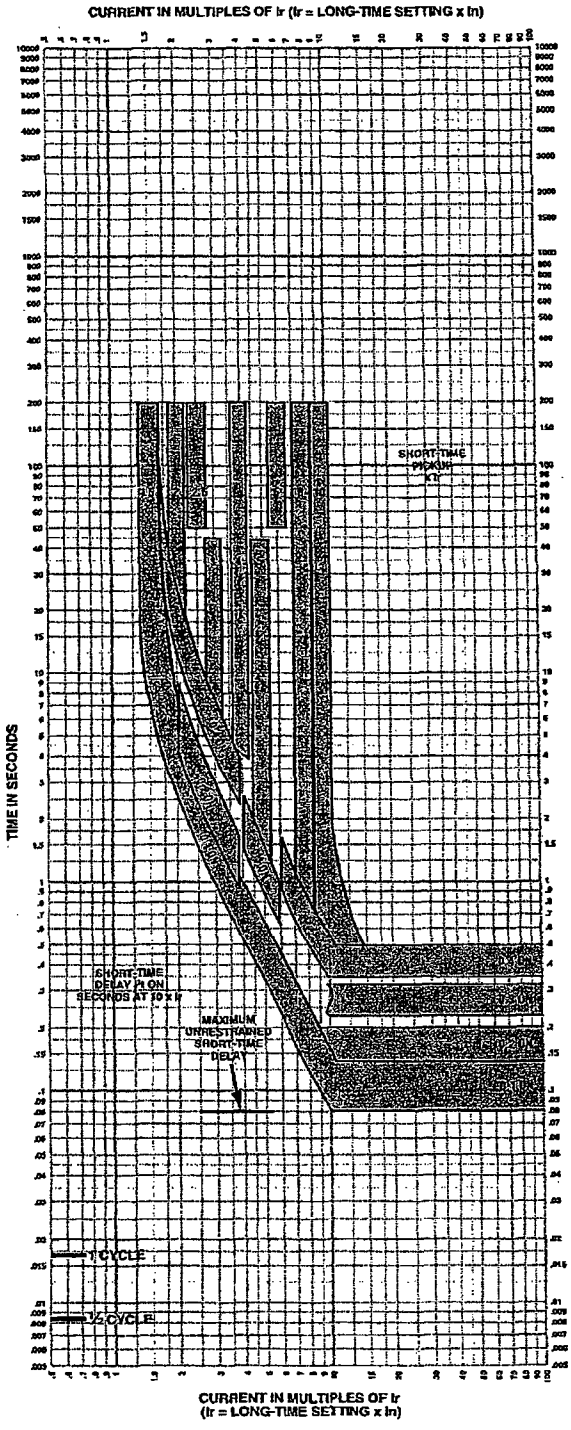
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

NOTE:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

Figure 167: Micrologic 5.0/6.0 A/P/H Trip Units: Short-Time Pickup and I^2t ON Delay



Curve No. 0613TC0005
Drawing No. 848095-613-05

Micrologic 5.0/6.0 A/P/H Trip Units

Characteristic Trip Curve No. 613-5

Short-Time Pickup and I^2t ON Delay

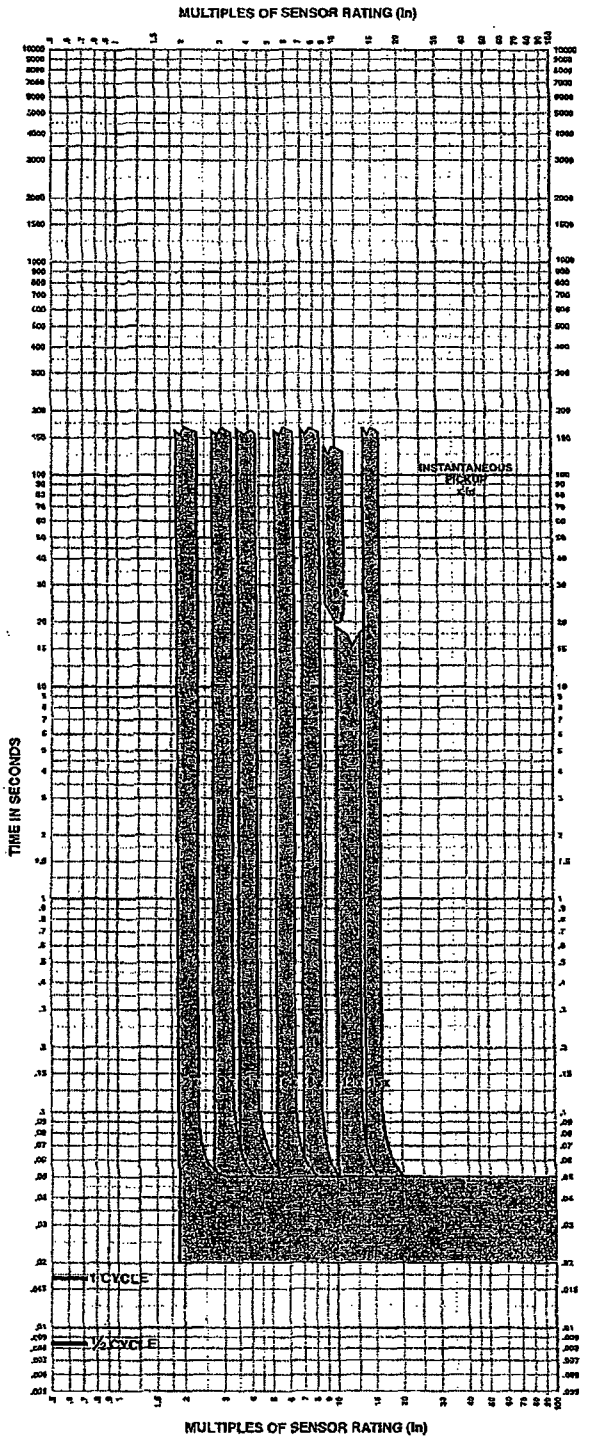
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

NOTE:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of current.
5. For withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for instantaneous override values.
6. See trip curve 613-4 for long-time pickup and delay trip curve.

Figure 168: Micrologic 5.0/6.0 Trip Units: Instantaneous Pickup, 2x to 15x and OFF



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-7

Instantaneous Pickup
2x–15x and OFF

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to +60°C ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
5. See 613-4 and 613-5 for long-time pickup, long-time delay, short-time pickup, and short-time delay trip curves.

ATTACHMENT II TO SVP-102

Excerpt from Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 4/2008: Page 7 – contact wear

Reduced Maintenance: Under normal operating conditions, the circuit breaker does not require maintenance. However, if maintenance or inspection is necessary, the arc chambers are easily removed so you may visually inspect the contacts and wear indicator groove (see the figure below for how wear is indicated). The operation counter can also indicate when inspections and possible maintenance should be done. The life of the circuit breaker may be extended by replacing the arc chamber and spring-charging motor and/or replacing the main contact assembly of ANSI Certified circuit breakers.

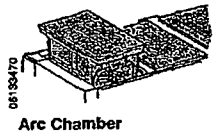
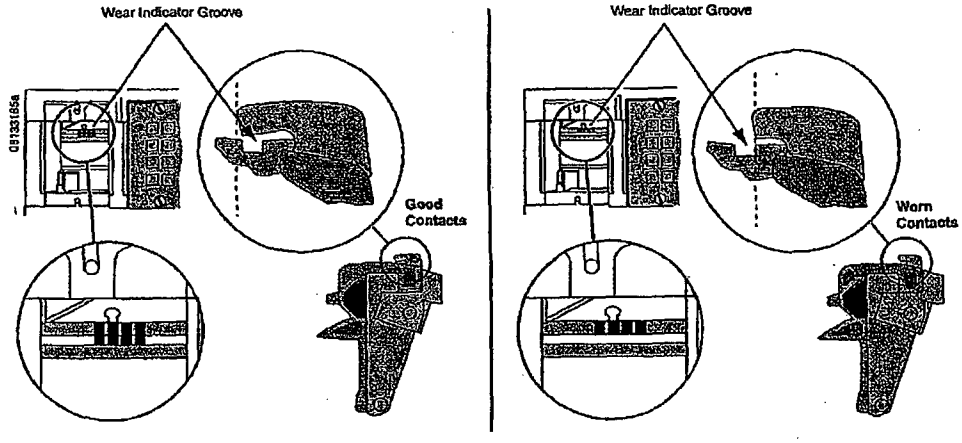


Figure 4: Contact Wear Indicators



Operating Conditions

Masterpact circuit breakers are suited for use:

- At ambient temperatures between -22°F (-30°C) and 140°F (60°C).
- At altitudes +13,000 ft. (3900 m).

Masterpact circuit breakers have been tested for operation in industrial atmospheres. It is recommended that the equipment be cooled or heated to the proper operating temperature and kept free of excessive vibration and dust. Operation at temperatures above 104°F (40°C) may require derating or overbussing the circuit breaker. See the appropriate instruction bulletin and page 15 of this catalog for additional information.

Masterpact circuit breakers meet IEC 68-2-6 Standards for vibration.

- 2 to 13.2 Hz and amplitude 0.039 in. (1 mm)
- 13.2 to 100 Hz constant acceleration 0.024 oz. (0.7 g.)

The materials used in Masterpact NT and NW circuit breakers will not support the growth of fungus and mold.

Masterpact circuit breakers have been tested to the following:

- IEC68-2-30 - Damp heat (temperature +55°C and relative humidity of 95%)
- IEC 68-2-52 level 2 - salt mist

Storage Temperature

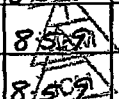
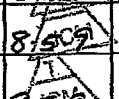
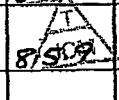
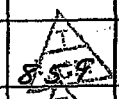
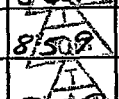
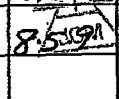
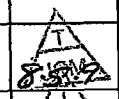
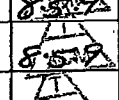
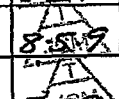
Circuit breakers with trip units without LCD displays may be stored in the original packaging at temperatures between -58°F (-50°C) and 185°F (85°C). For circuit breakers with trip units with LCD displays, this range is -40°F (-40°C) to 185°F (85°C).

INSPECTION CHECKLIST
Masterpact NT Breakers
Type: LGSB11

Cradle S/N:

	Sat	Unsat	Rework Satisfactory
Material Control	N/A		
NLI supplied dedicated material used during manufacture (fasteners, wire, lugs, grease, etc.)			
Circuit breaker p/n and s/n, See SVP Data Sheets			
Perform weld inspections per AWS. **N/A for Non-Safety Cradles.**			
Material testing (steel cradle) demonstrates material is per SDS specifications. **N/A for Non-Safety Cradles.**			
SDS purchased parts are per SDS design drawings (relays, sockets, switches, etc.) **N/A for Non-Safety Cradles.**			
Assembly Cradle Cell Interface			
N/A for Non-Safety Cradles. All wire installed is the correct size. Record wire size.			
Wire must be at least flush with end of lug barrel.			
No broken or nicked wire strands from being stripped.			
Wiring does not interfere with any moving parts.			
As-built wiring check against NLI schematic to verify correct wiring. NLI QC independent yellow-line.			
Verify the MOC actuator Snap Ring is properly installed.			
Verify the MOC E-Clips are properly installed (qty 2)			
Inspect the secondary disconnects and verify there are no cracks.			
Verify there is no binding of secondary disconnect pins.			
Verify Mobil-28 and Mobilith greases are used where they are needed only. Record locations on attached lubrication checklist.			
Verify the mechanism is free of foreign objects.			
Verify the cradle area is free of foreign objects.			
Verify torque/tightness and mark heads with Sharpie or equivalent for all accessible structural fasteners.			
	Sat	**Unsat**	**Rework Satisfactory**

Verify no loose or missing hardware in the cradle linkage.	N/A		
Verify no loose or missing hardware in the cradle frame.			
Verify primary finger assembly mounting is correct and tight.			
Verify primary finger assemblies are not damaged.			
Verify torque/tightness and mark heads with Sharpie or equivalent for all accessible electrical connections.			
Verify back primary disconnect stab mounting fastener torque 133 – 150 in/lbs. Check the accessible fasteners qty= __ of 12 fasteners. If torques are unacceptable for any fasteners, check 100%. See Figure 2.			
If the primary disconnects are removed to check 100% of the fastener torques, verify 100% of the primary disconnect mounting bolt torques.			
Verify there is clearance between fasteners/linkage and adjacent objects.			
Verify there is no binding of TOC assembly linkage.			
Verify the TOC operator Pin is loaded and cannot slip off roll pin.			
Verify the back panel nut retainers are removed in 4 locations. See Figure 3. Remove if present.			
Verify the bottom insulators are replaced after the nut retainer is removed. Verify that the fasteners are tightened properly.			
Cradle Inside			
Verify the rejection hardware configured per the design drawings and tightened properly.			
Verify the extension rail release latch is securely mounted (pin not loose). Replace rail if the pin is loose.			
Verify the extension rail mounting is tightened properly.			
Verify the primary disconnect back panel mounting bolt torque 89 - 107 in/lbs in 4 locations. See Figure 1.			
Verify discharge interlock mounting is correct and tightened properly.	↓		
	Sat	**Unsat**	**Rework Satisfactory**
Verify the breaker guide rails' mounting is correct and properly tightened.	N/A		
Verify the NT cradle to frame mounting is correct and properly tightened.	↓		

Verify the shutters operate without sticking or binding	N/A		
Masterpact Breaker Outside			
Record Breaker S/N: 06409636230l			
Verify the arc chutes mounting nut retainers are not missing and are properly installed.			
Verify the top of breaker is clean.			
Verify there are no cracks or chips in the breaker polyester case: Top, Sides, Back, Front, and Bottom.			
Verify the back insulator fins are not cracked.			
Verify the secondary block connects in test position			
Verify the secondary block housing "Locks-out" properly in the disconnected position.			
Verify the secondary block housing springs are silver in color.			
Verify the secondary block housing springs are properly installed.			
Verify the discharge interlock is properly installed – the return spring is installed.			
Verify the rejection hardware is configured per the design drawings and properly tightened.			
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks. Verify there are no cracks or chips.			
Record grease color RED. Grease must be red (Mobilith) or white (Kluber) Isoflex.			
Verify the electrical terminations are not loose.			
Verify all visible springs in the mechanism are connected and not loose.			
Verify all accessible fasteners are hand tight.			
	Sat	**Unsat**	**Rework Satisfactory**
Remove trip unit for mechanism assembly inspection. Verify there are no cracked washers.			
Apply NLI seal on trip unit after inspection.			
Verify the cover is replaced and the mounting screws are snug.			
Verify the breaker cover mounting holes are not stripped.			
Verify the Open/Close pushbutton covers are in place after inspection complete.			

Verify all cover plates are installed -Verify torque/tightness of fasteners.	I JCM 8.6.9		
Verify the counter operates properly.	I JCM 8.5.9		
Document counter reading 00051	I JCM 8.6.9		
Verify breaker is discharged, open	I JCM 8.6.9		
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision). ☑ 05410753-LD-1 REV 1 ☐	I JCM 8.6.9		
Verify the breaker data sheets filled out and signed.	I JCM 8.6.9		
Verify the Data plate is installed. Record the Date of Manufacture	N/A		
No grease on primary and secondary disconnects.	N/A		
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	I JCM 8.5.9		
Comments: MTE Used: MTE-256/5.7.10 on 8.5.9 MTE			

Inspections Performed by: I JCM Date: 8.5.9

Lubrication Points for LGSB11

Initial Points to be
Lubricated During Assembly:

	Verified	
Cradle Linkage/Cell Interface		
Cell Interlock	☐	Mobil 28
TOC Operator	☐	Mobil 28
MOC Switch Lever Pivot point	☐	Mobil 28
MOC Actuator Lever	☐	Mobil 28
MOC Operator	☐	Mobil 28
MOC Cam Roller	☐	Mobil 28
MOC Arm (1)	☐	Mobil 28
Breaker Interface		
Breaker to carriage primary clusters (6)	☐	Mobil 28
Roller Guides (2)	☐	Mobilith
Top Guide Right side (1)	☐	Mobilith
Bottom ground tabs (2)	☐	Mobilith
Extension Rail Slides (2)	☐	Mobilith

Verified By:_____ Date:_____

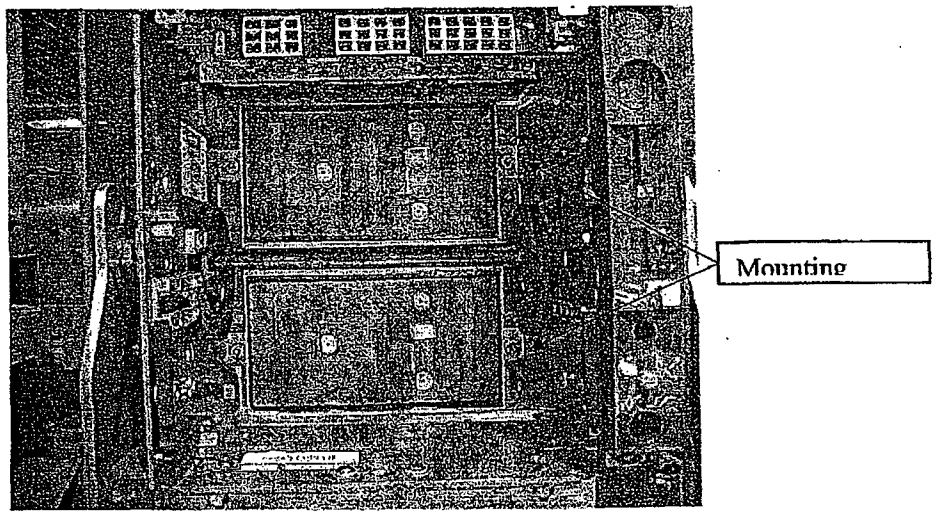


Figure 1: Location of Primary Disconnect Back Panel Mounting Bolts (qty=4)
Torque Value: 89 – 107 in-lbs

