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LOW VOLTAGE AIR CIRCUIT BREAKER
STANDARD TEST SPECIFICATION

GENERAL

1.1 PURPOSE OF FACTORY TEST

Production tests are made to check the quality and uniformity of the materials and workmanship used in the manufacture of low voltage air circuit breakers and to assure both Siemens Energy & Automation, Inc. and the purchaser that the breakers have characteristics essentially the same as a breaker of identical design which was subjected to and passed design tests.

2.1 SCOPE

This specification shall use as a basic reference NEMA Standards Publication SG-3-1981 or subsequent issues. LOW VOLTAGE POWER CIRCUIT BREAKERS, ANSI C37.50-1989 or subsequent issues, TEST PROCEDURES FOR LOW VOLTAGE AC POWER CIRCUIT BREAKERS used in enclosures, and UL1066 LOW VOLTAGE AC AND DC POWER CIRCUIT BREAKERS USED IN ENCLOSURES.

2.1.1 Inspection

Any piece of apparatus presented to the Test Department for test is presumed to be in as perfect mechanical adjustment as is possible prior to operating test.

2.1.2 Compliance

The requirements of this entire specification, where applicable, shall be met as a condition of completion of a satisfactory production test unless specific waivers are granted by an authorized member of the Engineering Department.

The lack of a specified procedure or the presence of adverse conditions not covered by this specification shall not absolve the TEST Department from the responsibility of reporting any known condition which is not in the best interest of Siemens Energy and Automation, Inc.

2.1.3 Reporting

Users often request certified copies of the production test results. When such certified tests are required, this fact will be noted on the Shipping Order Specifications. Forms for certified test reports shall be of design acceptable to the Sale Department and the Engineering Department.

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

Confidential-Property of							
Electrical Apparatus Division							
01 03/26/82 REDRAWN IN ACAD LT ECO LV9602 B-1 DRB	08 01/12/96 RESET ISSUE & DATE DRB 07/11/01	1-PLACE DECIMAL ± .06 2-PLACE DECIMAL ± .03 3-PLACE DECIMAL ± .01 ANGULAR 1.0 DEG.	SIMILAR TO DR DRB BULLETIN CH 07 APP 01	MACHINED SURFACE TEXTURE	DATA BASE 186\82761407		
N-C 2 C	CURRENT DATE 3-8 07-11-01	PART NUMBER 9-19 18-682-761-407	ISS 20-21 09				
MATERIAL							
TYPE 22	REP 23	PART NAME 24-43 TEST SPECIFICATION LOW VOLTAGE	N.M. 44-48	49-53	SCALE 1X	CHARACTERISTICS ←	SHEET NO. 1-22

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2.1.4 Special Tests

Special production tests are sometimes required by customers or by the Engineering Department. In such cases, the special or added production test requirements will be specified on the Shipping Order Specification sheet.

LIST OF REQUIRED TESTS

3.1 REQUIRED TESTS

3.1.1 CONTROL WIRING

3.1.2 DIELECTRIC TEST & RESISTANCE TEST

- 3-1.2.1 Primary
- 3-1.2.2 Secondary
- 3-1.2.3 Breaker Resistance Test

3.1.3 BREAKER OPERATIONAL TESTS

- 3-1.3.1 Manual Operation
- 3-1.3.2 Electrical Operation
- 3-1.3.3 Maintenance Closing

3.1.4 OVERCURRENT TRIP DEVICE TESTS

- 3-1.4.1 Static Trip Device

3.1.5 ACCESSORIES

- 3-1.5.1 Undervoltage Device
- 3-1.5.2 Bell Alarm
- 3-1.5.3 Mechanical Lockout
- 3-1.5.4 Trigger Fuses
- 3-1.5.5 Static Trip Device Test Set

3.1.6 REPAIR PARTS

3.1.7 SPECIAL MODIFICATION AND OPTIONAL EQUIPMENT

- 3.1.7.1 MOC switch operator

USED ON:

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* CAD GENERATED, DO NOT CHANGE MANUALLY.

01		REDRAWN IN ACAD		03/26/82		Confidential-Property of	
08		LT		ECO LV 9602 B-1		Electrical Apparatus Division	
01/12/96		DRB		MACHINED SURFACE TEXTURE		SIMILAR TO	
		DATA BASE		186\82761407		DR DRB BULLETIN	
		N-C		CURRENT DATE		PART NUMBER 9-19	
		C		01-12-96		18-682-761-407	
		ISS		20-21		08	
MATERIAL --		TYPE 22		REP. 23		PART NAME 24-43	
		-		-		TEST SPECIFICATION LOW VOLTAGE	
		N.M. 44-48		49-53		SCALE	
		-		-		1X	
		CHARACTERISTICS		SHEET NO.		2-22	

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DETAILS OF REQUIRED TESTS

3-1.1 CONTROL WIRING

Control; wiring shall be checked to ensure that all connections have been properly made. Relays and other electrical equipment shall be checked by actual operation where feasible. When wiring checks cannot be made by actual operation, continuity checks must then be made. The breaker wiring diagrams listed on the Shipping Order Specification sheet are the source of wiring information. Correct voltage ratings of coils, actuators and motors shall be verified by the Test Department. Resistance of the above must be verified during manufacture, if by SE&A or on receipt if purchased.