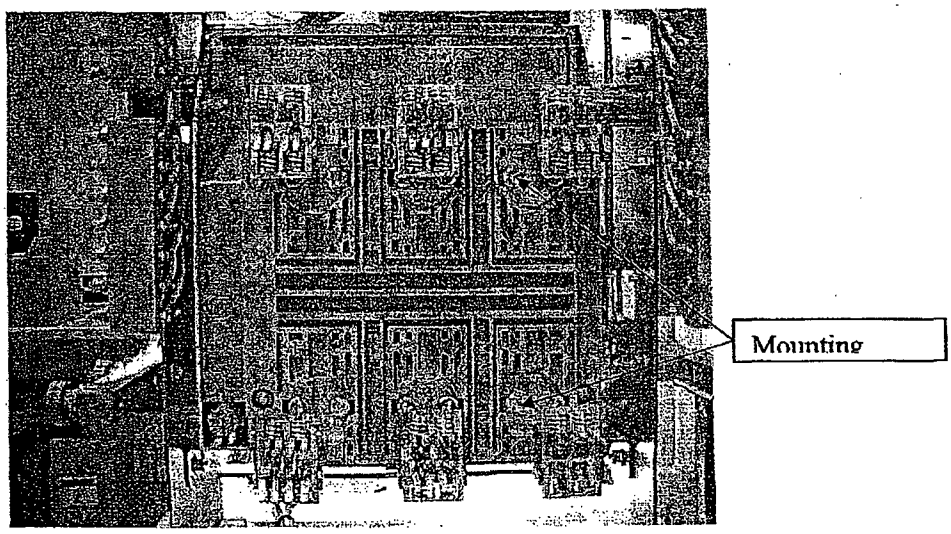


Figure 2: Location of Primary Disconnect Stabs to Back Panel Mounting Bolts (qty=12)

Torque Value: 133 – 150 in-lbs

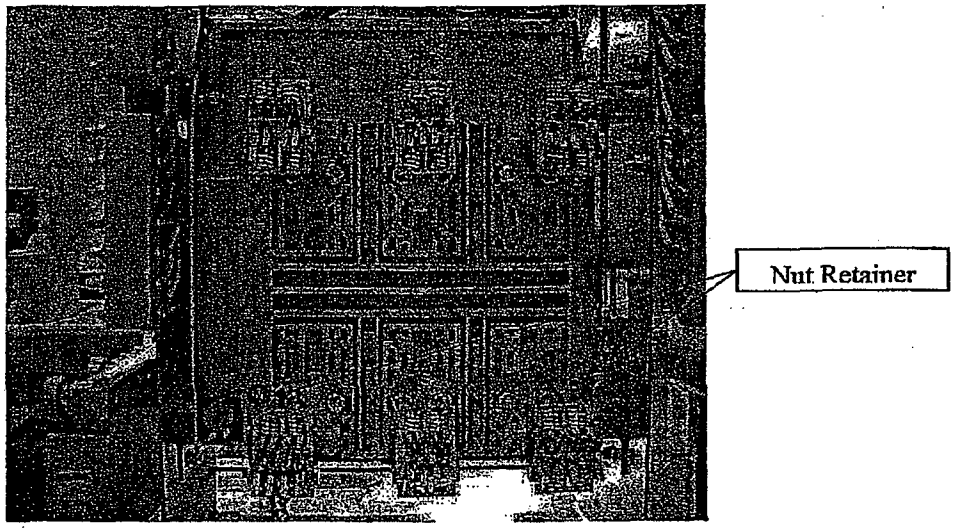
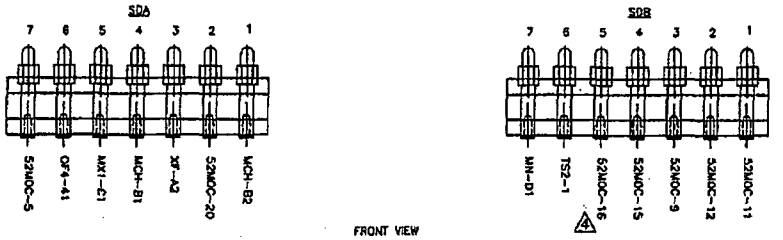
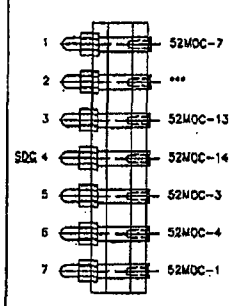


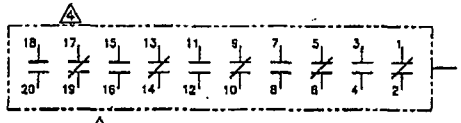
Figure 3: Location of Back Panel Nut Retainer on Primary Disconnect Mounting Back Panel
(Remove nut retainer, if present, from all 4 locations)

BREAKER S/N: 066/0963623301 N/A BREAKER ONLY

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE	6/3/08	AS
1	REVISED BREAKER INFO & TITLE BLOCK (ECN#: ECN-05410753-2).	6/12/08	AW
2	REVISED CONFIGURATION (ECN#: ECN-05410753-3).	7/1/08	AW
3	REVISED CONFIGURATION (ECN#: ECN-05410753-7).	10/13/08	AW
4	REVISED CONFIGURATION (ECN#: ECN-05410753-8).	10/14/08	AW

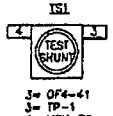


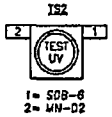


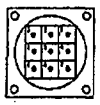


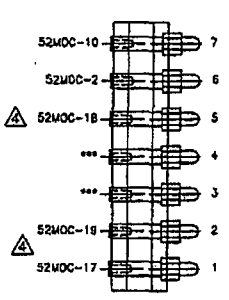
52MOC

1=SDC-7	9=SDB-3	17=SDD-1
2=SDD-6	10=SDD-7	18=SDD-5
3=SDC-5	11=SDB-1	19=SDD-2
4=SDC-6	12=SDB-2	20=SDA-2
5=SDA-7	13=SDC-3	
6=52MOC-8, TP-3	14=SDC-4	
7=SDC-1	15=SDB-4	
8=MX1-C1, 52MOC-6	16=SDB-5	









LEGEND

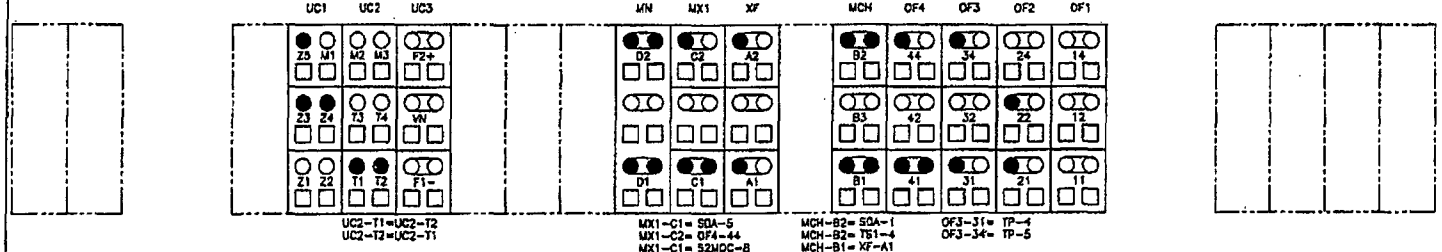
- 52MOC – BREAKER OPERATED AUXILIARY SWITCH
- MCH – SPRING CHARGING MOTOR
- MN – UNDERVOLTAGE TRIP COIL
- MX1 – SHUNT TRIP COIL
- OFn – AUXILIARY SWITCH CONTACTS
- SDn – SECONDARY DISCONNECT
- TP – TEST PLUG CONNECTOR
- TS1 – TEST SWITCH, SHUNT TRIP
- TS2 – TEST SWITCH, UNDERVOLTAGE TRIP COIL
- XF – SHUNT CLOSE COIL
- *** – NO CONNECTION
- ● – CRADLE CONNECTION POINT, USED
- ○ – CRADLE CONNECTION POINT, UNUSED
- UCn – POINTS USED WITH TRIP UNIT INSTALLATION TRIP UNIT IS NOT USED FOR THIS APPLICATION

BREAKER PART NO. INFORMATION

ASSEMBLED BREAKER (BREAKER AND CRADLE):
SQUARE D SERVICES P/N: LGSB11
NLI P/N: NLI-LGSB11

BREAKER ONLY:
SQUARE D SERVICES P/N: TA2AARNNX9SGFFXCJXN
NLI P/N: NLI-RPL-AK25-RT-001

CRADLE ONLY:
NLI P/N: NLI-RPL-CRDL-AK25-RT-001



UC2-T1=UC2-T2
UC2-T2=UC2-T1

MX1-C1= SDA-5
MX1-C2= OF4-44
MX1-C1= 52MOC-8

MCH-B2= SDA-1
MCH-B2= TS1-4
MCH-B1= XF-A1
MCH-B1= SDA-4

OF3-31= TP-4
OF3-34= TP-5

UC1-Z3=UC1-Z4
UC1-Z3=UC1-Z5
UC1-Z4=UC1-Z3
UC1-Z5=UC1-Z3

MN-D1=SDB-7
MN-D2=TS2-2
MN-D2=TP-2
MN-D1=TP-8

XF-A2=SDA-3
XF-A1=MCH-B1

OF4-41=TS1-3
OF4-41=SDA-6
OF-44=MX1-C2

OF2-21= TP-6
OF2-22= TP-7

NOTES:
1. ALL CRADLE WIRING SHALL BE 14AWG TYPE SIS, 90°C, 600V STRANDED, IEEE 383 QUALIFIED, WITH THE EXCEPTION OF THE FACTORY JUMPERS IDENTIFIED BELOW.
2. THE BREAKER IS NOT ZONE SELECTIVE INTERFACE CONNECTED. THEREFORE UC1-Z3, UC1-Z4 AND UC1-Z5 ARE JUMPERED. THESE JUMPERS ARE FACTORY INSTALLED.
3. THE BREAKER DOES NOT UTILIZE A NEUTRAL CURRENT TRANSFORMER. THEREFORE UC2-T1 AND UC2-T2 ARE JUMPERED TOGETHER. THIS JUMPER IS FACTORY INSTALLED.

		Date
DRAWN:	FVT	10/14/08
CHECK:	CT	10/14/08
APPROVE:	AW	10/14/08
CUSTOMER:		

PROJECT: REPLACEMENT BREAKERS (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE)

CLIENT: CONSTELLATION ENERGY CALVERT CLIFFS NUCLEAR POWER PLANT

CONTRACT: PO# 423110

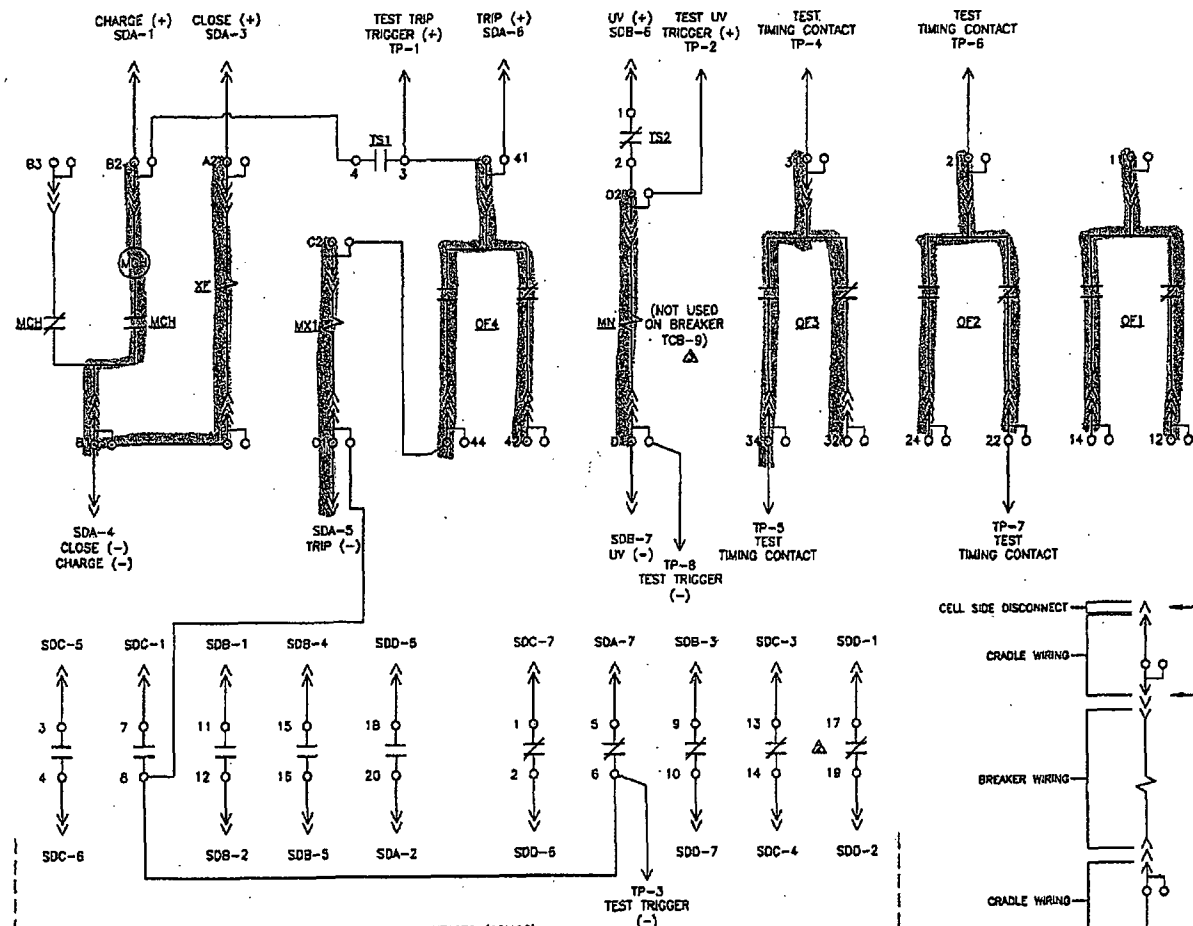
NLI NUCLEAR LOGISTICS INC.

TITLE: WIRING DIAGRAM FOR SQUARE D LGSB11 STYLE MASTERPACT BREAKER

Size B | DRAWING No. 05410753-WD-1 | REV 4

Scale: NTS | WEIGHT N/A | SHT 1 OF 1

BREAKER S/N: 0640963623O1 QC RLJ 8-6-09 T JCM 8-5-9



CRADLE/BREAKER WIRING (TYPICAL)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE	6/3/08	AS
1	REVISED BREAKER INFO & TITLE BLOCK (ECN#: ECN-05410753-2).	6/12/08	AW
2	REVISED CONTACTS (ECN#: ECN-05410753-8).	10/14/08	AW
3	ADDED INFORMATION (ECN#: ECN-05410753-9).	4/2/09	AW

LEGEND

52MOC – BREAKER OPERATED AUXILIARY SWITCH
MCH – SPRING CHARGING MOTOR
MN – UNDERVOLTAGE TRIP COIL
MX1 – SHUNT TRIP COIL
QFn – AUXILIARY SWITCH CONTACTS
SDn – SECONDARY DISCONNECT
TP – TEST PLUG CONNECTOR
TS1 – TEST SWITCH, SHUNT TRIP, MOMENTARY PUSHBUTTON, CONTACT SHOWN IN NORMAL STATE
TS2 – TEST SWITCH, UNDERVOLTAGE TRIP, MOMENTARY PUSHBUTTON, CONTACT SHOWN IN NORMAL STATE
XF – SHUNT CLOSE COIL
<<< – SECONDARY DISCONNECT FROM CRADLE TO CELL
<<< – SECONDARY DISCONNECT FROM BREAKER TO CRADLE
<– – TEST PLUG DISCONNECT
O – CONNECTION POINT

CONTROL VOLTAGE INFORMATION

CHARGE – 125 VDC
CLOSE – 125 VDC
SHUNT TRIP – 125 VDC
UNDERVOLTAGE TRIP – 125 VDC

BREAKER PART NO. INFORMATION

ASSEMBLED BREAKER (BREAKER AND CRADLE):
SQUARE D SERVICES P/N: LGSB11
NLI P/N: NLI-LGSB11

BREAKER ONLY:
SQUARE D SERVICES P/N: TA2AARNNX9SGFFXCJXN
NLI P/N: NLI-RPL-AK25-RT-001

CRADLE ONLY:
NLI P/N: NLI-RPL-CRDL-AK25-RT-001

NOTES:
1. THE STATUS OF THIS DRAWING IS WITH THE BREAKER INSTALLED IN THE CONNECTED POSITION AND THE BREAKER CHARGED AND OPEN.
2. REFERENCE NLI LAYOUT DRAWING 05410753-LO-1 FOR SPECIFICATIONS.

DRAWN:	FVT	Date 4/2/09
CHECK:	CT	4/2/09
APPROVE:	AW	4/2/09
CUSTOMER:		

PROJECT: REPLACEMENT BREAKERS (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE)

CLIENT: CONSTELLATION ENERGY CALVERT CLIFFS NUCLEAR POWER PLANT

CONTRACT: PO# 423110

NLI NUCLEAR LOGISTICS INC.

TITLE: SCHEMATIC DIAGRAM FOR SQUARE D LGSB11 STYLE MASTERPACT BREAKER

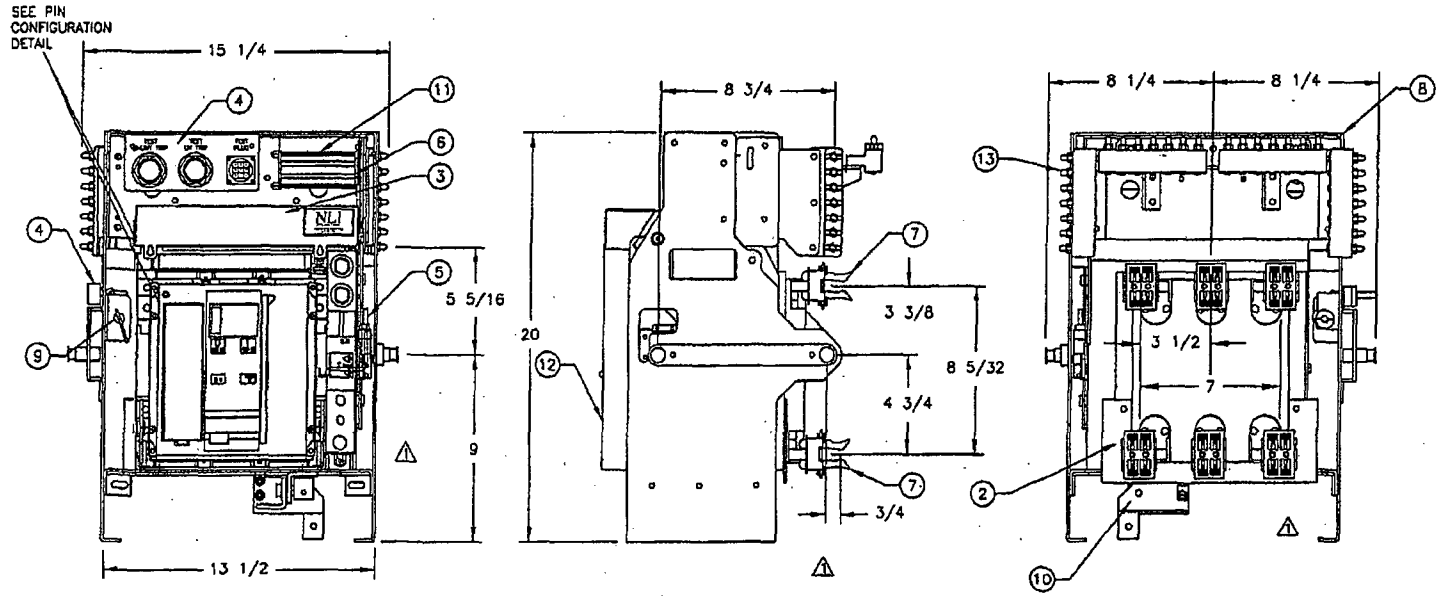
Size	DRAWING No:	REV
B	05410753-SD-1	3

Scale: NTS WEIGHT N/A SHT 1 OF 1

BREAKER S/N: 0640963623O1

N/A BREAKER DOES NOT GET REJECTION HARDWARE

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE	5/21/08	AS
1	REVISED BREAKER CONFIGURATION (ECN#: ECN-05410753-1).	6/12/08	AW

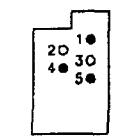


FRONT VIEW

SIDE VIEW

BACK VIEW

REJECTION PIN CONFIGURATION ON LEFT SIDE OF CRADLE



REJECTION PIN CONFIGURATION ON LEFT SIDE OF BREAKER

(FOR SAFETY RELATED BREAKER)

ITEM	QTY	DESCRIPTION
13	4	SECONDARY DISCONNECT ASSEMBLY
12	1	NT CRADLE BOTTOM PAN MODIFICATION
11	1	MOC SWITCH
10	1	TOC ASSEMBLY
9	1	RACKING INTERLOCK ASSEMBLY
8	1	FRAME ASSEMBLY
7	1	PRIMARY CURRENT PATH ASSEMBLY
6	1	SWITCH BARRIER
5	1	MOC ASSEMBLY
4	1	SWITCH BRACKET
3	1	WIRE COVER
2	1	INSULATOR, BACK
1	1	PIN GUIDE

BREAKER PART NO. INFORMATION

ASSEMBLED BREAKER (BREAKER AND CRADLE):
SQUARE D SERVICES P/N: LGSB11
NLI P/N: NLI-LGSB11

BREAKER ONLY:
SQUARE D SERVICES P/N: TA2AARNNX9SGFFXCJXN
NLI P/N: NLI-RPL-AK25-RT-001

CRADLE ONLY:
NLI P/N: NLI-RPL-CRDL-AK25-RT-001

REFERENCE DRAWING (FOR NLI INTERNAL USE ONLY)
SQUARE-D SERVICES DRAWING: AKS00001, REV. 0

SPECIFICATIONS

TRIP UNIT:	NONE
NOM. OPERATING VOLTAGE:	480VAC
RATED CURRENT:	800A
INTERRUPT RATING:	42kA @ 508VAC 30kA @ 535VAC
NOM. CONTROL VOLTAGE:	125VDC
CLOSE:	90-140VDC
CHARGE:	90-140VDC
TRIP:	70-140VDC
UV:	OPERATE - >90VDC TRIP - 44 TO 88VDC

DRAWN:	FVT	Date 6/12 08
CHECK:	CT	6/12 08
APPROVE:	AW	6/12 08
CUSTOMER:		

STANDARD TOLERANCE UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES ARE NOMINAL

PROJECT: REPLACEMENT BREAKERS (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE)

CLIENT: CONSTELLATION ENERGY CALVERT CLIFFS NUCLEAR POWER PLANT

CONTRACT: PO# 423110

NLI NUCLEAR LOGISTICS INC.

TITLE: LAYOUT DRAWING FOR SQUARE D LGSB11 STYLE MASTERPACT BREAKER

Size 8 | DRAWING No. 05410753-LD-1 | REV 1

Scale: NTS | WEIGHT N/A | SHT 1 OF 1

STANDARD VERIFICATION PLAN FOR
SQUARE-D MASTERPACT LGSB11 BREAKER
(LOW VOLTAGE CIRCUIT BREAKER)
FUNCTIONAL TESTING

TMI SPARE BREAKER ONLY

BREAKER S/N: 064096362302

ALL ELECTRICAL TESTING WAS PERFORMED IN CRADLE S/N: 25180820-002H

Document Number: SVP-102
Revision 2

Cradle S/N (on nameplate): N/A

APPROVAL

**STANDARD VERIFICATION PLAN FOR
SQUARE-D MASTERPACT LGSB11 BREAKER
(LOW VOLTAGE CIRCUIT BREAKER)
FUNCTIONAL TESTING**

This procedure is prepared in accordance with the NLI Quality Assurance Program and its implementing procedures.

Prepared by: _____ Date: 8/25/08

Verified by: _____ Date: 8/26/08

Approved by: _____ Date: 8/26/08

Cradle S/N (on nameplate): N/A

REVISION HISTORY

Revision No.	Item Description	Date
0	Original Issue	2/22/07
1	Added clarifications to sections 3.0, 5.8.3, 6.0 & 10.0. Removed Attachment I.	7/2/08
2	Renumbered sections 4 – 10, revised sections 2.1, 3.1.c, 4.0, 6.9.1.b, 8.1, added sections 6.9, 12.0, added attachment I & II	8/26/08

Cradle S/N (on nameplate): N/A

1.0 SCOPE

The purpose of this standard verification plan is to verify the critical characteristic and function of the Square-D Masterpact LGSB11 600A circuit breaker with cradle as a complete assembly. Some of the critical characteristics may not be applicable depending on the options and functions available on the assembly that is being verified. The following step numbers in this document identify the standard critical characteristics. The results shall be documented within each section of this SVP and on the NLI QC Inspection Checklist for Masterpact NT Breakers, MANCON-LGSB11-1 (latest revision).

This test plan is generally used for testing of the circuit breaker and cradle together (LGSB11 part number). If circuit breaker or cradle only testing is required, NLI engineering will specify what sections are to be performed for the specific part required to be tested.

2.0 PRODUCTION CONTROLS

The following production controls and procedures are to be in effect throughout the life of this project. All of the following activities will be performed.

2.1 Methodology

☐ Sat ☐ Unsat N/A QC a. SDS has been audited by NLI and is currently on the NLI Approved Vendor List. The NLI audit addressed the following:
1. All bolts, lugs, wire, nuts, etc. used for production have been dedicated for safety-related use.
2. All steel used in production of the cradles has been verified to be the correct material.

☐ Sat ☐ Unsat N/A QC b. NLI QC will implement the following production controls during construction. A separate QC inspection checklist will be used and maintained by QA. The sample size is 100%, unless a smaller sample size is documented. The QC checklist will verify the following items:
1. Dedicated parts supplied or verified by NLI are used during assembly as follows:
   a. Bolts, nuts, washer, and other fasteners.
   b. Lugs and wire.
   c. Steel.
   d. Mobil 28 grease.
   e. Primary and secondary fingers.
2. Welding as follows:
   a. Welding is performed per NLI-approved welding procedures.
   b. Welders performing welding activities have been CWI certified.
   c. Welds are inspected by a CWI.
3. Fastener tightness is verified on 100% of the accessible fasteners and terminations, including intermediate assemblies.
4. 100% of the wire and wire connections have been inspected. There shall be no kinks, cuts, nicks or splits in the wire.
5. Lubrication inspection
   a. Breakers are supplied without primary and secondary disconnect lubrication. Plant to lubricate per plant established procedures. Rev. 2
6. Inspect and verify that there are no loose or damaged parts.

Cradle S/N (on nameplate): N/A

3.0 BREAKER IDENTIFICATION

NOTE: Ensure that the correct engineering drawings are used for the specific client breakers during testing per this SVP.

3.1 Methodology

a. Record the Square D nameplate data of the cradle. The nameplate shall contain the following information:

1. Manufacturer: _____
2. Type (Breaker & Cradle): _____
3. Cradle Serial Number: _____
4. Style: _____
5. Rated Max Voltage/Freq: N/A
6. Rated Continuous Current: _____
7. Rated Short Circuit/Interrupt Current: _____
8. Control Voltage Range: Charge: _____
   Close: _____
   Trip: _____
9. Weight: _____
10. Conversion Date: _____

☑ Sat ☐ Unsat T JCM QC 8.5.9 b. Perform a detail inspection of the breaker & cradle for any chips, cracks, gouges or any other damage.

c. Record the circuit breaker specific data.

1. Circuit breaker p/n: NT08NA
2. Circuit breaker s/n: 06A096362302
3. Cradle date of manufacture: N/A
4. Circuit breaker date code: 09315
5. Micrologic trip unit s/n: 7082461 (DUMMY TRIP UNIT) (NO TRIP UNIT SUPPLIED)

Rev. 2

Cradle S/N (on nameplate): N/A

4.0 PROPER BREAKER CONFIGURATION

4.1 Methodology

This section is to be performed with the circuit breaker out of the cell.

a. Terminals tightened. Verify all terminals are tight during wire check.

☐ Sat ☐ Unsat N/A Tech b. Terminal identification. Verify the terminal points are labeled per the wiring/schematic drawing. Use the final revision of the NLI approved schematics and record discrepancies, if any. If there are any discrepancies found, do not proceed any further with the testing until the discrepancies have been resolved.

☑ Sat ☐ Unsat T JCM Tech 8-5-9 QC RLL QC 8-5-09 Proper wiring. Verify wiring against the final revision of the NLI approved schematic or wiring diagram. Attach a copy of the yellow-lined wiring/schematic drawing.

NLI drawing # with revision: 054/10753-SD-1 Rev. 3

☑ Sat ☐ Unsat T JCM QC 8-5-9 d. Correct programmer. Verify that the programmer, sensor plugs and rating plugs are per the design documents:

- Record the part numbers and/or rating:

  Programmer: N/A

  Rating Plug: N/A

  Sensor Plug: 800A

- Trip unit date code. Verify the trip unit date code is P05491 or later. The format of the date code is Pxxyyz, with:
  - xx = last two digits of the year.
  - yy = week.
  - z = day of the week.

  Trip Unit Date Code: P09271

☑ Sat ☐ Unsat T JCM Tech 8-5-9 e. With the breaker cover off, inspect the trip unit performer plug. The performer plug should be green. A blue performer plug is not acceptable. If a blue plug is present, replace with a green performer plug. Note: The correct green performer plug must be present during primary injection testing.

f. Trip unit is programmed for breaker type. Program the breaker type into the trip unit.

☐ Sat ☐ Unsat N/A Tech g. Trip unit battery is fully charged. Verify the battery is fully charged. Rev. 2

Cradle S/N (on nameplate): N/A

☐ Sat ☐ Unsat N/A Tech h. Verify the rejection hardware pin configuration against the final revision of the approved NLI layout drawings (if applicable).

NLI drawing # with revision:_____

Breaker pin configuration: N/A

Cradle pin configuration:_____ Rev. 2

5.0 CIRCUIT BREAKER PROPER FIT-UP & INSTALLTION

5.1 Methodology

☐ Sat ☐ Unsat N/A Tech a. Install the cradle into a typical AK-2A-25 type cell. Visually inspect that the primary disconnects, secondary disconnects and interlocks match up with the mating connectors in the cell. Verify the Truck Operated Cell Switch (TOC) flap on the cradle is aligned with the TOC switch inside the cell.

☐ Sat ☐ Unsat N/A Tech b. Ensure there is a positive ground connection between the switchgear and the cradle. Measure the continuity from the switchgear frame to the cradle frame. Maintain this continuity reading throughout this section.

☑ Sat ☐ Unsat T JCM Tech 8-5-9 c. Install the breaker into the 'DISCONNECT' position. Verify no binding of the interlocks occurs.

☑ Sat ☐ Unsat JCM Tech 8-5-9 d. Ensure that the racking crank cannot be inserted unless the "PUSH TO OPEN" button is depressed.

☑ Sat ☐ Unsat JCM Tech 8-5-9 e. Rack the breaker to the 'TEST' position. To rack the breaker into the cradle to the 'TEST' position, a racking crank is required to be inserted while pressing the 'PUSH TO OPEN' button. To begin turning the racking crank the 'STOP RELEASE' button must be pushed. Turn the racking crank clockwise until the breaker reaches the 'TEST' position. When the "TEST" position is reached, the 'STOP RELEASE' button will pop out. The status of the position indicator should show that the breaker is in the "T" position.

☐ Sat ☐ Unsat N/A Tech f. Monitor a set of closed and open TOC switch contacts. Verify that the contacts do not change state when the breaker is racked to the 'TEST' position.

☑ Sat ☐ Unsat T JCM Tech 8-5-9 g. Verify the primary disconnects, secondary disconnects and interlocks match up with the cradle without any interference or binding.

☐ Sat ☐ Unsat N/A Tech h. Verify the continuity from the switchgear frame to the cradle frame is present.

☑ Sat ☐ Unsat JCM Tech 8-5-9 i. Push the 'STOP RELEASE' button again to continue to turn the racking crank until the "CONNECT" position is reached. Again, the 'STOP RELEASE' button will pop out. The status of the position indicator should show that the breaker is in the "CONNECT" position.

Cradle S/N (on nameplate): N/A

☐ Sat ☐ Unsat N/A Tech j. Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'TEST' to the 'CONNECT' position.

k. Manually close the breaker.

l. Manually charge the breaker.

☐ Sat ☐ Unsat N/A Tech m. Verify that the cradle racking tool cannot be installed on the cradle racking mechanism and that the cradle cannot be removed from the cell.

☑ Sat ☐ Unsat T JCM Tech 8-5-9 n. Verify the primary disconnects, secondary disconnects and interlocks match up with the cradle without any interference or binding.

☐ Sat ☐ Unsat N/A Tech o. Verify the continuity from the switchgear frame to the cradle frame is present.

p. Trip the breaker.

q. Rack the breaker to the 'TEST' position.

☐ Sat ☐ Unsat N/A Tech r. Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'CONNECT' to the 'TEST' position.

s. Rack the breaker to the 'DISCONNECT' position and remove the breaker from the cradle.

t. Remove the cradle from the cell.

Cradle S/N (on nameplate): N/A

6.0 PRODUCTION TESTS

Sections 5.1, 5.2, 5.3 & 5.4 are to be performed with the circuit breaker racked into the cradle to the 'CONNECT' position but not racked into a cell.

6.1 MAIN CONTACT RESISTANCE (DUCTOR TEST)

a. This test checks the resistance of the primary current path, hinge points, wipe, connections, and quality of conductivity of the current path. Perform this test on each phase of the circuit breaker.

b. Apply 85Vdc minimum to UV trip device (if applicable). Note: UV trip device must be energized to close the breaker.

c. Connect test cables to Phase A, line & load bus or stabs.

☑ Sat ☐ Unsat T JCM Tech 8.5.9 Measure the contact resistance and record in μΩ using the appropriate M&TE. Repeat for each phase. Contact resistance for each phase is < 100μΩ.

Phase A: 29 μΩ (Criteria is < 100μΩ)
Phase B: 28 μΩ (Criteria is < 100μΩ)
Phase C: 30 μΩ (Criteria is < 100μΩ)

e. Compare the contact resistance between each phase. Contact resistance of each phase does not vary more than ±20% from the average of all three phases.

Average all phases: 29 μΩ

See discrepancy report number: N/A (N/A if all pass)

Cradle S/N (on nameplate): N/A

6.2 INSULATION INTEGRITY (DC MEGGER TEST)

6.2.1 Control Wiring

☑ Sat ☐ Unsat T JCM Tech 8.5.9 a. Control wiring except charging motor. Isolate the charging motor from the control circuit. With the breaker in the open position, apply 1000Vdc and megger each secondary disconnect to ground for 1 minute except the charging motor disconnects. Record the lowest insulation resistance. Repeat this test with the breaker in the closed position. Rev. 2

Applied Voltage: 1000 Vdc (Criteria is 1000VDC nominal)

WITH BREAKER OPEN

Lowest insulation res.: >20,000 MΩ (Criteria is ≥ 100MΩ)

WITH BREAKER CLOSED

Lowest insulation res.: >20,000 MΩ (Criteria is ≥ 100MΩ)

Record the number of tested secondary disconnects: 26

☑ Sat ☐ Unsat T JCM Tech 8.5.9 b. Charging motor. Megger the charging motor secondary disconnects (SDA-1 & SDA-2) to ground at 500Vdc for one minute. Record the lowest insulation resistance.

Perform with the breaker open discharged:

Applied Voltage: 500 Vdc (Criteria is 500VDC nominal)

Lowest insulation res.: >20,000 MΩ(Criteria is ≥ 2MΩ)

Perform with the breaker closed and charged:

Applied Voltage: 500 Vdc (Criteria is 500VDC nominal)

Lowest insulation res.: >20,000 MΩ(Criteria is ≥ 2MΩ)

Cradle S/N (on nameplate): N/A

6.2.2 **Phase-to-Phase, Phase-to-Ground, & Line-to-Load**

☑ Sat ☐ Unsat T JCM Tech 8.5.9 a. With the breaker in the closed position, apply 1000VDC and megger between phases (Note: UV trip device must be energized with 85Vdc minimum to close the breaker).

APPLIED VOLTAGE: 1000 VDC (Criteria is 1000VDC)

PHASE-TO-PHASE WITH BREAKER CLOSED

Ø A To Ø B: >20,000 MΩ (Criteria is > 100MΩ)
Ø B To Ø C: >20,000 MΩ (Criteria is > 100MΩ)
Ø C To Ø A: >20,000 MΩ (Criteria is > 100MΩ)

See discrepancy report number: N/A (N/A if all pass)

☑ Sat ☐ Unsat T JCM Tech 8.5.9 b. With the breaker in the closed position, apply 1000VDC and megger between phases to ground (Note: UV trip device must be energized with 85Vdc minimum to close the breaker).

APPLIED VOLTAGE: 1000 VDC (Criteria is 1000VDC)

PHASES-TO-GROUND WITH BREAKER CLOSED

Ø A To GROUND: >20,000 MΩ (Criteria is > 100MΩ)
Ø B To GROUND: >20,000 MΩ (Criteria is > 100MΩ)
Ø C To GROUND: >20,000 MΩ (Criteria is > 100MΩ)
See discrepancy report number: N/A (N/A if all pass)

☑ Sat ☐ Unsat T JCM Tech 8.5.9 c. With the breaker in the open position, apply 1000VDC and megger between phase line-to-load.