Coil resistances are listed on the following drawings:

18-724-513-008

Motor Resistance as follows:

71-340-297-001	(120VAC/125VDC)	25 - 30 Ohms
-002	(240VAC/250VDC)	90 - 130 Ohms
-005	(48VDC)	8 - 30 Ohms
-006	(24VDC)	2 - 20 Ohms

Sealed Actuator Resistance as follows:

18-387-921-504	32 - 40 Ohms
18-809-575-506 (Red to Black)	17 - 24 Ohms

3-1.2 DIELECTRIC TEST

NOTE: Before any dielectric tests, ground the current transformer neutral to the breaker frame. Disconnect any intentional grounds for the PT Module, Unplug the PT Secondary from the back of the Trip Device and ground its common terminal. Restore all connections when Dielectric tests are completed.

3-1.2.1 Primary

On the completely assembled breaker, prior to shipping or stocking a dielectric test of 2200 Volts RMS for a period of 60 seconds shall be applied at any temperature between 10 and 55 C as follows: (20% higher voltage for 1 second is permissible)

3-1.2.1.1 WITH THE BREAKER CONTACTS OPEN

- 3-1.2.1.1.1 between live parts, including load terminals, and metal parts normally grounded.
- 3-1.2.1.1.2 Between line terminals and load terminals.

3-1.2.1.2 WITH THE BREAKER CONTACTS CLOSED (remove all PT fuses)

- 3-1.2.1.2.1 Between live parts and metal parts normally grounded.
- 3-1.2.1.2.2 Between terminals of different phases.

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09 DATE 07/11/01	08 RESET ISSUE & DRB DATE 01/12/96
01 REDRAMN IN ACAD LT ECO LV9602 B-1 03/26/82	1-PLACE DECIMAL ± .06 2-PLACE DECIMAL ± .03 3-PLACE DECIMAL ± .01
DATA BASE 186\82761407	
N-C 2 C	CURRENT DATE 3-8 07/11/01
MATERIAL	PART NUMBER 9-19 18-682-761-407
TYPE 22	ISS 20-21 09
REP 23	SCALE 1X
PART NAME 24-43 TEST SPECIFICATION LOW VOLTAGE	
N.M. 44-48	CHARACTERISTICS SHEET NO. 3-22
49-53	

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3-1.2 CONT'D

3-1.2.2 Secondary (replace PT fuses, and plug module into the trip device)
 With the circuit breaker in either the closed or open position, apply 1500 volts RMS for a period of 60 sec., at any temperature between 10° and 55 ° C as follows:
 (20% higher voltage for 1 sec. is permissible)

3-1.2.2.1 Between the control circuit and the metal parts that are normally grounded.

NOTE: Avoid terminals that connect to the static trip device and sealed actuator. If the circuit breaker includes a motor, the motor MUST be disconnected for this part of the test. However the motor must be tested with 1000 Volts RMS between EITHER motor lead and ground. Do not apply 1000 Volts across the motor circuit (between both leads).

Test static trip device, sealed actuator and all connected secondary disconnect points at 500 Volt RMS to frame ground. Disconnect any external capacitor and any intentional grounds for this test.

3-1.2.3 BREAKER RESISTANCE TEST
 SEE TABLE (1)

3-1.3 BREAKER OPERATIONAL TESTS

3-1.3.1 Manual Operation

Prior to shipping or stocking, all manually operated breakers shall be given 6 close & 6 trip operations. (3 operations charge-close-trip-charge sequence) & (3 operations charge-close-charge-trip-close-charge sequence) and 5 mechanically trip free operations.

If the breaker is equipped with shunt trip device 5 tripping operations shall be performed at minimum voltage, See Table "2". Refer to Static Device Section for additional tests required on breakers equipped with a static trip device. It shall be considered a failure if at anytime during the factory test the breaker should act unstable.

3-1.3.2 Electrical Operation

Prior to shipping or stocking, all electrically operated breakers shall be given operations under the following conditions. See TABLE "2". Refer to static trip device section for additional tests on breakers equipped with static trip devices. It shall be considered a failure if at any time during the factory test the breaker should act unstable.

USED ON: 2R: * CAD GENERATED, DO NOT CHANGE MANUALLY.

01		03/26/82		REDRAMN IN ACAD		08		01/14/96		RESET ISSUE & DATE DRB		09		07/11/01	
ECO LV9602 B-1				DRB											
Confidential-Property of												SIMILAR TO			
Electrical Apparatus Division															
1-PLACE DECIMAL ± .06		ANGULAR		1.0 DEG.											
2-PLACE DECIMAL ± .03												DR DRB		BULLETIN	
3-PLACE DECIMAL ± .01												CH		07	
DATA BASE		186\82761407		MACHINED SURFACE TEXTURE								APP		01	
N-C		CURRENT DATE		PART NUMBER 9-19		ISS									
2		3-8		18-682-761-407		20-21									
C		07-11-01		09											
MATERIAL															
TYPE 22		REP 23		PART NAME 24-43		N.M. 44-48		49-53		SCALE		CHARACTERISTICS		SHEET NO.	
-		-		TEST SPECIFICATION LOW VOLTAGE		-		-		1X		←		4-22	

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3-1.3.2 CONT'D

3-1.3.2.1 AT MINIMUM VOLTAGE

5 Closing Operations
5 Tripping Operations

3-1.3.2.2 AT MAXIMUM VOLTAGE

3 close & 3 trip operations
(charge-close-charge-trip-close sequence)
3 close & 3 trip operations
(Charge (open MI) close-trip-(close MI) charge (open MI)
close-trip sequence)

5 electrically trip free operations
holding trip shaft in tripped position.