APPLIED VOLTAGE: 1000 VDC (Criteria is 1000VDC)

PHASE LINE-TO-LOAD WITH BREAKER OPEN

Ø A LINE To LOAD: >20,000 MΩ (Criteria is > 100MΩ)
Ø B LINE To LOAD: >20,000 MΩ (Criteria is > 100MΩ)
Ø C LINE To LOAD: >20,000 MΩ (Criteria is > 100MΩ)

See discrepancy report number: N/A (N/A if all pass)

Cradle S/N (on nameplate): N/A

6.3 INSULATION INTEGRITY (AC HI-POT TEST)

CAUTION: STAND AT LEAST 6 FEET FROM THE BREAKER DURING THIS TESTING. REMOVE THE TRIP UNIT RATING PLUG PRIOR TO PERFORMING THIS TEST.

Note: This is a "pass/fail" test. Perform this test at 2200Vac for 1 minute. Acceptance criteria is no insulation breakdown after 1 minute.

6.3.1 Poles-to-Ground, Phase-to-Phase, & Line-to-Load

Methodology

☑ Sat ☐ Unsat T JCM Tech 8.6.9 a. All unenergized poles should be grounded for the AC hi-pot tests.

☑ Sat ☐ Unsat JCM Tech 8.6.9 b. Line to load w/ breaker open. With the breaker in the open position, apply 2,200VAC and hi-pot between phase line-to-load. Acceptance Criteria is no insulation breakdown after 1 min.

Applied Voltage: 2200 Vac (Criteria is 2,200VAC nom.)

Ø A Line to Load: Pass/Fail PASS
Ø B Line to Load: Pass/Fail PASS
Ø C Line to Load: Pass/Fail PASS

☑ Sat ☐ Unsat T JCM Tech 8.6.9 c. Phase to ground w/ breaker closed. Close the breaker and repeat the testing between each phase-to-ground. Acceptance Criteria is no insulation breakdown after 1 min.

Applied Voltage: 2200 Vac (Criteria is 2,200VAC nom.)

ØA to Ground: Pass/Fail PASS
ØB to Ground: Pass/Fail PASS
ØC to Ground: Pass/Fail PASS

☑ Sat ☐ Unsat T JCM Tech 8.6.9 d. Phase to phase w/ breaker closed. With the breaker in the closed position, apply 2,200VAC and hi-pot between phases. Acceptance Criteria is no insulation breakdown after 1 min.

Applied Voltage: 2200 Vac (Criteria is 2,200VAC nom.)

ØA to ØB: Pass/Fail PASS
ØB to ØC: Pass/Fail PASS
ØC to ØA: Pass/Fail PASS

Cradle S/N (on nameplate): N/A

6.4 OPERATION AT NOMINAL/DEGRADED/OVERVOLTAGE CONDITIONS & INTERLOCK OPERATION

* BREAKER HAS AC CHARGING MOTOR.

a. With the breaker installed in a cradle.

☑ Sat ☐ Unsat T JCM Tech b. Apply 125vdc to the UV trip device circuit (if applicable).

8.6.9 VOLTAGE APPLIED: 125 VDC
120VAC CT 8/6/09 (SEE NOTE A.20)

c. Apply ~~125Vdc~~ to the charging motor circuit.

VOLTAGE APPLIED: 120 VAC

d. Apply 70VDC to the trip circuit.

VOTLAGE APPLIED: 70 VDC

☑ Sat ☐ Unsat T JCM Tech e. Rack the breaker to the "TEST" position.

8.6.9 f. Verify that breaker charges as the breaker is racked to the 'TEST' position.

☑ Sat ☐ Unsat T JCM Tech g. Verify status indicators indicate that breaker is open and closing spring is charged.

8.6.9 h. Close the breaker.

☑ Sat ☐ Unsat T JCM Tech i. Verify that the closing springs recharge.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 j. Verify status indicators indicate that breaker is closed and closing spring is charged.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 k. Trip the breaker.

8.6.9 l. Verify status indicators indicate that breaker is open and closing spring is charged.

m. Close the breaker.

n. Attempt to rack the breaker to the 'CONNECT' or 'DISCONNECT' positions.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 o. Verify that the breaker cannot be racked to the 'CONNECT' or 'DISCONNECT' positions.

p. Trip the breaker.

☑ Sat ☐ Unsat T JCM Tech q. Verify status indicators indicate that breaker is open and the closing spring is charged.

8.6.9 r. Rack the breaker beyond the 'TEST' position but before the 'CONNECT' position.

s. Attempt to close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 t. Verify that the breaker cannot be closed.

Cradle S/N (on nameplate): N/A

☑ Sat ☐ Unsat T JCM Tech 8.6.9 u. Verify status indicators indicate that breaker is open and closing spring is charged.

v. Rack the breaker to the 'CONNECT' position.

w. Close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 x. Verify that the closing springs recharge

☑ Sat ☐ Unsat T JCM Tech 8.6.9 y. Verify status indicators indicate that breaker is closed and closing spring is charged.

T JCM Tech 8.6.9 z. Trip the breaker.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 aa. Verify status indicators indicate that breaker is open and closing spring is charged.

bb. Lower the control voltage to ~~90Vdc~~ 90VAC CT 8/6/09 (SEE NOTE P.20) to the charging motor circuit.

VOLTAGE APPLIED: 88 VAC

cc. Lower the UV voltage to 85Vdc.

VOLTAGE APPLIED: 85 VDC

☑ Sat ☐ Unsat T JCM Tech 8.6.9 dd. Charge, close and trip the breaker 5 times.

ee. Raise the control voltage to ~~140Vdc~~ 137VAC CT 8/6/09 (SEE NOTE P.20) to the charging motor circuit.

VOLTAGE APPLIED: 137 VAC

ff. Raise the UV voltage to 140Vdc.

VOLTAGE APPLIED: 140 VDC

☑ Sat ☐ Unsat T JCM Tech 8.6.9 gg. Charge, close and trip the breaker 5 times.

hh. Close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 ii. With the breaker closed, attempt to rack the breaker out to the 'TEST' position.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 jj. Verify that the breaker cannot be racked to the 'TEST' position.

8.6.9 kk. Trip the breaker.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 ll. Rack the breaker to the 'TEST' position. Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'CONNECT' to the 'TEST' position.

mm. Rack the breaker back to the 'CONNECT' position.

Cradle S/N (on nameplate): N/A

6.5 ANTI-PUMPING FUNCTION

PERFORM THIS TEST 3 TIMES. Record the results in the table below.

Sections 6.5, 6.6, 6.7, 6.8 & 6.9 are to be performed with the circuit breaker racked into the cradle to the 'CONNECT' position but not racked into a cell. Note: Ensure that there is 85Vdc minimum power to the UV trip device (if applicable).

a. Apply and maintain a close signal at 125Vdc nominal. Apply a momentary trip signal at 125Vdc nominal while maintaining the close signal. Verify the breaker opens and does not re-close.

b. Release the close signal and then re-apply the close signal. Verify the breaker closes.

c. Trip the breaker.

☑ Sat ☐ Unsat T JCM Tech 8.6.9

1ST Test	2nd Test	3rd Test
☑ Sat ☐ Unsat	☑ Sat ☐ Unsat	☑ Sat ☐ Unsat

6.6 MANUAL OPERATION

☑ Sat ☐ Unsat T JCM Tech 8.6.9

a. Remove 125VDC control voltage.

b. Ensure that there is 85Vdc minimum power to the UV trip device (if applicable).

c. Ensure that the breaker is open and the closing springs are discharged.

d. With the breaker in the 'CONNECT' position, verify that the circuit breaker can be manually charged using the charging handle to charge the closing spring.

☑ Sat ☐ Unsat T JCM Tech 8.6.9

e. Verify the status indicators indicate that the closing spring is charged upon completion.

f. Close the breaker.

g. Trip the breaker.

6.7 TIMING TESTS

6.7.1 Shunt Trip

a. Ensure that there is 85Vdc minimum power to the UV trip device (if applicable).

b. With the breaker in the closed position, apply 70Vdc to the shunt trip coil.

APPLIED VOLTAGE: 70 VDC

Cradle S/N (on nameplate): N/A

☑ Sat ☐ Unsat T JCM Tech 8.6.9 Using the appropriate M&TE timing equipment, record the opening time of the main and auxiliary contacts and verify that the breaker is open.

ϕA MAIN POLE OPENING TIME: 26.9 mS (Criteria is ≤ 50mS)
ϕB MAIN POLE OPENING TIME: 28.1 mS (Criteria is ≤ 50mS)
ϕC MAIN POLE OPENING TIME: 28.1 mS (Criteria is ≤ 50mS)
AUXILIARY CONTACT OPENING TIME: 32.9 mS (Criteria is ≤ 62mS)

6.7.2 UV Trip (if applicable)

PERFORM STEPS 6.7.2.d – 6.7.2.o 3 TIMES. Record the results in the table below.

a. Apply a voltage of 105Vdc to the UV coil and close the circuit breaker.

b. Reduce the voltage until the breaker trips.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 c. Verify breaker tripped in the voltage range of 43.75 to 87.5Vdc.

TRIP VOLTAGE: 48.7 VDC (Criteria is 43.75 to 87.5VDC)

d. Re-apply a voltage of 105Vdc to the UV trip.

e. Charge and close the breaker.

f. Remove power from the UV trip.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 g. Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

	1ST Test	2nd Test	3rd Test	Acceptance Criteria
ϕA	19.0 mS	16.1 mS	19.0 mS	≤ 50mS
ϕB	19.0 mS	16.1 mS	19.0 mS	≤ 50mS
ϕC	19.0 mS	16.7 mS	19.0 mS	≤ 50mS
Auxiliary Contact	25.6 mS	25.2 mS	29.9 mS	≤ 62mS

h. After the breaker trips, attempt to close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8.6.9 i. Verify that breaker cannot be closed.

j. Apply a voltage of 135Vdc to the UV trip.

k. Charge and close the breaker.

l. Remove power from the UV trip.

Cradle S/N (on nameplate): N/A

☑ Sat ☐ Unsat T JCM Tech 8-6-9 m. Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

	1ST Test	2nd Test	3rd Test	Acceptance Criteria
ϕA	17.2 ms	23.7 ms	17.9ms	≤ 50mS
ϕB	17.7 ms	23.7 ms	17.9 ms	≤ 50mS
ϕC	17.8 ms	23.8 ms	18.0 ms	≤ 50mS
Auxiliary Contact	28.7 ms	28.7 ms	26.3 ms	≤ 62mS

n. After the breaker trips, attempt to close the breaker.

☑ Sat ☐ Unsat T JCM Tech 8-6-9 o. Verify that breaker cannot be closed.

6.7.3 Operation of Test Pushbuttons & Test Plug

6.7.3.1 Shunt Trip Test PushButton

1. Apply 90Vdc at the secondary disconnect terminals for the shunt trip circuit.
2. Apply 85Vdc minimum to the UV trip device at the secondary disconnect terminals. The UV trip device must be energized in order to close the breaker.
3. Charge and close the breaker.

☐ Sat ☐ Unsat N/A Tech 4. Verify the nameplate on top of the shunt trip test pushbutton is designated as "TEST SHUNT".

☐ Sat ☐ Unsat ____ Tech 5. Verify the TEST SHUNT pushbutton is installed with 'ORANGE' plastic disk.

6. Push the Shunt Trip Test Button.

☐ Sat ☐ Unsat ____ Tech 7. Verify that the breaker trips.

☐ Sat ☐ Unsat ✓ Tech 8. Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

ϕA MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)
ϕB MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)
ϕC MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)

AUXILIARY CONTACT OPENING TIME:_____(Criteria is ≤ 62mS)

Cradle S/N (on nameplate): N/A

6.7.3.2 UV Trip Pushbutton

a. Apply 85Vdc minimum to the UV trip device at the secondary disconnect terminals. The UV trip device must be energized in order to close the breaker.

b. Charge and close the breaker.

☐ Sat ☐ Unsat N/A Tech c. Verify the nameplate on top of the UV test trip pushbutton is designated as "TEST UV".

☐ Sat ☐ Unsat _____ Tech d. Verify the TEST UV pushbutton is installed with 'BLUE' plastic disk.

e. Push the "UV TRIP" button on the front of the breaker.

☐ Sat ☐ Unsat _____ Tech f. Verify that breaker trips.

☐ Sat ☐ Unsat _____ Tech g. Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

ϕA MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)
ϕB MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)
ϕC MAIN POLE OPENING TIME:_____ (Criteria is ≤ 50mS)

AUXILIARY CONTACT OPENING TIME:_____(Criteria is ≤ 62mS)

6.8 AUXILIARY SWITCH / MOC SWITCH TESTS

6.8.1 Methodology

☑ Sat ☐ Unsat T JCM Tech / Q 6.8.1 RiJ QC 8-6-09

a. With the breaker in the OPEN position, verify all auxiliary contacts and MOC contacts that are accessible by secondary disconnect pins are in the correct state (closed or open). Use the final revision of the NLI approved schematics and record discrepancies, if any. Identify each contact and record contact resistance. Acceptance Criteria is >40MΩ for open contacts and <1Ω for closed contacts. Record the readings in the table below.

8-6-09
8-6-9

NLI Drawing # with revision: 054/10753-SD-1 REV. 3

Contact ID:	Resistance:	Contact ID:	Resistance:
OF1-11 TO OF1-12 (NC)	0.2Ω		
OF1-11 TO OF1-14 (NO)	>40MΩ		
OF2-21 TO OF2-22 (NC)	0.2Ω		
OF2-21 TO OF2-24 (NO)	>40MΩ		
OF3-31 TO OF3-32 (NC)	0.2Ω		
OF3-31 TO OF3-34 (NO)	>40MΩ		
OF4-41 TO OF4-42 (NC)	0.2Ω		
OF4-41 TO OF4-44 (NO)	>40MΩ		

Cradle S/N (on nameplate): N/A

☑ Sat ☐ Unsat JCM Tech QC RLJ QC 8-6-09

b. With the breaker in the CLOSED position, verify all auxiliary contacts and MOC contacts that are accessible by secondary disconnect pins are in the correct state (closed or open). Use the final revision of the NLI approved schematics and record discrepancies, if any. Identify each auxiliary contact and record contact resistance. Acceptance Criteria is >40MΩ for open contacts and <1Ω for closed contacts, except for the contact in series with the trip coil. It is not practical to measure the contact resistance of this switch while closed. When the breaker is closed, measuring the resistance across secondary disconnect pins will result in the shunt trip coil resistance and not the closed contact resistance. Proper closing of this switch is verified by tripping the breaker at degraded voltage conditions. The resistance across the secondary disconnect pins, while the breaker is closed, shall be recorded for informational purposes only. Rev. 2

Contact ID:	Resistance:	Contact ID:	Resistance:
OF1-11 TO OF1-12 (NC)	>40MΩ		
OF1-11 TO OF1-14 (NO)	0.2Ω		
OF2-21 TO OF2-22 (NC)	>40MΩ		
OF2-21 TO OF2-24 (NO)	0.2Ω		
OF3-31 TO OF3-32 (NC)	>40MΩ		
OF3-31 TO OF3-34 (NO)	0.2Ω		
OF4-41 TO OF4-42 (NC)	>40MΩ		
OF4-41 TO OF4-44 (NO)	0.2Ω		

6.9 TRIP UNIT / OVERCURRENT TRIP SWITCH TESTS

6.9.1 Methodology

☐ Sat ☐ Unsat N/A Tech ____ QC

a. Overcurrent trip switch configuration/contact resistance. With the breaker closed, measure the resistance of the overcurrent trip switch contacts. Only measure those switches that are being used; i.e. only measure those switches accessible via a secondary disconnect. Verify the contacts are in the proper state using the final revision of the NLI approved schematics and record discrepancies, if any. Identify each contact and record contact resistance. Acceptance Criteria is >40MΩ for open contacts and <1Ω for closed contacts.

NLI Drawing # with revision:_____

Contact ID (SDEn):	Resistance:

Cradle S/N (on nameplate): N/A

☐ Sat ☐ Unsat N/A (Tech) b. Overcurrent trip switch configuration/contact resistance. While the breaker is tripped from step 6.9.1.a, verify the overcurrent trip switches changed states from step 6.9.1.a. Identify each contact and record contact resistance. Acceptance Criteria is >40MΩ for open contacts and <1Ω for closed contacts. Rev. 2

Contact ID (SDEn):	Resistance:

☐ Sat ☐ Unsat N/A (Tech) _____ (QC) c. Long-time pickup point. Perform before primary injection tests per step 6.9.1.d. Apply [(long time pickup setting) x (sensor plug rating) x 1] amps of current through all three phases. Verify the breaker does not trip and that the overload (OL) signal LED on the trip unit does not come on.

Long time pickup setting:_____Applied Current:_____

Does breaker trip?_____

Does the OL signal LED light come on?_____

Apply [(long time pickup setting) x (sensor plug rating) x 1.25] amps of current through all three phases. Verify the overload signal LED light comes on. Note: This is not a trip test; it is not required to verify that the breaker trips.

Long time pickup setting:_____ Applied Current:_____

Does the OL signal LED light come on?_____

☐ Sat ☐ Unsat N/A (Tech) _____ (QC) d. Primary injection tests. Perform primary injection testing per the primary injection test table. Perform the testing at the client settings (if applicable). The current through one phase will power the trip unit. Use the following Schneider Electric trip curves to determine the acceptable trip time for each test. The curves are in Attachment I.

- Long time tests: Curve No. 0613TC0004, dated 4/2008
- Short time tests: Curve No. 0613TC0004 or 0613TC0005, dated 4/2008 depending upon the i^2t setting
- Instantaneous tests: the acceptance criteria is ≤ 0.05 seconds, (based upon Curve No. 0613TC0007, dated 4/2008) Rev. 2

Cradle S/N (on nameplate): N/A

PRIMARY INJECTION TEST TABLE

Actual trip times:

Trip Function	Pickup Setting	Time Delay Setting	i^2t on/off	Sensor plug rating	Applied current	Trip time range acceptance criteria	ØA	ØB	ØC
Long time at 200%[1]	Ir =____	tr =____	N/A						
Long time at 500%[1,5]	Ir =____	tr =____	N/A			N/A			
Short time at 200% or 170%[2,4]	Ir =____ Isd=____	tsd =____							
Instantaneous at 200%[3]	Ii =____	N/A	N/A			≤ 0.05 seconds			

Record the client-required trip setting drawing number and revision level (if not applicable, write N/A): _____

Notes:

1. Applied current for long time testing is (long time pickup) x (sensor plug rating) x (2 or 5).
2. Applied current for short time testing is (long time pickup) x (short time pickup) x (sensor plug rating) x (2 or 1.7).
3. Applied current for instantaneous testing is (instantaneous pickup) x (sensor plug rating) x 2.
4. Perform short time primary injection testing at 200% for NT type breakers and at 170% for NW type breakers.
5. When testing long time at 500%, put the short time pickup setting at the maximum value to avoid interference.

Rev. 2

Cradle S/N (on nameplate): N/A

7.0 DESIGN TESTS

All design tests in accordance with IEEE C37.50/20 for the Masterpact LGSB11 circuit breaker have been performed and documented. Copies of the test report(s) shall be provided (if required).

8.0 DEDICATION OF DOOR

Test Equipment ID:_____ SDS Tech ID:_____

8.1 Methodology

☐ Sat ☐ Unsat N/A Tech a. Verify that the dimensions on the door matches the NLI approved door drawings by measuring the overall width, length, depth, material thickness and location of the hinges and location of the hole cut-outs and size of the hole cut-outs. Visually inspect that the door is the correct color per the client required specification. Rev. 2

NLI DRAWING NUMBER:_____

☐ Sat ☐ Unsat N/A Tech b. Verify that each door has the appropriate labeling per the door drawings.

9.0 QUALITY ASSURANCE

All activities will be performed in accordance with the requirements of the NLI Quality Assurance Program and its implementing procedures. This QA program meets the requirements of 10CFR50 Appendix B, 10CFR21 and ASME NQA-1.

10.0 MEASUREMENT & TEST EQUIPMENT

All measurement and test equipment used for the testing shall be documented in the test data sheets including the calibration due dates. All M&TE shall be traceable to a NIST or equivalent industry standard, where applicable.

11.0 REFERENCES

11.1 Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 10/2003.
11.2 IEEE C37.13-90, "ANSI Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures."
11.3 C37.16-88, "ANSI Standard for Low Voltage Power Circuit Breakers & AC Power Circuit Protectors – Preferred Ratings, Related Requirements & Application Recommendations."
11.4 C37.20.1-87, "ANSI Standard for Metal Enclosed Low Voltage Power Circuit Breaker Switchgear."
11.5 IEEE C37.50-89, "ANSI Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures Test Procedures"
11.6 IEEE C37-59-91, "IEEE Standard Requirements for Conversion of Power Switchgear Equipment."
11.7 NLI QA Manual, Rev.6 dated 12/8/04.
11.8 NLI design drawings for LGSB11 Masterpact circuit breaker and doors.
11.9 NETA ATS-1999, "Acceptance Testing Specifications for Electrical Power Distribution Equipment & Systems".
11.10 EPRI TR-017218-R1, "Guideline for Sampling in Commercial-Grade Item Acceptance Process."
11.11 MANCON-LGSB11-1, latest revision, "NLI QC Checklist for Masterpact NT Breakers."
11.12 IM-LGSB11-1, (latest revision), "NLI Instruction Manual for Square-D Masterpact NT Breakers, P/N: LGSB11."

12.0 ATTACHMENTS

Attachment I – trip curves:

- Schneider Electric Curve No. 0613TC0004, dated 4/2008
- Schneider Electric Curve No. 0613TC0005, dated 4/2008
- Schneider Electric Curve No. 0613TC0007, dated 4/2008

Attachment II – Exert from Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 10/2003, page 7. Rev. 2

Prepared by: QC RLJ 8-6-09 T JCM Date: 8-5-9

Verified by: 8/7/09 Date: 8/6/09

Approved by: Date: 8/7/09

Client Approval: Date:

NOTE: THE TESTING OF THE CHARGE CIRCUIT WAS PERFORMED WITH AC VOLTAGE APPLIED. THE BREAKERS ARE SUPPLIED WITH AC CHARGING MOTOR. THE ACCEPTABLE RANGE IS 90-139 VAC. THE TESTING PERFORMED IS ACCEPTABLE.

CT 8/6/09

TEST DATA APPROVAL / MTE LOG

Breaker S/N: 064096362302 Cradle S/N: N/A

MTE Log

Item Description	Test Equipment ID#	Calibration Due Date
MEGGER	MEG-NUK	06-23-10
DUCTOR	DUC-140	02-09-10
HI-POT	HIPO-NUK	02-05-10
TEST SET	HCTS-007	07-01-10
MULTIMETER	MTE-256	05-07-10
STOP WATCH	MTE-1176	12-01-09
TIMER	TIME-019	06-16-10

Discrepancy Log

Discrepancy #:	SVP Section:	Check one:	PE initials and date:
		☐ Acceptable ☐ Unacceptable	
		☐ Acceptable ☐ Unacceptable	
		☐ Acceptable ☐ Unacceptable	
		☐ Acceptable ☐ Unacceptable	
		☐ Acceptable ☐ Unacceptable	

Final Cycle Counter Reading (if applicable): 00056

Client Breaker ID (if applicable): N/A

Prepared by: QC/QAV 8-6-09 T/ICM CW 8/7/09 Date: 08-05-09

Verified by: Date: 8/6/09

Approved by: Date: 8/7/09

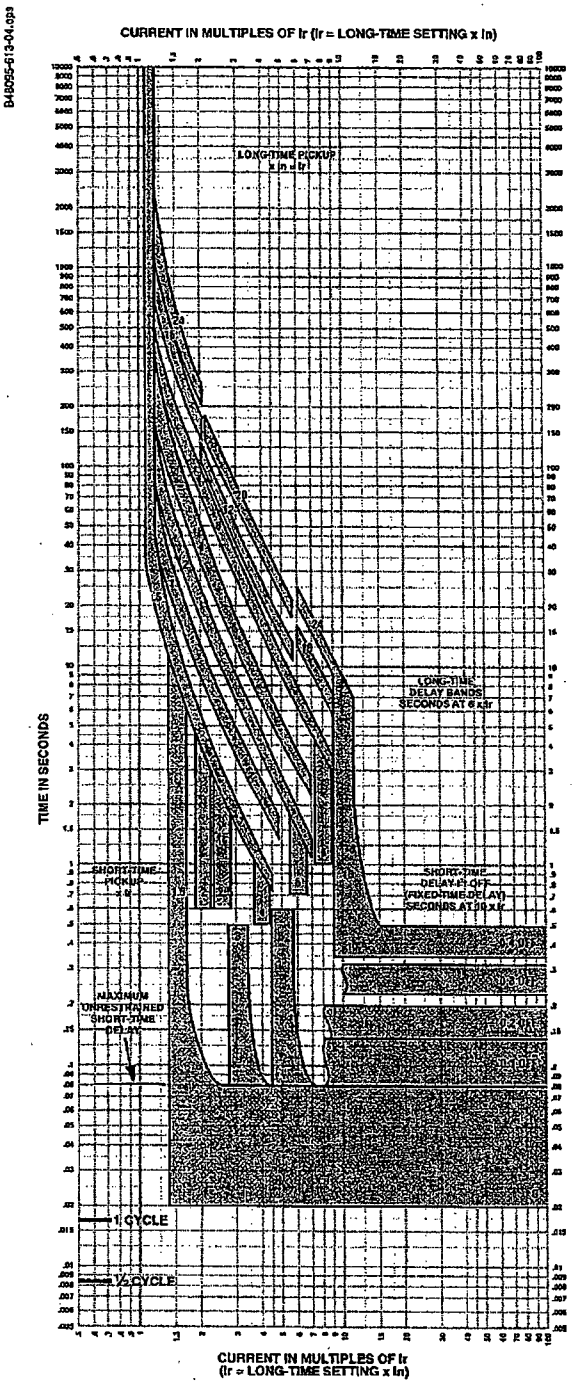
ATTACHMENT I TO SVP-102

TRIP CURVES:

- Schneider Electric Curve No. 0613TC0004, dated 4/2008
- Schneider Electric Curve No. 0613TC0005, dated 4/2008
- Schneider Electric Curve No. 0613TC0007, dated 4/2008

Micrologic 5.0/6.0 A/P/H Trip Unit

Figure 166: Micrologic 5.0/6.0 A/P/H Trip Units: Long-Time Pickup and Delay, Short-Time Pickup, and I^2t OFF Delay



Micrologic 5.0/6.0 A/P/H Trip Units

Characteristic Trip Curve No. 613-4

Long-Time Pickup and Delay
Short-Time Pickup and I^2t OFF Delay

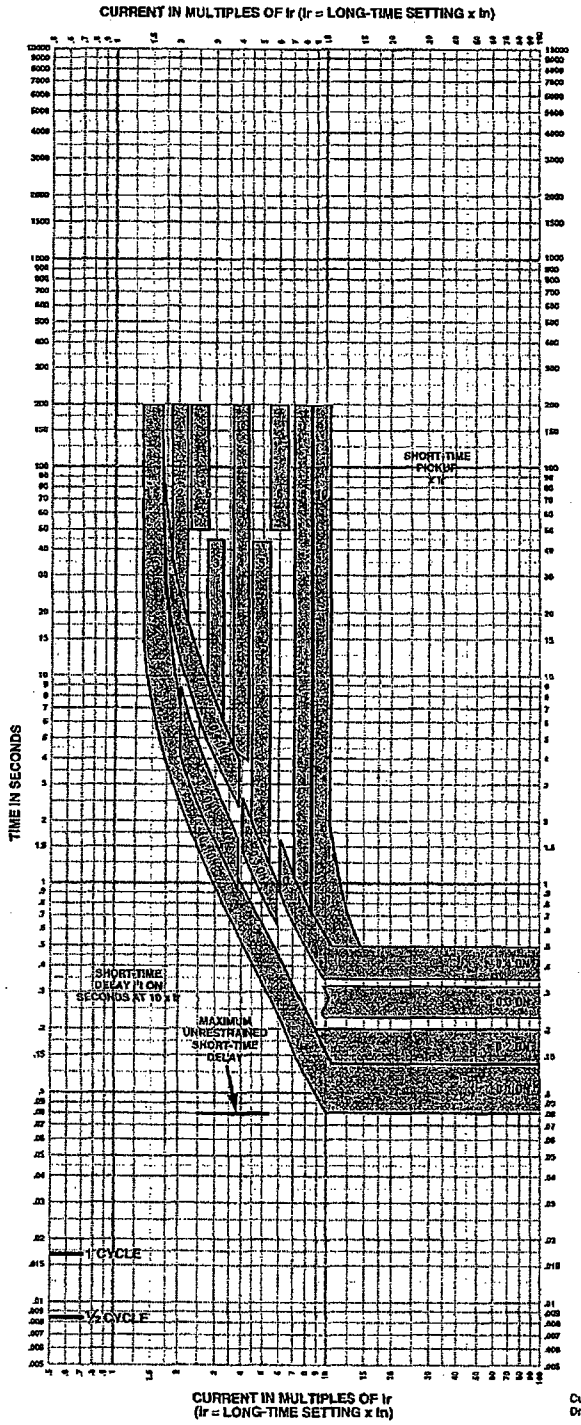
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

NOTE:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

Figure 167: Micrologic 5.0/6.0 A/P/H Trip Units: Short-Time Pickup and I^2t ON Delay



Curve No. 0613TC0005
Drawing No. B48095-613-05

Micrologic 5.0/6.0 A/P/H Trip Units

Characteristic Trip Curve No. 613-5

Short-Time Pickup and I^2t ON Delay

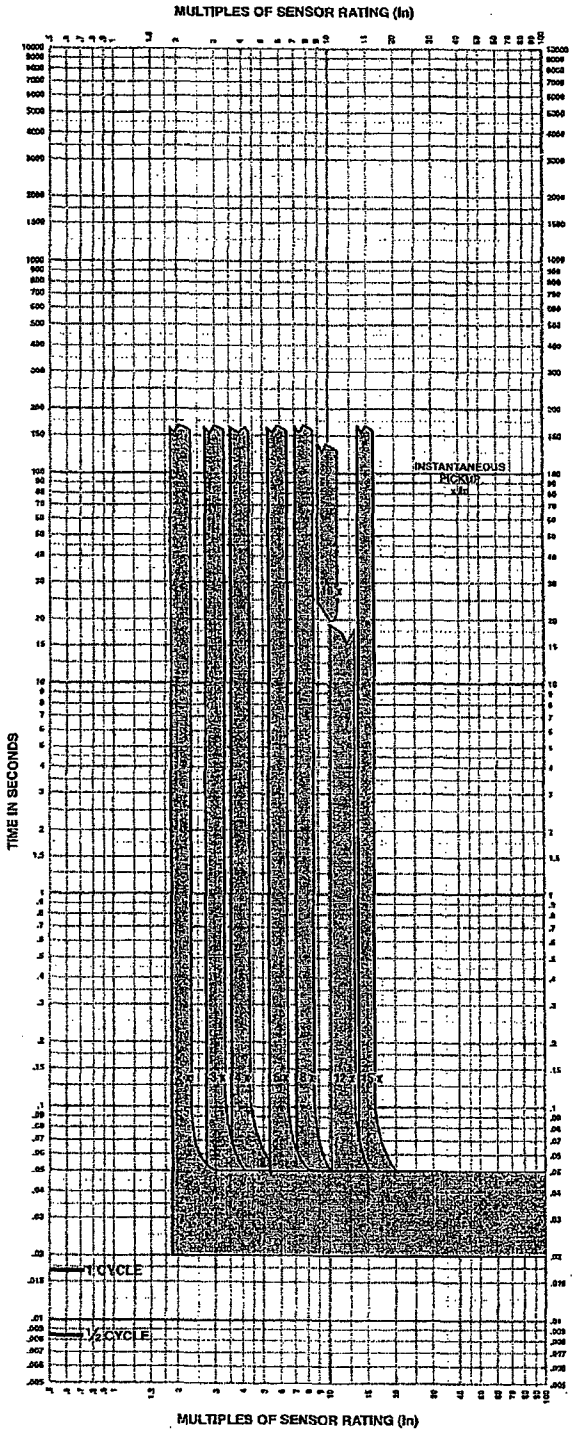
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

NOTE:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of current.
5. For withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for instantaneous override values.
6. See trip curve 613-4 for long-time pickup and delay trip curve.

Figure 168: Micrologic 5.0/6.0 Trip Units: Instantaneous Pickup, 2x to 15x and OFF



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-7

Instantaneous Pickup
2x–15x and OFF

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to +60°C ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
5. See 613-4 and 613-6 for long-time pickup, long-time delay, short-time pickup, and short-time delay trip curves.

ATTACHMENT II TO SVP-102

Excerpt from Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 4/2008: Page 7 – contact wear

Reduced Maintenance: Under normal operating conditions, the circuit breaker does not require maintenance. However, if maintenance or inspection is necessary, the arc chambers are easily removed so you may visually inspect the contacts and wear indicator groove (see the figure below for how wear is indicated). The operation counter can also indicate when inspections and possible maintenance should be done. The life of the circuit breaker may be extended by replacing the arc chamber and spring-charging motor and/or replacing the main contact assembly of ANSI Certified circuit breakers.

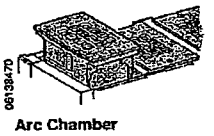
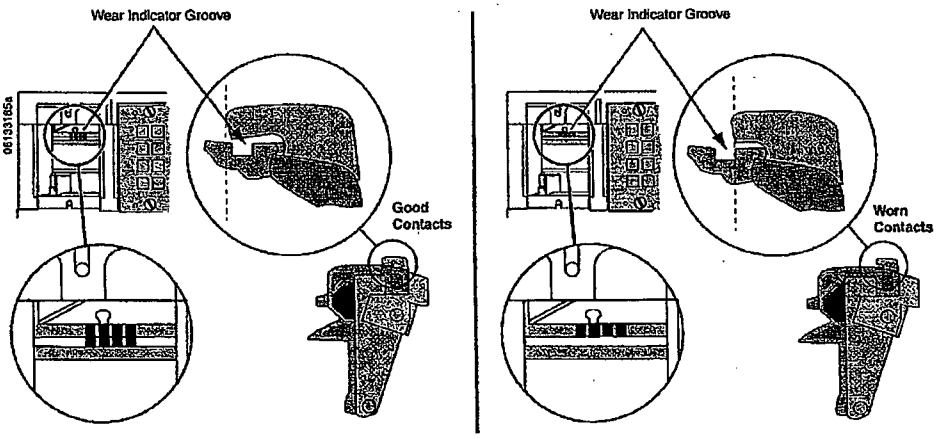


Figure 4: Contact Wear Indicators



Operating Conditions

Masterpact circuit breakers are suited for use:

- At ambient temperatures between -22°F (-30°C) and 140°F (60°C).
- At altitudes +13,000 ft. (3900 m).

Masterpact circuit breakers have been tested for operation in industrial atmospheres. It is recommended that the equipment be cooled or heated to the proper operating temperature and kept free of excessive vibration and dust. Operation at temperatures above 104°F (40°C) may require derating or overbussing the circuit breaker. See the appropriate instruction bulletin and page 15 of this catalog for additional information.

Masterpact circuit breakers meet IEC 68-2-6 Standards for vibration.

- 2 to 13.2 Hz and amplitude 0.039 in. (1 mm)
- 13.2 to 100 Hz constant acceleration 0.024 oz. (0.7 g.)

The materials used in Masterpact NT and NW circuit breakers will not support the growth of fungus and mold.

Masterpact circuit breakers have been tested to the following:

- IEC68-2-30 - Damp heat (temperature +55°C and relative humidity of 95%)
- IEC 68-2-52 level 2 - salt mist

Storage Temperature

Circuit breakers with trip units without LCD displays may be stored in the original packaging at temperatures between -58°F (-50°C) and 185°F (85°C). For circuit breakers with trip units with LCD displays, this range is -40°F (-40°C) to 185°F (85°C).