3-1.3.2.3 Antipumping check, two operations. Apply uninterrupted power to the closing circuit, trip the breaker. The breaker must remain open until closing power has been interrupted and restored.

3-1.3.2.4 SPS (SPRING POSITION) AND 88 (MOTOR CUTOFF SWITCH) ADJUSTMENT

⚠ Check gap between levers and switch leaf
.04 to .09 As specified on drawing 18-657-852-489

3-1.3.2.5 Trip latch engagement shall be checked during electrical operation test.

3-1.3.3 MAINTENANCE CLOSING

All breakers shall undergo one successful maintenance closing operation.

3-1.4 OVERCURRENT TRIP DEVICE TEST

NOTE #1: On some orders one of the following designations may appear on the Shipping Order Specification:
SET TO _____. For this designation the tester can make the settings after the standard testing is completed, no additional tests are needed.

SET TO _____ AND TEST, This requires that the settings be made, and the device tested with those settings.

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2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

09		07/11/01		01		03-26-82		REDRAWN IN ACAD		08		01/15/96		ECO LV9602 B-1		DRB		09		07/11/01		DRB		Δ WAS .015 to .062		DRB					
Confidential-Property of												Electrical Apparatus Division																			
1-PLACE DECIMAL ± .06										ANGULAR		SIMILAR TO																			
2-PLACE DECIMAL ± .03										1.0 DEG.																					
3-PLACE DECIMAL ± .01																															
DATA BASE										186\82761407										MACHINED SURFACE TEXTURE		DR DRB		BULLETIN		CH		07		01	
N-C		CURRENT DATE		PART NUMBER 9-19		ISS		2		3-8		18-682-761-407		20-21		C		07-11-01		09											
TYPE		REP.		PART NAME 24-43		N.M.		44-48		49-53		SCALE		CHARACTERISTICS		SHEET NO.		22		23		TEST SPECIFICATION LOW VOLTAGE		1X		5-22					

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3-1.4.1 Static Trip Device & Actuator

POLARITY CHECK (MAY BE PERFORMED PRIOR TO ASSEMBLY TO BREAKER)
 With the actuator leads disconnected from the trip device, apply DC voltage (Approximately 9 Volts, .4 Amp. supply) to the actuator leads, positive connected to the RED lead must cause the actuator to release.

3-1.4.1.1

(A) Static Trip II

Jumper terminal #4 to #9 to disable Ground Fault tripping if required. Check the trip device long-time and short-time triggers: connect the negative lead of a 30 to 50 volt DC voltmeter to TP-1. Connect the voltmeter positive lead to TP-3 for long-time trigger indication. Set long time pickup to "A". Increase current slowly, until the voltmeter reading jumps from a low value to 20-25 Volts this is the pickup point and the source ammeter must read per table 3, use line #1 values for secondary current injection. Test all three phases.

Connect the voltmeter positive lead to TP-4 for short-time trigger. Set short-time pickup to 3X and long time pickup to "A". Increase current slowly until the voltmeter jumps to 20-25 Volts. The ammeter must read per table 3. Only one phase needs be tested.

With long time set on "A" and instantaneous set on 3X, short-time set on 12X apply 6X current per table 3 to phase one to insure operation of instantaneous. The short circuit target only must function for each operation.

With long-time pickup set on "A" and instantaneous set on 12X, short time pickup set on 3X apply 6X current per table 3 to phase one. Measure short-time delay and verify times per table "4". Short circuit target only must function for each operation.

USED ON:

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01		02/26/82		Confidential-Property of			
08		01/16/96		Electrical Apparatus Division			
REDRAWN IN ACAD		DRB		1-PLACE DECIMAL ± .06	ANGULAR	SIMILAR TO	
LT		ECO LV9602 B-1		2-PLACE DECIMAL ± .03	1.0 DEG.	DR DRB	
				3-PLACE DECIMAL ± .01		BULLETIN	
				DATA BASE	186\82761407	CH	01
						APP	96
MATERIAL -		N-2	CURRENT DATE	PART NUMBER 9-19			ISS
		C	01-16-96	18-682-761-407			20-21
							08
TYPE	REP.	PART NAME 24-43		N.M.	SCALE	CHARACTERISTICS	SHEET NO.
22	23			44-48	1X	←	6-22
-	-	TEST SPECIFICATION LOW VOLTAGE		49-53			

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3-1.4.1.1 Cont'd.

Set long-time band switch on 2. With instantaneous and/or short-time set to 12X and long-time pickup set on "A", apply 6X current per Table 3 to phase 1. Check to see that measured tripping time agrees with Table 4. Set long-time pickup to "C", apply 4X current per table 3 to phase 2, check tripping per Table 4. Set long-time pickup to "E", apply 2X current per Table 3 to phase 3 and check tripping time per Table 4. "Overload" target only must operate for each test.