INSPECTION CHECKLIST
Masterpact NT Breakers
Type: LGSB11

Cradle S/N:

	Sat	Unsat	Rework Satisfactory
Material Control	N/A		
NLI supplied dedicated material used during manufacture (fasteners, wire, lugs, grease, etc.)			
Circuit breaker p/n and s/n, See SVP Data Sheets			
Perform weld inspections per AWS. **N/A for Non-Safety Cradles.**			
Material testing (steel cradle) demonstrates material is per SDS specifications. **N/A for Non-Safety Cradles.**			
SDS purchased parts are per SDS design drawings (relays, sockets, switches, etc.) **N/A for Non-Safety Cradles.**			
Assembly Cradle Cell Interface			
N/A for Non-Safety Cradles. All wire installed is the correct size. Record wire size.			
Wire must be at least flush with end of lug barrel.			
No broken or nicked wire strands from being stripped.			
Wiring does not interfere with any moving parts.			
As-built wiring check against NLI schematic to verify correct wiring. NLI QC independent yellow-line.			
Verify the MOC actuator Snap Ring is properly installed.			
Verify the MOC E-Clips are properly installed (qty 2)			
Inspect the secondary disconnects and verify there are no cracks.			
Verify there is no binding of secondary disconnect pins.			
Verify Mobil-28 and Mobilith greases are used where they are needed only. Record locations on attached lubrication checklist.			
Verify the mechanism is free of foreign objects.			
Verify the cradle area is free of foreign objects.			
Verify torque/tightness and mark heads with Sharpie or equivalent for all accessible structural fasteners.			
	Sat	**Unsat**	**Rework Satisfactory**

Verify no loose or missing hardware in the cradle linkage.	N/A		
Verify no loose or missing hardware in the cradle frame.			
Verify primary finger assembly mounting is correct and tight.			
Verify primary finger assemblies are not damaged.			
Verify torque/tightness and mark heads with Sharpie or equivalent for all accessible electrical connections.			
Verify back primary disconnect stab mounting fastener torque 133 – 150 in/lbs. Check the accessible fasteners qty= __ of 12 fasteners. If torques are unacceptable for any fasteners, check 100%. See Figure 2.			
If the primary disconnects are removed to check 100% of the fastener torques, verify 100% of the primary disconnect mounting bolt torques.			
Verify there is clearance between fasteners/linkage and adjacent objects.			
Verify there is no binding of TOC assembly linkage.			
Verify the TOC operator Pin is loaded and cannot slip off roll pin.			
Verify the back panel nut retainers are removed in 4 locations. See Figure 3. Remove if present.			
Verify the bottom insulators are replaced after the nut retainer is removed. Verify that the fasteners are tightened properly.			
Cradle Inside			
Verify the rejection hardware configured per the design drawings and tightened properly.			
Verify the extension rail release latch is securely mounted (pin not loose). Replace rail if the pin is loose.			
Verify the extension rail mounting is tightened properly.			
Verify the primary disconnect back panel mounting bolt torque 89 - 107 in/lbs in 4 locations. See Figure 1.			
Verify discharge interlock mounting is correct and tightened properly.	↓		
	Sat	**Unsat**	**Rework Satisfactory**
Verify the breaker guide rails' mounting is correct and properly tightened.	N/A		
Verify the NT cradle to frame mounting is correct and properly tightened.	↓		

Verify the shutters operate without sticking or binding	N/A		
Masterpact Breaker Outside			
Record Breaker S/N: 06d096362302	8:59		
Verify the arc chutes mounting nut retainers are not missing and are properly installed.	8:59		
Verify the top of breaker is clean.	8:59		
Verify there are no cracks or chips in the breaker polyester case: Top, Sides, Back, Front, and Bottom.	8:59		
Verify the back insulator fins are not cracked.	8:59		
Verify the secondary block connects in test position	8:59		
Verify the secondary block housing "Locks-out" properly in the disconnected position.	8:59		
Verify the secondary block housing springs are silver in color.	8:59		
Verify the secondary block housing springs are properly installed.	8:59		
Verify the discharge interlock is properly installed – the return spring is installed.	8:59		
Verify the rejection hardware is configured per the design drawings and properly tightened.	8:59		
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks. Verify there are no cracks or chips.	8:59		
Record grease color RED. Grease must be red (Mobilith) or white (Kluber) Isoflex.	8:59		
Verify the electrical terminations are not loose.	8:59		
Verify all visible springs in the mechanism are connected and not loose.	8:59		
Verify all accessible fasteners are hand tight.	8:59		
	Sat	**Unsat**	**Rework Satisfactory**
Remove trip unit for mechanism assembly inspection. Verify there are no cracked washers.	8:59		
Apply NLI seal on trip unit after inspection.	8:59		
Verify the cover is replaced and the mounting screws are snug.	8:59		
Verify the breaker cover mounting holes are not stripped.	8:59		
Verify the Open/Close pushbutton covers are in place after inspection complete.	8:59		

Verify all cover plates are installed -Verify torque/tightness of fasteners.	T 8.5.9		
Verify the counter operates properly.	T 8.5.9		
Document counter reading 000516	T 8.6.9		
Verify breaker is discharged, open	T JCM 8.6.9		
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision). ☑ 054/10753-CD-1 REV. 1 ☐	T JCM 8.6.9		
Verify the breaker data sheets filled out and signed.	T JCM 8.6.9		
Verify the Data plate is installed. Record the Date of Manufacture	N/A		
No grease on primary and secondary disconnects.	N/A		
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	T JCM 8.5.9		
Comments: MTE Used: on 8.5.9 2K MTE-256/ 5.7.10			

Inspections Performed by: T JCM Date: 8.5.9

Lubrication Points for LGSB11

Initial Points to be
Lubricated During Assembly:

	Verified	
Cradle Linkage/Cell Interface		
Cell Interlock	☐	Mobil 28
TOC Operator	☐	Mobil 28
MOC Switch Lever Pivot point	☐	Mobil 28
MOC Actuator Lever	☐	Mobil 28
MOC Operator	☐	Mobil 28
MOC Cam Roller	☐	Mobil 28
MOC Arm (1)	☐	Mobil 28
Breaker Interface		
Breaker to carriage primary clusters (6)	☐	Mobil 28
Roller Guides (2)	☐	Mobilith
Top Guide Right side (1)	☐	Mobilith
Bottom ground tabs (2)	☐	Mobilith
Extension Rail Slides (2)	☐	Mobilith

Verified By:_____ Date:_____

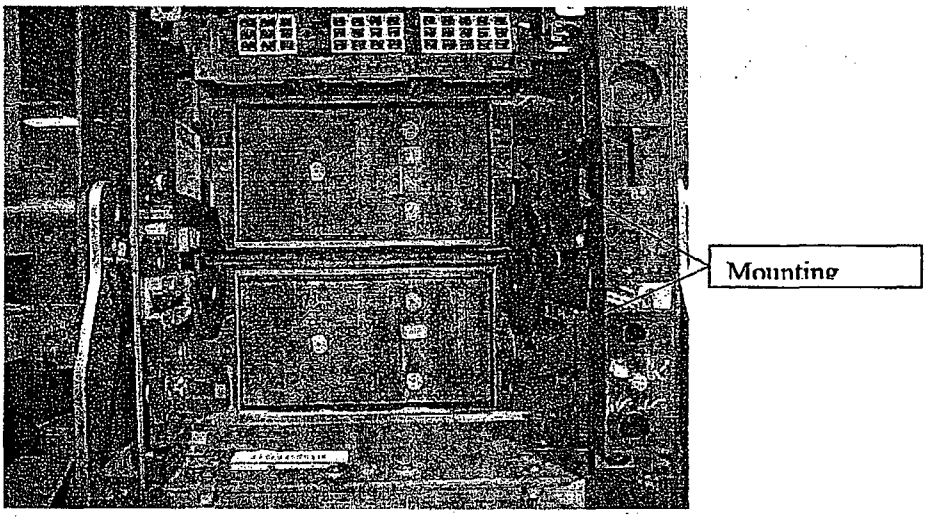


Figure 1: Location of Primary Disconnect Back Panel Mounting Bolts (qty=4)
Torque Value: 89 – 107 in-lbs

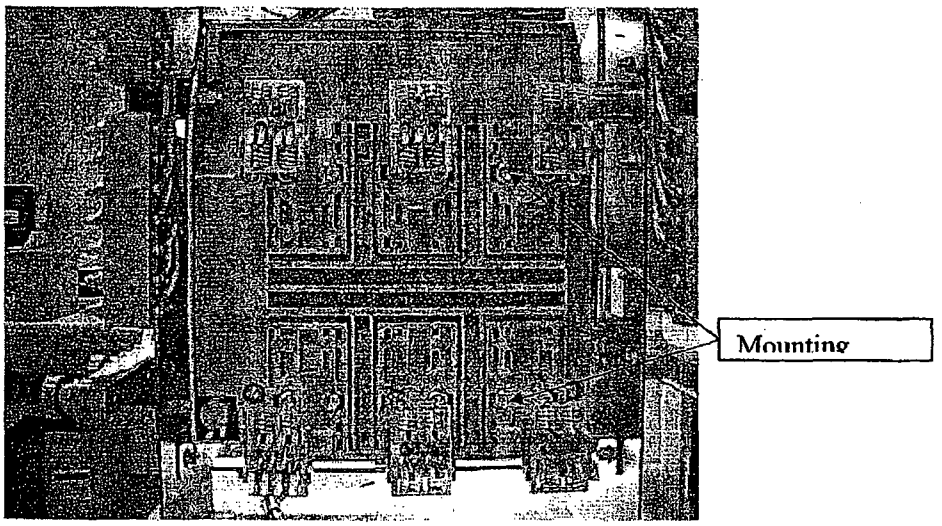


Figure 2: Location of Primary Disconnect Stabs to Back Panel Mounting Bolts (qty=12)

Torque Value: 133 – 150 in-lbs

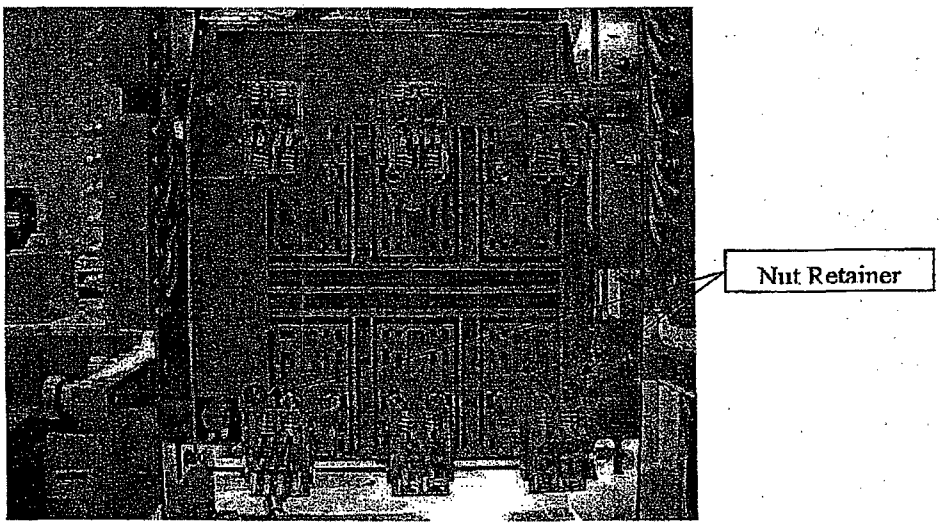
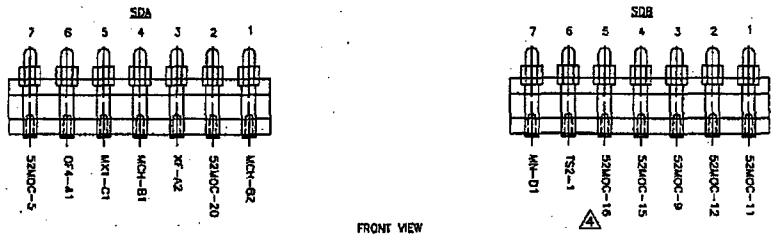


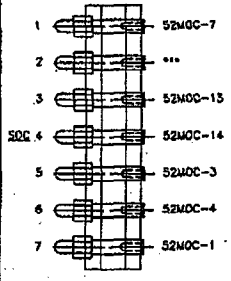
Figure 3: Location of Back Panel Nut Retainer on Primary Disconnect Mounting Back Panel
(Remove nut retainer, if present, from all 4 locations)

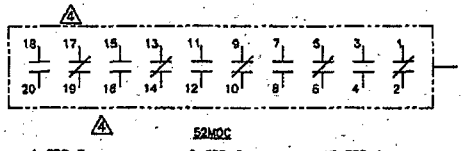
BREAKER S/N: 0640963623O1 N/A BREAKER ONLY

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE	6/3/08	AS
1	REVISED BREAKER INFO & TITLE BLOCK (ECN#: ECN-05410753-2).	6/12/08	AW
2	REVISED CONFIGURATION (ECN#: ECN-05410753-3).	7/1/08	AW
3	REVISED CONFIGURATION (ECN#: ECN-05410753-7).	10/13/08	AW
4	REVISED CONFIGURATION (ECN#: ECN-05410753-8).	10/14/08	AW



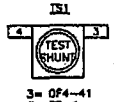
FRONT VIEW



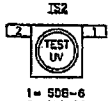


52MOC

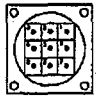
1=SDC-7	9=SDB-3	17=SDD-1
2=SDD-6	10=SDD-7	18=SDD-5 ④
3=SDC-5	11=SDB-1	19=SDD-2
4=SDC-8	12=SDB-2	20=SDA-2
5=SDA-7	13=SDC-3	
6=52MOC-8, TP-3	14=SDC-4	
7=SDC-1	15=SDB-4	
8=MX1-C1, 52MOC-6	16=SDB-5 ④	



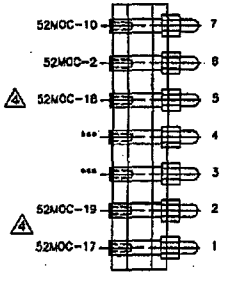
3= OF4-41
3= TP-1
4= MCH-B2



1= SDB-6
2= MN-D2



TP-1= TS1-3
TP-2= MN-D2
TP-3= 52MOC-6
TP-4= OF3-31
TP-5= OF3-34
TP-6= OF2-21
TP-7= OF2-22
TP-8= MN-D1
TP-9= ***



LEGEND

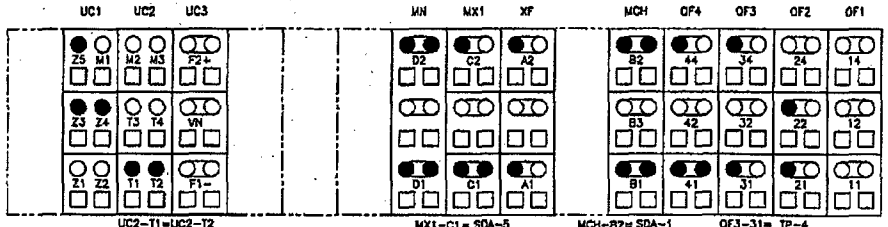
52MOC – BREAKER OPERATED AUXILIARY SWITCH
MCH – SPRING CHARGING MOTOR
MN – UNDERVOLTAGE TRIP COIL
MX1 – SHUNT TRIP COIL
OFn – AUXILIARY SWITCH CONTACTS
SDn – SECONDARY DISCONNECT
TP – TEST PLUG CONNECTOR
TS1 – TEST SWITCH, SHUNT TRIP
TS2 – TEST SWITCH, UNDERVOLTAGE TRIP COIL
XF – SHUNT CLOSE COIL
*** – NO CONNECTION
● – CRADLE CONNECTION POINT, USED
○ – CRADLE CONNECTION POINT, UNUSED
UCn – POINTS USED WITH TRIP UNIT INSTALLATION
TRIP UNIT IS NOT USED FOR THIS APPLICATION

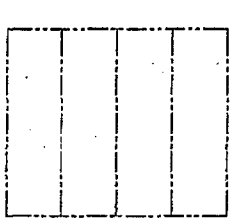
BREAKER PART NO. INFORMATION

ASSEMBLED BREAKER (BREAKER AND CRADLE):
SQUARE D SERVICES P/N: LGSB11
NLI P/N: NLI-LGSB11

BREAKER ONLY:
SQUARE D SERVICES P/N: TA2AARNNX95GFFKCJXN
NLI P/N: NLI-RPL-AK25-RT-001

CRADLE ONLY:
NLI P/N: NLI-RPL-CRDL-AK25-RT-001





UC2-T1=UC2-T2
UC2-T2=UC2-T1

MX1-C1= SDA-5
MX1-C2= OF4-44
MX1-C1= 52MOC-8

MCH-B2= SDA-1
MCH-B2= TS1-4
MCH-B1= XF-A1
MCH-B1= SDA-4

OF3-31= TP-4
OF3-34= TP-5

UC1-Z3=UC1-Z4
UC1-Z3=UC1-Z5
UC1-Z4=UC1-Z3
UC1-Z5=UC1-Z3

MN-D1= SDB-7
MN-D2= TS2-2
MN-D2= TP-2
MN-D1= TP-8

XF-A2=SDA-3
XF-A1=MCH-B1

OF4-41= TS1-3
OF4-41= SDA-6
OF-44= MX1-C2

OF2-21= TP-6
OF2-22= TP-7

NOTES:
1. ALL CRADLE WIRING SHALL BE 14AWG TYPE SIS, 90°C, 600V STRANDED, IEEE 383 QUALIFIED, WITH THE EXCEPTION OF THE FACTORY JUMPERS IDENTIFIED BELOW.
2. THE BREAKER IS NOT ZONE SELECTIVE INTERFACE CONNECTED. THEREFORE UC1-Z3, UC1-Z4 AND UC1-Z5 ARE JUMPERED. THESE JUMPERS ARE FACTORY INSTALLED.
3. THE BREAKER DOES NOT UTILIZE A NEUTRAL CURRENT TRANSFORMER. THEREFORE UC2-T1 AND UC2-T2 ARE JUMPERED TOGETHER. THIS JUMPER IS FACTORY INSTALLED.

DRAWN:	FVT	Date 10/14/08
CHECK:	CT	10/14/08
APPROVE:	AW	10/14/08
CUSTOMER:		

PROJECT: REPLACEMENT BREAKERS (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE)

CLIENT: CONSTELLATION ENERGY CALVERT CLIFFS NUCLEAR POWER PLANT

CONTRACT: PO# 423110

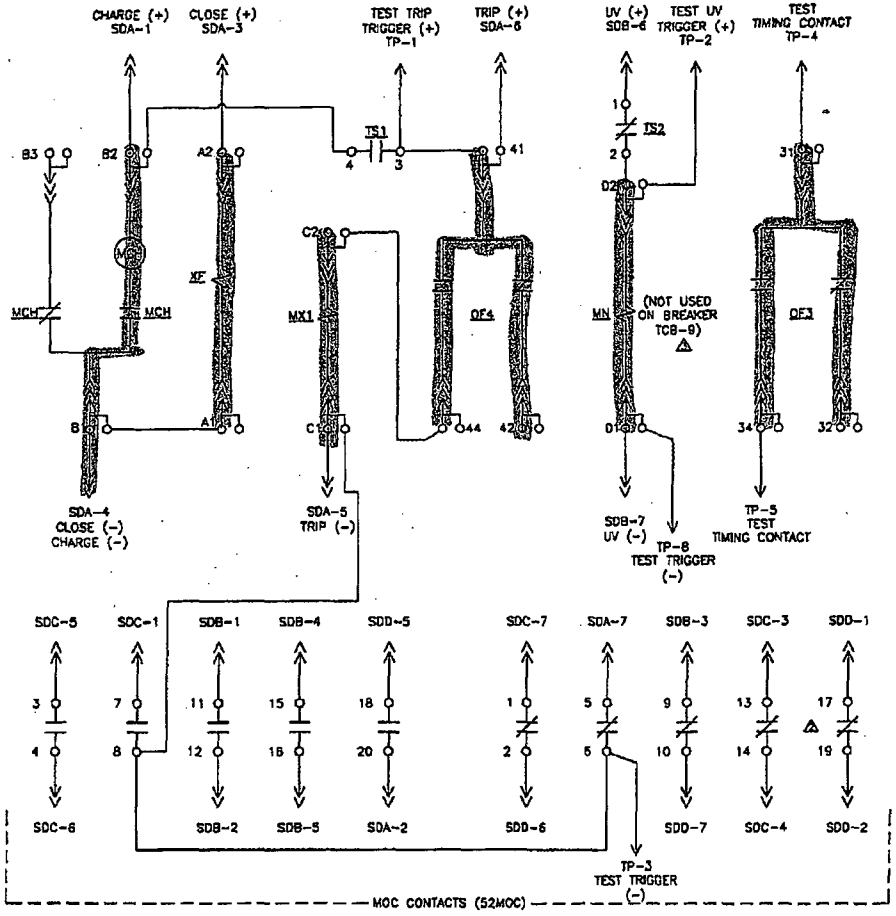
NLI NUCLEAR LOGISTICS INC.

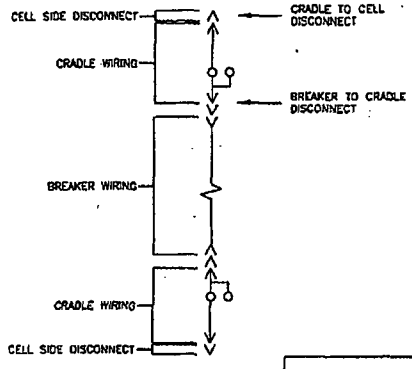
TITLE: WIRING DIAGRAM FOR SQUARE D LGSB11 STYLE MASTERPACT BREAKER

Size B | DRAWING No. 05410753-WD-1 | REV 4

Scale NTS | WEIGHT N/A | SHT 1 OF 1

BREAKER S/N: 064/0963623O/Y 2 CT 8/6/09 QC RLJ 8-6-09 I JCM 8-6-09





CRADLE/BREAKER WIRING (TYPICAL)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE	6/3/08	AS
1	REVISED BREAKER INFO & TITLE BLOCK (ECN#: ECN-05410753-2).	6/12/08	AW
2	REVISED CONTACTS (ECN#: ECN-05410753-8).	10/14/08	AW
3	ADDED INFORMATION (ECN#: ECN-05410753-9).	4/2/09	AW

LEGEND

52MOC – BREAKER OPERATED AUXILIARY SWITCH
MCH – SPRING CHARGING MOTOR
MN – UNDERVOLTAGE TRIP COIL
MX1 – SHUNT TRIP COIL
OFn – AUXILIARY SWITCH CONTACTS
SDn – SECONDARY DISCONNECT
TP – TEST PLUG CONNECTOR
TS1 – TEST SWITCH, SHUNT TRIP, MOMENTARY PUSHBUTTON, CONTACT SHOWN IN NORMAL STATE
TS2 – TEST SWITCH, UNDERVOLTAGE TRIP, MOMENTARY PUSHBUTTON, CONTACT SHOWN IN NORMAL STATE
XF – SHUNT CLOSE COIL
<<– – SECONDARY DISCONNECT FROM CRADLE TO CELL
<<<– – SECONDARY DISCONNECT FROM BREAKER TO CRADLE
<– – TEST PLUG DISCONNECT
0 – CONNECTION POINT

CONTROL VOLTAGE INFORMATION

CHARGE – 125 VDC
CLOSE – 125 VDC
SHUNT TRIP – 125 VDC
UNDERVOLTAGE TRIP – 125 VDC

BREAKER PART NO. INFORMATION

ASSEMBLED BREAKER (BREAKER AND CRADLE):
SQUARE D SERVICES P/N: LGSB11
NLI P/N: NU-LGSB11

BREAKER ONLY:
SQUARE D SERVICES P/N: 7A2AARNNDSGFFXCJXN
NLI P/N: NU-RPL-AK25-RT-001

CRADLE ONLY:
NLI P/N: NU-RPL-CRDL-AK25-RT-001

NOTES:
1. THE STATUS OF THIS DRAWING IS WITH THE BREAKER INSTALLED IN THE CONNECTED POSITION AND THE BREAKER CHARGED AND OPEN.
2. REFERENCE NLI LAYOUT DRAWING 05410753-LO-1 FOR SPECIFICATIONS.

DRAWN:	FVT	Date 4/2 09
CHECK:	CT	4/2 09
APPROVE:	AW	4/2 09
CUSTOMER:		

PROJECT: REPLACEMENT BREAKERS (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE)
CLIENT: CONSTELLATION ENERGY CALVERT CLIFFS NUCLEAR POWER PLANT
CONTRACT: PO# 423110

NLI NUCLEAR LOGISTICS INC.

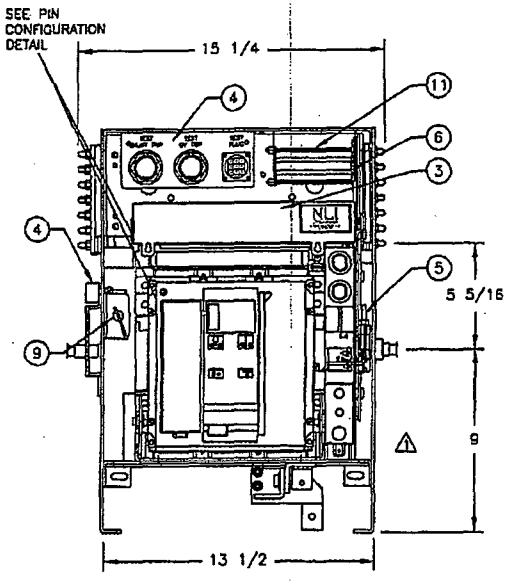
TITLE: SCHEMATIC DIAGRAM FOR SQUARE D LGSB11 STYLE MASTERPACT BREAKER

Size	DRAWING No.	REV
B	05410753-SD-1	3

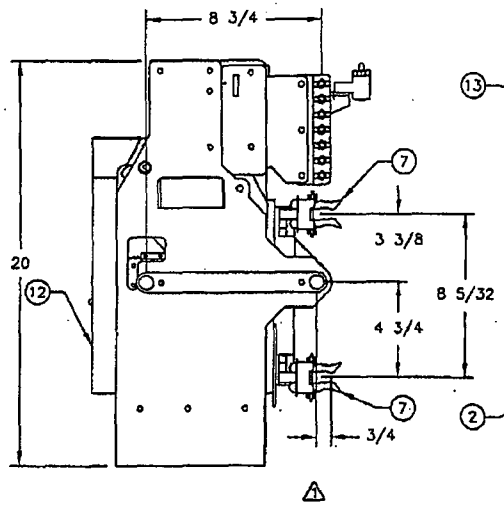
Scale: NTS WEIGHT: N/A SHT 1 OF 1

BREAKER S/N: 0641096362302 CT 8/6/09

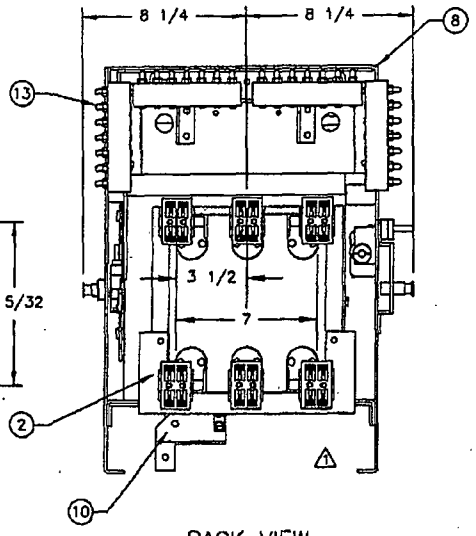
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ORIGINAL ISSUE	5/21/08	AS
1	REVISED BREAKER CONFIGURATION (ECN#: ECN-05410753-1).	6/12/08	AW



FRONT VIEW

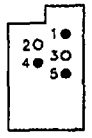


SIDE VIEW



BACK VIEW

REJECTION PIN CONFIGURATION ON LEFT SIDE OF CRADLE



REJECTION PIN CONFIGURATION ON LEFT SIDE OF BREAKER

(FOR SAFETY RELATED BREAKER)

ITEM	QTY	DESCRIPTION
13	4	SECONDARY DISCONNECT ASSEMBLY
12	1	NT CRADLE BOTTOM PAN MODIFICATION
11	1	MOC SWITCH
10	1	TOC ASSEMBLY
9	1	RACKING INTERLOCK ASSEMBLY
8	1	FRAME ASSEMBLY
7	1	PRIMARY CURRENT PATH ASSEMBLY
6	1	SWITCH BARRIER
5	1	MOC ASSEMBLY
4	1	SWITCH BRACKET
3	1	WIRE COVER
2	1	INSULATOR, BACK
1	1	PIN GUIDE

BREAKER PART NO. INFORMATION

ASSEMBLED BREAKER (BREAKER AND CRADLE):
SQUARE D SERVICES P/N: LGSB11
NLI P/N: NLI-LGSB11

BREAKER ONLY:
SQUARE D SERVICES P/N: TA2AARNNX9SCFFXCJXN
NLI P/N: NLI-RPL-AK25-RT-001

CRADLE ONLY:
NLI P/N: NLI-RPL-CRDL-AK25-RT-001 ⚠1

REFERENCE DRAWING (FOR NLI INTERNAL USE ONLY)
SQUARE-D SERVICES DRAWING: AKS00001, REV. 0 ⚠

SPECIFICATIONS

TRIP UNIT:	NONE
NOM. OPERATING VOLTAGE:	480VAC
RATED CURRENT:	800A
INTERRUPT RATING:	42kA @ 508VAC 30kA @ 535VAC
NOM. CONTROL VOLTAGE:	125VDC
CLOSE:	90-140VDC
CHARGE:	90-140VDC
TRIP:	70-140VDC
UV:	OPERATE - >90VDC TRIP - 44 TO 88VDC

DRAWN:	FVT	Date 6/12/08
CHECK:	CT	6/12/08
APPROVE:	AW	6/12/08
CUSTOMER:		

STANDARD TOLERANCE UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES ARE NOMINAL

PROJECT: REPLACEMENT BREAKERS (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE) ⚠1

CLIENT: CONSTELLATION ENERGY CALVERT CLIFFS NUCLEAR POWER PLANT

CONTRACT: PO# 423110

NLI NUCLEAR LOGISTICS INC.

TITLE: LAYOUT DRAWING FOR SQUARE D LGSB11 STYLE MASTERPACT BREAKER ⚠1

Size B | DRAWING No. 05410753-LD-1 | REV 1

Scale: NTS | WEIGHT N/A | SHT 1 OF 1

Appendix B

Fuse Factory Acceptance Test Data

FUSE TEST DATA SHEET

Test Temperature: 20.0°C
Fuse Amperage: 5 Amp
Test surface: H

VP- ATDRFUSES-1 Rev. O
Fuse P/N: ATDR5
Date code: 12/07
JOB # 069-10327

Serial Number 27526-001-	CC# 1 Dimensions: Length	CC# 1 Dimensions: Diameter	CC # 2 Markings	CC# 3 Fuse resistance	CC# 4 Hold-in capability (Current = 5A, Time = 1hr)	CC# 5 Interrupt capability
00001	1.507"	0.408"	ATDR5 600 VAC 300 VDC	R = 60.02mΩ (2 btl 12/22/08)	Fuse melt: ☐ Yes ☒ No	Current: 10A Trip time: 46.46 sec
00002	1.520"	0.407"		R = 60.08mΩ (8 btl 12/22/08)	Fuse melt: ☐ Yes ☒ No	current: 10A Trip time: 47.23 sec
00003	1.520"	0.408"		R = 56.9mΩ	Fuse melt: ☐ Yes ☒ No	T KTL pass 12/23/08
00004	1.521"	0.408"		R = 58.2mΩ	Fuse melt: ☐ Yes ☒ No	
00005	1.509"	0.408"		R = 55.6mΩ	Fuse melt: ☐ Yes ☒ No	
00006	1.512"	0.407"		R = 64.1mΩ	Fuse melt: ☐ Yes ☒ No	
00007	1.511"	0.408"		R = *49.6mΩ	Fuse melt: ☐ Yes ☐ No	*
00008	1.509"	0.407"		R = 56.0mΩ	Fuse melt: ☐ Yes ☒ No	
00009	N/A	N/A		R = *67.4mΩ	Fuse melt: ☐ Yes ☐ No	*
00010				R = 62.7mΩ	Fuse melt: ☐ Yes ☒ No	→ CC#4 T KTL pass 12/23/08
00011				R = 57.9mΩ	Fuse melt: ☐ Yes N/A ☐ No	
00012				R = *68.3mΩ	Fuse melt: ☐ Yes ☐ No	*
00013				R = 54.8mΩ	Fuse melt: ☐ Yes ☐ No	
00014				R = 63.9mΩ	Fuse melt: ☐ Yes ☐ No	
00015				R = 59.1mΩ	Fuse melt: ☐ Yes ☐ No	
00016				R = 63.7mΩ	Fuse melt: ☐ Yes ☐ No	
00017				R = 55.3mΩ	Fuse melt: ☐ Yes ☐ No	
00018				R = 56.7mΩ	Fuse melt: ☐ Yes ☐ No	
00019				R = 61.1mΩ	Fuse melt: ☐ Yes ☐ No	
00020				R = 63.1mΩ	Fuse melt: ☐ Yes ☐ No	

T KTL 12/23/08

T KTL pass 12/23/08

* see DR # 0690327-02

T KTL 12/23/08

FUSE TEST DATA SHEET

Test Temperature: 20.0°C
Fuse Amperage: 5 Amp
Test surface: #

VP- ATDRFUSES-1 Rev. D
Fuse P/N: ATDR5
Date code: 12/07
JOB # 069-10327

Serial Number	CC# 1 Dimensions		CC # 2 Markings	CC# 3 Fuse resistance	CC# 4 Hold-in capability		CC# 5 Interrupt capability
	Length	Diameter			Current = N/A Time = N/A		
27526-001-							
00021	N/A	N/A	ATDR5 600 VAC 300 VDC	R = 65.8 mΩ	Fuse melt: ☐ Yes	☐ No	Current: N/A Trip time: N/A
00022				R = 64.6 mΩ	Fuse melt: ☐ Yes	☐ No	
00023				R = 65.7 mΩ	Fuse melt: ☐ Yes	☐ No	
00024				R = 58.7 mΩ	Fuse melt: ☐ Yes	☐ No	
00025				R = 65.6 mΩ	Fuse melt: ☐ Yes	☐ No	
00026				R = 63.4 mΩ	Fuse melt: ☐ Yes	☐ No	
00027				R = 59.4 mΩ	Fuse melt: ☐ Yes	☐ No	
00028				R = 57.2 mΩ	Fuse melt: ☐ Yes	☐ No	
00029				R = *48.0 mΩ	Fuse melt: ☐ Yes	☐ No	
00030				R = *53.8 mΩ	Fuse melt: ☐ Yes	☐ No	
	CC#1 PASS CT 1/19/09		T KTL pass 12/23/08	R avg = 59.92 mΩ R = T KTL 12/23/08	Fuse melt: ☐ Yes	☐ No	
				*see DR# 06910327-01 R =	Fuse melt: ☐ Yes	☐ No	
				R =	Fuse melt: ☐ Yes	☐ No	
				R =	Fuse melt: ☐ Yes	☐ No	
				R =	Fuse melt: ☐ Yes	☐ No	
				R =	Fuse melt: ☐ Yes	☐ No	
				R =	Fuse melt: ☐ Yes	☐ No	
				R =	Fuse melt: ☐ Yes	☐ No	
				R =	Fuse melt: ☐ Yes	☐ No	

*see DR# 06910327-02
T KTL 12/23/08

FUSE TEST DATA SHEET

Test Temperature: 20.0°C
Fuse Amperage: 5 Amp
Test surface: #

VP- ATDRFUSES-1 Rev. O
Fuse P/N: ATDR5
Date code: 12/07

I: 27526-001-00001 thru -00030

JOB # 069-10327

Number of fuses in lot	30
Normal sample size based on lot size	8
Average fuse resistance from lot of same fuses	59.92 mΩ
Acceptable fuse resistance range	53.93 mΩ ≤ R ≤ 65.91 mΩ

Summary of Results

Item passed all CC#s ☐ Yes ☒ No If no, fill in DR# below and attach DR.