Remove jumper from #4 to #9 to check ground pickup on devices with ground fault tripping. Connect the voltmeter positive lead to TP-2 for ground trigger indication. Set Ground pickup to 15%. Slowly increase the current on phase 1, for primary injection, or to terminal #4 for secondary injection. The voltmeter jumps to 15-25 Volts at pickup. The ammeter must read per Table 3. Set ground time delay band on "intermediate". Apply 1.0X current per Table 3 to phase 3 (or terminal #4 for secondary injection). Check tripping time per Table 4. Ground target only must operate.

(B) Limitrip

Check the static trip device long-time trigger: Connect the negative lead of a 30-50 Volt DC voltmeter to the negative lead of capacitor C-1. Connect the positive lead to the long-time trigger test point, set long-time pickup on "A". increase current slowly until the voltmeter reading jumps to 8-12 volts. This is the pickup point and the ammeter must read per table 3, test all three phases.

Set instantaneous to 12X. Set short-time pickup to 3X and long-time pickup on "A". Increase the current slowly until tripping occurs. The ammeter must read per table 3. One phase test only required.

Set instantaneous to 3X. set short time pickup to 12X and long-time pickup on "A". Increase current slowly until tripping occurs. The ammeter must read per Table 3. One phase test only required.

With long-time pickup set on "A", instantaneous set on 12X, short-time pickup set on 3X apply 6X current per Table 3 to phase one. Measure short-time delay and verify times per Table 4.

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2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

08		01		Confidential-Property of			
01/16/96		03-26-82		Electrical Apparatus Division			
REDRAWN IN ACAD		DRB		1-PLACE DECIMAL ± .06	ANGULAR	SIMILAR TO	
ECO LV 9602 B-1				2-PLACE DECIMAL ± .03	1.0 DEG.		
				3-PLACE DECIMAL ± .01		DR DRB	
				DATA BASE 186\82761407		CH 01	
						APP 96	
MATERIAL -		N-C	CURRENT DATE	PART NUMBER 9-19		ISS	
		2	3-8	18-682-761-407		20-21	
		C	01-16-96			08	
TYPE	REP.	PART NAME 24-43		N.M.	49-53	SCALE	CHARACTERISTICS
22	23	TEST SPECIFICATION LOW VOLTAGE		44-48	-	1X	SHEET NO.
-	-						7-22

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3-1.4.1.1 Cont'd.

Set long-time band switch on 1. With instantaneous and/or short-time set to 12X and long-time pickup on "A", apply 6X current per Table 3 to phase 1. Check that measured delay agrees with the value in Table 4. Set long-time pickup on "C". apply 4X current per table 3 to phase 2. Check trip time per Table 4. Set long-time pickup to "E", apply 2X current per table 3 and check time per Table 4.

(C) Static Trip III and Static Trip IIIc (all versions)

Set thermal memory switch to "out". Jumper terminals #4 and #5 together to disable ground fault tripping. It is permissible to move the wire from #4 to #5 for test. BE CERTAIN TO RECONNECT AFTER TESTING. Check static trip long-time and short-time pickup. Set long-time setting 0.5, increase current slowly until long-time pickup LED turns on, steady. This is the pickup point and the ammeter must read per table 5, use line 1 for secondary injection. Test all three phases.

Set short-time pickup to 2X, increase current until the short-time pickup LED turns on, ammeter must read per table 5. Test one phase only.

With long-time setting on 0.5 and short-time pickup at 12X, set instantaneous to 2X, apply 6X current per Table 5. Short circuit target only must function each operation.

With long-time setting on 0.5, instantaneous set on 15X, short-time pickup on 2X, Short time I^t and zone interlock on "out", apply 6X current per Table 5 to phase 1, Measure short-time delay and verify compliance with Table 4. Short circuit target only must function for each operation.

Set long-time band switch on 3.5, instantaneous on 15X, short-time pickup on 12X. with long-time setting on 0.5, apply 6X current per Table 5 to phase 1. Measure time delay. With long-time setting at .75, apply 4X current per table 5, to phase 2, measure time delay. with long-time setting at 1.0, apply 2X current per Table 5 to phase 3, measure time delay. All delay times must meet limits of Table 4, and overload target only must function for each operation.

USED ON:

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* CAD GENERATED, DO NOT CHANGE MANUALLY.

01		03/26/82		Confidential-Property of			
08		01/16/96		Electrical Apparatus Division			
REDRAWN IN ACAD		DRB		1-PLACE DECIMAL ± .06		ANGULAR	
ECO LV 9602 B-1				2-PLACE DECIMAL ± .03		1.0 DEG.	
				3-PLACE DECIMAL ± .01		SIMILAR TO	
				DATA BASE		MACHINED SURFACE TEXTURE	
				186\82761407		DR DRB	
						CH	
						APP	
						BULLETIN	
						01	
						96	
MATERIAL		N-C		CURRENT DATE		PART NUMBER 9-19	
-		2		3-8		ISS	
		C		01-16-96		20-21	
				18-682-761-407		08	
TYPE		REP.		PART NAME 24-43		N.M.	
22		23		TEST SPECIFICATION LOW VOLTAGE		44-48	
-		-				49-53	
						SCALE	
						1X	
						CHARACTERISTICS	
						SHEET NO.	
						8-22	

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3-1.4.1.1 Cont'd.