Discrepancy reports:

S/N:	CC#	DR#			
27526-001-00007,	3	06910327-02	☐ Acceptable	☒ Not Acceptable	PE Initials CT
-00009, ~~-00011~~ used 12/23/08			☐ Acceptable	☐ Not Acceptable	PE Initials
-00012, -00029,			☐ Acceptable	☐ Not Acceptable	PE Initials
-00030			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials

Notes:

(PE to pass or fail ec #1) * REMAINING SERIAL NUMBERS ARE GOOD FOR USE
CT 1/19/09

MTE#	Instrument Used	Calibration Due Date
561	Caliper	1/23/09
201	micro-Ohm meter	9/23/09
560	Circuit breaker test set	4/3/09
714	Thermoclock	3/11/09

☒ Update MTE on computer: KTL 12/23/08
Initials and date

Prepared by: KTL Date: 12/23/08

Verified by: Date: 1/19/09

Approved by: Date: 1/19/09

FUSE TEST DATA SHEET

Test Temperature: 23.5°C
Fuse Amperage: 10A
Test surface: V

VP- ~~KTKR15-1~~ ATDRFUSES-1 CBL 2.9.09 Rev. 0
Fuse P/N: ATOR10
Date code: 10/08

Job# 069-10327

Serial Number 27526K2-01 -XXXX	CC# 1 Dimensions Length	Diameter	CC# 2 Markings	CC# 3 Fuse resistance	CC# 4 Hold-in capability Current = 10A Time = 1hr	CC# 5 Interrupt capability
-0001	1.525"	0.405"	Pass	R = 18.9mΩ	Fuse melt: ☐ Yes ☑ No	Current: 20A Trip time: 45.855sec.
-0002	1.521"	0.406"	Pass	R = 18.8mΩ	Fuse melt: ☐ Yes ☑ No	N/A
-0003	1.515"	0.405"	Pass	R = 18.5mΩ	Fuse melt: ☐ Yes ☑ No	
-0004	1.520"	0.406"	Pass	R = 17.9mΩ	Fuse melt: ☐ Yes ☑ No	
-0005	N/A		Pass	R = 18.4mΩ	Fuse melt: ☐ Yes ☐ No	
-0006			Pass	R = 18.6mΩ	Fuse melt: ☐ Yes ☐ No	
-0007			Pass	R = 18.3mΩ	Fuse melt: ☐ Yes ☐ No	
-0008			Pass	R = 19.0mΩ	Fuse melt: ☐ Yes ☐ No	
-0009			Pass	R = 18.9mΩ	Fuse melt: ☐ Yes ☐ No	
-0010			Pass	R = 18.7mΩ	Fuse melt: ☐ Yes ☐ No	
N/A			N/A	R = N/A	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
					Fuse melt: ☐ Yes ☐ No	
					Fuse melt: ☐ Yes ☐ No	
					Fuse melt: ☐ Yes ☐ No	
					Fuse melt: ☐ Yes ☐ No	
					Fuse melt: ☐ Yes ☐ No	
					Fuse melt: ☐ Yes ☐ No	
					Fuse melt: ☐ Yes ☐ No	
					Fuse melt: ☐ Yes ☐ No	

T CBL Pass 2.9.09 | T CBL Pass 2.9.09 | T CBL Pass 2.9.09 | T CBL Pass 2.9.09 | T CBL Pass 2.9.09

FUSE TEST DATA SHEET

ATDRFUSES-1

Test Temperature: 23.5°C
Fuse Amperage: 10A
Test surface: V

VP- ~~KTKR15-1~~ 2.9.09 Rev. 0
Fuse P/N: ATDR10
Date code: 10108

Number of fuses in lot	10
Normal sample size based on lot size	4
Average fuse resistance from lot of same fuses	18.6mΩ
Acceptable fuse resistance range	16.7 - 20.5 mΩ

Summary of Results

Item passed all CC#s ☑ Yes ☐ No If no, fill in DR# below and attach DR.

Discrepancy reports:

S/N:	CC#	DR#			
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials

Notes: 27526K2-01-6001 melted per cc# 5
CC#1 DMS ACCEPTABLE. CT 2/19/09

MTE#	Instrument Used	Calibration Due Date
264	6" Dial calipers	5.16.09
201	micro ohm meter	9.23.09
798	CBTS	10.27.09
228	Thermometer	8.15.09

☐ Update MTE on computer: CBL 2.9.09
Initials and date

Prepared by: CBL Date: 2.9.09

Verified by: Stan G. Gray Date: 2/19/09

Approved by: [signature] Date: 2/19/09

FUSE TEST DATA SHEET

Test Temperature: 23.0°C
Fuse Amperage: 15 Amp
Test surface: #

VP- ATDRFUSES-1 Rev. D
Fuse P/N: ATDR15
Date code: 05/08
Job # 069-10827

Serial Number 27526-003-	CC# 1 Dimensions: Length	CC# 1 Dimensions: Diameter	CC # 2 Markings	CC# 3 Fuse resistance	CC# 4 Hold-in capability (Current = 15A, Time = 1hr)	CC# 5 Interrupt capability
00001	1.500"	0.408"	ATDR15 600VAC 300 VDC	R = 11.28mΩ	Fuse melt: ☐ Yes ☒ No	Current: 30A Trip time: 53.64Sec
00002	1.500"	0.408"		R = 11.62mΩ	Fuse melt: ☐ Yes ☒ No	N/A
00003	1.490"	0.408"		R = 11.08mΩ	Fuse melt: ☐ Yes ☒ No	
00004	1.502"	0.407"		R = 10.95mΩ	Fuse melt: ☐ Yes ☒ No	
00005	N/A	N/A		R = 11.33mΩ	Fuse melt: ☐ Yes N/A ☐ No	
00006				R = 11.26mΩ	Fuse melt: ☐ Yes ☐ No	
00007				R = 11.25mΩ	Fuse melt: ☐ Yes ☐ No	
00008				R = 11.19mΩ	Fuse melt: ☐ Yes ☐ No	
00009				R = 10.36mΩ	Fuse melt: ☐ Yes ☐ No	
00010				R = 11.19mΩ	Fuse melt: ☐ Yes ☐ No	
	T KTL 12/23/08		T KTL pass 12/23/08	R avg = 11.15mΩ	Fuse melt: ☐ Yes ☐ No	T KTL pass 12/23/08
				R = T KTL pass 12/23/08	Fuse melt: ☐ Yes ☐ No	
	CC# 1 PASS CT 1/19/09			R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	

T KTL pass 12/23/08

FUSE TEST DATA SHEET

Test Temperature: 20.0°C
Fuse Amperage: 15 Amp
Test surface: #

VP- ATDRFUSES-1 Rev. 0
Fuse P/N: ATDR15
Date code: 05/08

Job # 069-10327

Number of fuses in lot	10
Normal sample size based on lot size	4
Average fuse resistance from lot of same fuses	11.15mΩ
Acceptable fuse resistance range	10.04mΩ ≤ R ≤ 12.27mΩ

Summary of Results

Item passed all CC#s ☒ Yes ☐ No If no, fill in DR# below and attach DR.

Discrepancy reports:

S/N:	CC#	DR#			
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials

Notes:

(PE to pass or fail cc #1)

MTE#	Instrument Used	Calibration Due Date
~~138~~ → KTL	12/22/08	
561	Caliper	1/23/09
201	Micro-Ohm meter	9/23/09
560	Circuit Breaker test set	7/3/09
714	Thermoclock	3/11/09

☐ Update MTE on computer: KTL 12/23/08
Initials and date

Prepared by: KTL Date: 12/23/08

Verified by: Tracy Mule Date: 1/6/09

Approved by: Date: 1/19/09

FUSE TEST DATA SHEET

Test Temperature: 23.9°C
Fuse Amperage: 50A
Test surface: H

VP- AJTFUSES-1 Rev. 0
Fuse P/N: AJT50
Date code: 07/08
JOB # 069-10327

Serial Number	CC# 1 Dimensions		CC # 2 Markings	CC# 3 Fuse resistance	CC# 4 Hold-in capability	CC# 5 Interrupt capability
	Length	Diameter			Current = 50A Time = 1 hr	
27526-004						
-00001	2.396"	1.062"	AJT50 600 VAC 500 VDC	R = 2.21mΩ	Fuse melt: ☒ Yes ☐ No *	Current: 100A Trip time: 142.82 sec
-00002	2.400"	1.062"		R = 2.32mΩ	Fuse melt: ☐ Yes ☒ No	
-00003	2.396"	1.062"		R = 2.33mΩ	Fuse melt: ☐ Yes ☒ No	T KTL
-00004	2.393"	1.062"		R = 2.49mΩ	Fuse melt: ☐ Yes ☒ No	pass 12/30/08
-00005	N/A	N/A		R = 2.30mΩ	Fuse melt: ☐ Yes ☒ No	
-00006				R = 2.35mΩ	Fuse melt: ☐ Yes ☒ No	
-00007				R = 2.32mΩ	Fuse melt: ☐ Yes ☒ No	
-00008				R = 2.31mΩ	Fuse melt: ☐ Yes ☒ No	
-00009				R = 2.35mΩ	Fuse melt: ☐ Yes ☒ No	
-00010				R = 2.34mΩ	Fuse melt: ☐ Yes ☒ No	
	T KTL 12/30/08		T KTL pass 12/30/08	R = avg 2.33mΩ	Fuse melt: ☐ Yes ☐ No	
	CC# 1 PASS			R = T KTL pass 12/30/08	Fuse melt: ☐ Yes N/A ☐ No	
	CT 1/9/09				Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes N/A ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes N/A ☐ No	
				R =	Fuse melt: ☐ Yes ☐ No	
				R =	Fuse melt: ☐ Yes N/A ☐ No	

* See DR# 06910327-03
T KTL 12/30/08

FUSE TEST DATA SHEET

Test Temperature: 23.9°C
Fuse Amperage: 50A
Test surface: #

VP- AJTFUSES-1 Rev. O
Fuse P/N: AJT50
Date code: 07/08
JOB# 069-10327

S/N: 27526-004-00001 thru -00010

Number of fuses in lot	10
Normal sample size based on lot size	4
Average fuse resistance from lot of same fuses	2.33mΩ
Acceptable fuse resistance range	2.10mΩ ≤ R ≤ 2.56mΩ

Summary of Results

Item passed all CC#s ☒ Yes ☒ No If no, fill in DR# below and attach DR.
59 1.9.09

Discrepancy reports:

S/N:	CC#	DR#			
27526-004-00001	4	06910327-03	☐ Acceptable	☑ Not Acceptable	PE Initials CT
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials

Notes:

PE to pass or fail cc#1

MTE#	Instrument Used	Calibration Due Date
561	Caliper	1/23/09
201	micro ohm meter	9/23/09
228	Fluke 52	8/15/09
1196	Big Red	10/14/09

☒ Update MTE on computer: T KTL 12/30/08
Initials and date

Prepared by: T KTL Date: 12/30/08

Verified by: Steve G. Gang Date: 1-9-09

Approved by: Date: 1/19/09

FUSE TEST DATA SHEET

Test Temperature: 20.5°C
Fuse Amperage: 125A
Test surface: H

VP- ~~AJDRFUSES-1~~ AJTFUSES-1 utl 12/23/08 Rev. 0
Fuse P/N: AJT125
Date code: 06/08
JOB # 069-10327

Serial Number	CC# 1 Dimensions		CC # 2 Markings	CC# 3 Fuse resistance	CC# 4 Hold-in capability	CC# 5 Interrupt capability
27526-005-	Length	Diameter			Current = 125A Time = 1hr	
00001	5.767"	1.633"	AJT125 600 VAC 500 VDC	R = 0.72 mΩ	Fuse melt: ☐ Yes ☒ No	Current: 250A Trip time: 539.78 sec
00002	5.763"	1.631"	↓	R = 0.74 mΩ	Fuse melt: ☐ Yes ☒ No	KTL pass 12/23/08
00003	5.765"	1.635"	↓	R = 0.78 mΩ	Fuse melt: ☐ Yes ☒ No	
00004	5.766"	1.631"	↓	R = 0.79 mΩ	Fuse melt: ☐ Yes ☐ No (NA)	
00005	5.764"	1.635"	↓	R = 0.79 mΩ	Fuse melt: ☐ Yes ☐ No (NA)	
	KTL 12/23/08		KTL pass 12/23/08	R = 0.764 mΩ avg	Fuse melt: ☐ Yes ☐ No (NA)	
				R = KTL	Fuse melt: ☐ Yes ☐ No (NA)	
	CC#1 PASS			R = pass 12/23/08	Fuse melt: ☐ Yes ☐ No (NA)	
	CT 1/19/09			R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	
				R =	Fuse melt: ☐ Yes ☐ No (NA)	

pass 12/23/08 KTL

FUSE TEST DATA SHEET

Test Temperature: 20.5°C
Fuse Amperage: 125 A
Test surface: #

VP- AJTFUSES-1 Rev. 0
Fuse P/N: AJT125
Date code: 06/08
Job # 069-10327

I: 27526-005-00001thru-00005

Number of fuses in lot	5
Normal sample size based on lot size	3
Average fuse resistance from lot of same fuses	0.764mΩ
Acceptable fuse resistance range	0.688mΩ ≤ R ≤ 0.840mΩ

Summary of Results

Item passed all CC#s ☑ Yes ☐ No If no, fill in DR# below and attach DR.

Discrepancy reports:

S/N:	CC#	DR#			
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials
			☐ Acceptable	☐ Not Acceptable	PE Initials

Notes:

(PE to pass or fail cc#1)

MTE#	Instrument Used	Calibration Due Date
561	Caliper	1/23/09
201	micro ohm meter	9/23/09
362	big gray	11/11/09
228	Fluke 52	8/15/09

☑ Update MTE on computer: T KTL 12/23/08
Initials and date

Prepared by: T KTL Date: 12/23/08

Verified by: Steven O. Gary Date: 1-9-09

Approved by: Date: 1/19/09

Appendix C

Discrepancy Reports

Discrepancy Report

A. IDENTIFICATION NLI Job Number: 06910327 DR#: 06910327-04

Item: Switchgear

Manufacturer: SQUARE D

Model/P/N: PZ4

Serial Number: 25570-001-00001

Qty: 1

Issue:

The VP states that the instrument sections 6 white indicating lights. The instrument sections have 5 white indicating lights.

Affected Hardware/Document/M&TE: VP-PZ4, Rev. 6, CC#1

Initial Evaluation / Tagging ☑ Conditional Release ☐ Material Hold

Tribble, Chris	7/22/2009	Wong, Alan	7/22/2009
Prepared By	Date	Approved By	Date

B. RESOLUTION (Attach additional pages, if required.)

Evaluation:

The VP incorrectly states that the instrument sections have 6 white lights. The instrument sections have 5 white lights. The sixth white light is a global 'trip confirm status' light for the switchgear.

The switchgear configuration is correct with 5 indicating lights per instrument section and is acceptable.

Disposition ✔ Acceptable/Use as is ☐ Acceptable with rework noted

Acceptable with limitations noted ☐ Reject / Do not use

Code 1 30 Code 2

See Table 3.2

Prepared By: Date: 7/22/09

Reviewed By: Date: 8/4/9

Approved By: Date: 8/4/09

Page 1 of 1

Discrepancy Report

A. IDENTIFICATION NLI Job Number: 06910327 DR#: 06910327-05

Item: Switchgear

Manufacturer: SQUARE D

Model/P/N: PZ4

Serial Number: 25570-001-00001

Qty: 1

Issue:

The VP states that the 'Shunt Trip Power' light extinguishes when power is applied to the switchgear. The 'Shunt Trip Power' light does not extinguish, the 'Shunt Trip Signal Present' light extinguishes.

Affected Hardware/Document/M&TE: VP-PZ4, Rev. 6, CC#4a, 4b, 4c

Initial Evaluation / Tagging ☑ Conditional Release ☐ Material Hold

Tribble, Chris	7/22/2009	Wong, Alan	7/22/2009
Prepared By	Date	Approved By	Date

B. RESOLUTION (Attach additional pages, if required.)

Evaluation:

The VP incorrectly states which light will extinguish. The proper operation is for the 'Shunt Trip Signal Present' light to extinguish. The VP test data sheets list the correct light. The switchgear operated properly and the correct expected light sequence was achieved and is acceptable.

Disposition ☑ Acceptable/Use as is ☐ Acceptable with rework noted

☐ Acceptable with limitations noted ☐ Reject / Do not use

Code 1 30 Code 2

See Table 3.2

Prepared By: Date: 7/22/09

Reviewed By: Date: 8/4/09

Approved By: Date: 8/7/09

Discrepancy Report

A. IDENTIFICATION NLI Job Number: 06910327 DR#: 06910327-06

Item: Switchgear

Manufacturer: SQUARE D

Model/P/N: PZ4

Serial Number: 25570-001-00001

Qty: 1

Issue:

The VP states to remove fuses F3, F7, F13 & F17 from the switchgear. The fuses were not removed from the gear during testing.

Affected Hardware/Document/M&TE: VP-PZ4, Rev. 6, CC#4e

Initial Evaluation / Tagging ☑ Conditional Release ☐ Material Hold

Tribble, Chris	7/22/2009	Wong, Alan	7/22/2009
Prepared By	Date	Approved By	Date

B. RESOLUTION (Attach additional pages, if required.)

Evaluation:

The VP incorrectly states to remove the fuses. The fuses must remain so that the UV coil has power applied to allow the circuit breakers to close for this testing. The test procedure was modified as documented in DR-06910327-07.

The use of the fuses for testing is acceptable and the gear operated as expected according to the procedure as documented in DR-06910327-07

Disposition ☑ Acceptable/Use as is ☐ Acceptable with rework noted

Acceptable with limitations noted ☐ Reject / Do not use

Code 1 30 Code 2

See Table 3.2

Prepared By: Date: 7/22/09

Reviewed By: Date: 8/4/9

Approved By: Date: 8/7/09

Discrepancy Report

A. IDENTIFICATION NLI Job Number: 06310327 DR#: 06910327-07

Item: Switchgear

Manufacturer: SQUARE D

Model/P/N: PZ4

Serial Number: 25570-001-00001

Qty: 1

Issue:

The VP states to remove the 90VAC applied to the UV circuit (MN coil and 27 relay) to trip the breakers using the 27 relay undervoltage relay. The 90VAC was not removed as stated in the test plan during this testing.

Affected Hardware/Document/M&TE: VP-PZ4, Rev. 6, CC#4e

Initial Evaluation / Tagging ☑ Conditional Release ☐ Material Hold

Tribble, Chris	7/22/2009	Wong, Alan	7/22/2009
Prepared By	Date	Approved By	Date

B. RESOLUTION (Attach additional pages, if required.)

Evaluation:

The VP states to remove the power applied to the UV circuit of the breaker (both the MN coil in the breaker and the external undervoltage relay). The purpose of this particular test is to perform breaker main pole opening timing after loss of AC power using the external (27) relay actuating the shunt trip coil of the breaker. In order to perform this test correctly, the AC power must remain applied to the breaker installed MN (UV) coil to ensure that the 27 relay/shunt trip combination trips the breaker and does not race the breaker installed MN UV coil to trip the breaker.

It was determined that the power would be applied to the MN coil installed in the breaker and the breaker test switch would be moved to the 'Shunt Trip' position. The movement of the test switch to the shunt trip position allows the AC voltage to remain applied to the MN coil in the breaker, but removes the AC voltage sensed by the external 27 UV relay. (see continuation sheet)

Disposition ✔ Acceptable/Use as is ☐ Acceptable with rework noted

☐ Acceptable with limitations noted ☐ Reject / Do not use

Code 1 30 Code 2 _____

See Table 3.2

Prepared By: _____ Date: 7/22/09

Reviewed By: _____ Date: 8/4/9

Approved By: _____ Date: 8/7/09

DISCREPANCY REPORT

Continuation of: Part B. Resolution DR#: 06910327-07

The 27 relay then actuates and closes a contact in series with the shunt trip coil thus tripping the breaker and producing the correct circuit progression to measure a valid opening time of the breaker due to loss of voltage on the 27 relay and shunt tripping.

TMI engineering representatives on-site during the FAT testing concurred with the test setup. The change in procedure is acceptable and produced acceptable test results.