Remove jumper from terminals #4 and #5 , replace wiring if removed previously, to check ground pickup on devices with residual ground trip. Set ground pickup to 20%, slowly increase current on phase 1, if primary injection or into terminal 4 if secondary injection is used for test. Pickup is indicated by the short time/ ground fault LED lighting. The current at this point must meet the limits of Table 5. With ground pickup set at 20% apply 1.0X current to phase 1, (or terminal 4), tripping time must meet limits of Table 4. Ground target only must function.

Note: NEC limited ground pickup, test per 2000A, line 15.
For secondary injection use current values of line 1, on Table 5.

On devices with residual ground trip and all devices with communications, check CT polarity and/or communications. Disable ground tripping to set current for primary current tests. Set long time to 1.0, . Supply balanced three phase "test current", current per table 6. Enable ground fault (remove jumper, set ground pickup to 20%) , breaker must not trip.

On devices with communications, verify readings per table 6. For devices with PT module, also reverse the PT polarity and verify readings per Table 7.

On devices with residual ground fault tripping, reduce current on phase 1, breaker must trip. ground fault target only must function.

On devices with communications close and/or communications opening. check each function 3 operations, at nominal control voltage.

USED ON:

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* CAD GENERATED, DO NOT CHANGE MANUALLY.

08		REDRAWN IN ACAD ECO LV9602 B-1 DRB 01/15/96		01	Confidential-Property of Electrical Apparatus Division			
03-26-82		1-PLACE DECIMAL ± .06 2-PLACE DECIMAL ± .03 3-PLACE DECIMAL ± .01		ANGULAR 1.0 DEG.	SIMILAR TO			
DATA BASE		186\82761407		MACHINED SURFACE TEXTURE	DR DRB CH APP	BULLETIN 01 96		
MATERIAL —		N-C 2	CURRENT DATE 3-8 01-15-96	PART NUMBER 9-19 18-682-761-407			ISS 20-21 08	
TYPE 22	REP 23	PART NAME 24-43 TEST SPECIFICATION LOW VOLTAGE		N.M. 44-48	49-53	SCALE 1X	CHARACTERISTICS ←	SHEET NO. 9-22

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3-1.4.1.2 STATIC TRIP DEVICE 9-OPERATION CYCLING TEST

Each Static Trip device, prior to shipping, must be mounted on a breaker and subjected to a * 9-operation cycling shock test. The breaker may be operated either manually or electrically. Tripping to be done by the static trip device and actuator. * 3 operations per phase). The correct operation of all targets is required, during this test. Set long time pick-up on "A", 0.5 on Static Trip III devices. Instantaneous and/or short time on maximum marked value. Long time band on 2 for Static Trip II, 1 for Limitrip, 3.5 on Static Trip III. Set current at 4X per table 3 or 5. run 3 operations on phase 1, 3 operations on phase 2, and 3 operations on phase 3.

STANDARD SETTINGS

Return all static Trip device knob or switch settings to the standard settings as follows:

STATIC TRIP III AND STATIC TRIP IIIc (All Versions)

Long-time Setting	0.5
Short-time Pickup	2X
Instantaneous Pickup	2X
Long-time Delay	3.5
Short-time Delay	.22
Ground fault Pickup	20%
Ground fault Delay	.25
Thermal Memory	Out
Short-time I ² t	Out
Zone Interlock	Out

USED ON:

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18-682-761-407
 18-682-761-407
 18-682-761-407
 18-682-761-407
 18-682-761-407

04		10-29-87		Confidential-Property of			
08		01/16/96		Electrical Apparatus Division			
REDRAWN IN ACAD		DRB		1-PLACE DECIMAL ± .06	ANGULAR	SIMILAR TO	
ECO LV9602 B-1				2-PLACE DECIMAL ± .03	1.0 DEG.		
				3-PLACE DECIMAL ± .01			
				DATA BASE 186\82761407		MACHINED SURFACE TEXTURE	DR DRB BULLETIN
						CH	01
						APP	96
MATERIAL -		N-C	CURRENT DATE	PART NUMBER 9-19		ISS	
		2	3-8	18-682-761-407		20-21	
		C	01-16-96			08	
TYPE	REP.	PART NAME 24-43		N.M.	49-53	SCALE	CHARACTERISTICS
22	23	TEST SPECIFICATION LOW VOLTAGE		44-48		1X	SHEET NO.
-	-			-			10-22

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3-1.4.1.3 Cont'd.

<u>STATIC TRIP II</u>	
Long-time Pickup	A
Short-time Pickup	3X
Instantaneous Pickup	3X
Ground Pickup	15%
Long-time Band	2
Short-time Band	Intermediate
Ground time Band	Intermediate

<u>Limitrip</u>	
Long-time Pickup	A
Short-time Pickup	3X
Instantaneous Pickup	3X
Long-time Band	1
Short-time Band	2 (Intermediate)

3-1.4.1.4 TEST WITH STATIC TRIP DEVICE TEST SET

Every 30 days of production, this test is to be performed on one breaker equipped with a Static Trip device. After completion of the Static Trip Device cycling Test 3-1.4.1.2, use a current production Trip Device Test Set to test the Static Trip device. Static Trip device settings: Long time Pickup on minimum value, Short time pickup on minimum, Instantaneous on 3X or higher, Ground pickup on minimum. Set long-time Band per Table 4. Do not check ground pick-up on Ground devices.

For connections to Test Set see its instruction book SG-3138. Set the test set to supply 2X pickup value. Check time delay on all three phases, closing breaker for each test, compare values per Table 4, Check all three phases and ground time delay.

Return all trip device setting to the standard settings 3-1.4.1.3, unless otherwise specified in the Shipping Order Specification.

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

		04 REDRAWN IN ACAD 10/28/87		Confidential-Property of			
		08 ECO LV9602 B-1 01/16/96		Electrical Apparatus Division			
				1-PLACE DECIMAL ± .06 2-PLACE DECIMAL ± .03 3-PLACE DECIMAL ± .01		ANGULAR 1.0 DEG.	
				DATA BASE 186\82761407		MACHINED SURFACE TEXTURE	
				DR DRB CH APP		BULLETIN 01 96	
MATERIAL -		N-C C		CURRENT DATE 3-8 01-16-96		PART NUMBER 9-19 18-682-761-407	
				ISS 20-21 08			
TYPE 22		REP 23		PART NAME 24-43		N.M. 44-48	
				TEST SPECIFICATION LOW VOLTAGE		49-53	
						SCALE 1X	
						CHARACTERISTICS SHEET NO. 11-22	

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3-1.5.2 BELL ALARM

Devices are available in two styles.
 1- Mechanically operated, standard.
 2- Relay version, special.

Standard devices are to be tested per sections A & B.
 Special devices shall be tested per sections A, B, & C.

A) BELL ALARM SHOCK TEST

The operation of the bell alarm should be checked throughout the tests on the breaker. Verify that the alarm operates each time when the tripping actuator trips the breaker, and that all individual switches operate each time. Verify that the bell alarm remains reset when the breaker is closed and opened, including any trip free operations. Readjust and retest if any problem is found.

B) BELL ALARM OPERATION TEST-DURING STATIC TRIP CYCLING

The proper operation of the bell alarm must be verified during the static trip 9 operation cycling test (see Section 3-1.4.1.2). The bell alarm should be reset following each tripping operation, and proper operation of all switches verified.

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

01		REDRAWN IN ACAD		03-26-82		Confidential-Property of					
08		ECO LV9602 B-1		01/17/96		1-PLACE DECIMAL ± .06		ANGULAR		SIMILAR TO	
09		RESET ISSUE & DRB DATE		07/11/01		2-PLACE DECIMAL ± .03		1.0 DEG.		DR DRB	
09		DATE		07/11/01		3-PLACE DECIMAL ± .01		MACHINED SURFACE TEXTURE		BULLETIN	
09		DATE		07/11/01		DATA BASE		186\82761407		CH 07	
09		DATE		07/11/01		PART NUMBER 9-19		18-682-761-407		APP 01	
09		DATE		07/11/01		CURRENT DATE		07-11-01		ISS 20-21	
09		DATE		07/11/01		N-C		C		09	
09		DATE		07/11/01		MATERIAL		-		SHEET NO.	
09		DATE		07/11/01		PART NAME 24-43		TEST SPECIFICATION LOW VOLTAGE		13-22	
09		DATE		07/11/01		N.M.		44-48		49-53	
09		DATE		07/11/01		SCALE		1X		CHARACTERISTICS	
09		DATE		07/11/01		SHEET NO.		13-22		←	

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3-1.5.5 (Continued).

3-1.5.5.2 NON-INTEGRALLY FUSED BREAKER

Blown fuse trip device on breaker must be tested by applying DC voltage to the correct secondary contacts. (see wiring diagram). The breaker must trip and remain trip-free when 20 VDC is applied momentarily to the secondary contacts.

3-1.5.6 SEPARATELY MOUNTED FUSE DRAWOUT

Every fuse drawout shall be subjected to the same dielectric tests as are required for circuit breakers per 3-1.2.1.

Operation of the blown fuse sensor must be verified.

- a) connect voltmeter to output at secondary disconnect. (see wiring Diagram).
- b) Disconnect two small wires from top end of fuse and connect together, insulate from fuse, same arrangement for each phase.
- c) Remove all three trigger fuses and apply 120 VAC in turn, to each pair of fuse clips of the trigger fuse assembly.
- d) D.C. output must be 25 VDC min. when the voltage is applied to any phase.

3-1.5.7 STATIC TRIP DEVICE TEST SET

Refer to Test Specification 18-682-776-401 and Instruction Book SG-3138.

3-1.6 REPAIR PARTS

Any items covered in this Test Specification to be shipped separately for repair parts are subject to the same tests required for complete breakers with accessories. In some cases, the repair part item must be mounted on a breaker for testing.

3-1.7 SPECIAL MODIFICATIONS AND OPTIONAL EQUIPMENT

All modifications and special optional equipment must be tested.

3-1.7.1 MOC switch operator test.

Breakers equipped with MOC switch operators shall be tested for 5 closing and 5 opening operations driving a remote mounted auxiliary switch. Proper travel in both the open and closed position shall be verified for each operation.

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

09		RESET ISSUE & DRB PAGE	08	01/17/96	01	03/26/82	Confidential-Property of Electrical Apparatus Division			
07/11/01			ECO LV9602 B-1				1-PLACE DECIMAL ± .06	ANGULAR	SIMILAR TO	
							2-PLACE DECIMAL ± .03	1.0 DEG.	DR DRB	
							3-PLACE DECIMAL ± .01		CH 07	
							DATA BASE	186\82761407	MACHINED SURFACE TEXTURE	BULLETIN 01
							N-C	CURRENT DATE	PART NUMBER 9-19	ISS 20-21
							C	07-11-01	18-682-761-407	09
TYPE 22	REP. 23	PART NAME 24-43				N.M. 44-48	49-53	SCALE	CHARACTERISTICS	SHEET NO.
-	-	TEST SPECIFICATION LOW VOLTAGE				-	-	1X		15-22

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TABLE 1

D.C. RESISTANCE OF CURRENT PATH AT 100 A

<u>BREAKER DESCRIPTION</u>	<u>MAXIMUM MILLIVOLT DROP</u>	<u>MAXIMUM D.C. RESISTANCE MICRO-OHMS</u>
LA-600B, LA-600C	8.0	80
LA-1600B, LA-1600C	4.0	40
LA-3200A	2.5	25
LA-4000B	2.0	20
LA-800A, LA-800C	8.0	80
RL-800, RLK-800, RLI-800	8.0	80
RLE-800	8.0	80
RLX-800, RLH-800	4.0	40
RL-1600, RLN-1600, RLE-1600	4.0	40
RLX-1600, RL-2000, RLE-2000	2.5	25
RL-3200, RLE-3200	2.5	25
RL-4000, RLE-4000	2.0	20
RL-5000	1.8	18

- NOTE: (1) ALL RESISTANCE TESTS TO BE PERFORMED ACROSS PRIMARY STUDS ON EACH INDIVIDUAL PHASE WITH BREAKER CLOSED.
- (2) ABOVE RESISTANCE VALUES DO NOT INCLUDE PRIMARY DISCONNECTS OR FUSE ASSEMBLIES ON FUSED BREAKERS. THE VALUES SHOWN APPLY FOR THE FUSED BREAKERS OF THE SAME RATING.

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

		09	REVISED ISSUE DRB	01	Confidential-Property of				
		07/11/01		03/26/82	Electrical Apparatus Division				
					1-PLACE DECIMAL ± .06	ANGULAR	SIMILAR TO		
					2-PLACE DECIMAL ± .03	1.0 DEG.			
					3-PLACE DECIMAL ± .01				
					DATA BASE	186\82761407	MACHINED SURFACE TEXTURE	DR DRB	
							CH	BULLETIN	
							APP	07	
					N-C	CURRENT DATE	PART NUMBER 9-19	ISS	
					2	07-11-01	18-682-761-407	20-21	
					C			09	
TYPE	REP.	PART NAME 24-43			N.M.	49-53	SCALE	CHARACTERISTICS	SHEET NO.
22	23	TEST SPECIFICATION LOW VOLTAGE			44-48	-	1X	←	16-22

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LOW VOLTAGE AIR CIRCUIT BREAKER
STANDARD TEST SPECIFICATION

TABLE 2
VOLTAGES FOR OPERATION

<u>NOMINAL VOLTAGE</u>	<u>MINIUM VOLTAGE</u>		<u>MAXIMUM VOLTAGE</u>	
	<u>CLOSE</u>	<u>TRIP</u>	<u>CLOSE</u>	<u>TRIP</u>
120 AC	104	104	127	127
240 AC	208	208	254	254
480 AC	416	416	508	508
24 DC	19	14	28	28
28 DC	22	16	33	33
32 DC	25	18	38	38
48 DC	38	28	56	56
125 DC	100	70	140	140
250 DC	200	140	280	280

THE ABOVE LIMITS APPLY WHEN MEASURED AT THE TERMINAL OF THE MECHANISM WITH FULL OPERATING CURRENT FLOWING.

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

01		Confidential—Property of					
08		Electrical Apparatus Division					
01/16/96		1-PLACE DECIMAL ± .06		ANGULAR	SIMILAR TO		
03/26/82		2-PLACE DECIMAL ± .03		1.0 DEG.			
01/16/96		3-PLACE DECIMAL ± .01					
01		DATA BASE		MACHINED SURFACE TEXTURE	DR DRB BULLETIN		
08		186\82761407			CH 01		
01		ISS			APP 96		
01		N-C	CURRENT DATE	PART NUMBER 9-19	ISS		
01		2	3-8		20-21		
01		C	01-16-96	18-682-761-407	08		
MATERIAL -		N.M.	44-48	49-53	SCALE	CHARACTERISTICS	SHEET NO.
TYPE 22		-		1X		←	17-22
REP. 23		-		-			
-		TEST SPECIFICATION LOW VOLTAGE					



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TABLE 3 STATIC TRIP II & LIMITRIP
SECONDARY AND/OR PRIMARY INJECTION

LINE No.	1.0X Current OR XFMR RATING	LONG TIME PICKUP		SHORT TIME PICKUP		INSTANTANEOUS PICKUP		GROUND PICKUP		TIMING				CYCLE
		"A" Setting		3X("A")		3X("A")		15% SETTING		2X(1.0)	4X(0.75)	6X(0.5)	4X(0.5)	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	Min.	MAX.					
1	SECDY	0.450	0.550	1.35	1.65	1.35	1.65	0.135	0.165	2.00	3.00	3.00	2.00	
2	80	36	44	108	132	108	132	10.8	13.2	160	240	240	160	
3	150	75	90	150	180	270	330	27	33	300	450	450	300	
4	200	100	120	200	240	360	440	36	44	400	600	600	400	
5	300	150	180	300	360	540	660	54	66	600	900	900	600	
6	400	200	240	400	480	720	880	72	88	800	1200	1200	800	
7	600	300	360	600	720	1080	1320	108	132	1200	1800	1800	1200	
8	800	400	480	800	960	1440	1760	144	176	1600	2400	2400	1600	
9	1200	600	720	1200	1440	2160	2640	216	264	2400	3600	3600	2400	
10	1600	800	960	1600	1920	2880	3520	288	352	3200	4800	4800	3200	
11	2000	1000	1200	2000	2400	3600	4400	360	440	4000	6000	6000	4000	
12	3200	1600	1920	3200	3840	5760	7040	576	704	6400	9600	9600	6400	
13	4000	2000	2400	4000	4800	7200	8800	720	880	8000	12000	12000	8000	
14	5000	2500	3000	5000	6000	9000	11000	1000	1200	10000	15000	15000	10000	
15	2000	NEC GROUND SENSE ABOVE 2000AMP						360	440	GROUND TEST ONLY, APPLIES TO SEP. GRD. WDG.				

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

01		03/26/82		Confidential—Property of	
REDRAWN IN ACAD		ELECTRICAL APPARATUS DIVISION		SIMILAR TO	
ECO LV9602 B-1		1-PLACE DECIMAL ± .06		ANGULAR	
ADD 150,300,2400		2-PLACE DECIMAL ± .03		1.0 DEG.	
& line 15 DRB		3-PLACE DECIMAL ± .01		MACHINED SURFACE TEXTURE	
07/11/01		DATA BASE		DR DRB BULLETIN	
		186\82761407		CH 07	
				APP 01	
MATERIAL —		N-C 2		CURRENT DATE	
		C		3-8	
		07-11-01		PART NUMBER 9-19	
		18-682-761-407		ISS 20-21	
		09			
TYPE 22		REP 23		PART NAME 24-43	
—		—		TEST SPECIFICATION LOW VOLTAGE	
		N.M. 44-48		49-53	
		—		—	
		SCALE		CHARACTERISTICS	
		1X		←	
				SHEET NO. 18-22	

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TABLE 4

LONG-TIME ALLOWABLE TRIP RANGES-- ALL TYPES

INPUT CURRENT Multiples of PICK-UP OR SETTING	STATIC TRIP II TIME--Secs.		LIMITRIP Time--Secs.		STATIC TRIP III& IIIc Time--Secs.	
	BAND 2		BAND 1		DELAY 3.5	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
2X	24	37	24	37	31	49
4X	4.0	7	4.0	7.0	8	12
6X	1.7	2.7	1.7	2.7	3.5	5.2

SHORT TIME BANDS

TIME DELAY

		.08 SEC. OR MIN.	.22 SEC. OR INTERMEDIATE	.40 SEC. OR MAX.
→	STATIC TRIP II	.09-.11	.22-.28	.35-.50
	LIMITRIP	.09-.15	.20-.28	.35-.50
	STATIC TRIP III & IIIc	.08-.15	.22-.30	.40-.50

←

GROUND TIME BANDS

GROUND TIME BAND

		MIN.	INTERMEDIATE	MAX.
STATIC TRIP II	TRIPPING TIME SECONDS	.09-.11	.22-.28	.35-.50
STATIC TRIP III & IIIc	TRIPPING TIME SECONDS	.10-.15	.25-.30	.40-.45

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

01 03-26-82 REDRAWN IN ACAD		Confidential-Property of	
		Electrical Apparatus Division	
08 01/15/96	ECO LV9602 B-1 DRB	1-PLACE DECIMAL ± .06	ANGULAR
		2-PLACE DECIMAL ± .03	1.0 DEG.
		3-PLACE DECIMAL ± .01	SIMILAR TO
		DATA BASE 186\82761407	MACHINED SURFACE TEXTURE
		N-C 2	DR DRB BULLETIN
		CURRENT DATE 3-8	CH 01
		PART NUMBER 9-19	APP 96
MATERIAL --		01-15-96	ISS 20-21
		18-682-761-407	08
TYPE 22	REP. 23	PART NAME 24-43	N.M. 44-48
		TEST SPECIFICATION LOW VOLTAGE	49-53
			SCALE 1X
			CHARACTERISTICS
			SHEET NO. 19-22



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TABLE 5 STATIC TRIP III & III-c
SECONDARY AND/OR PRIMARY INJECTION

LINE No.	1.0X Current OR XFMR RATING	LONG TIME PICKUP		SHORT TIME PICKUP		INSTANTANEOUS PICKUP		GROUND PICKUP		TIMING				CYCLE
		(0.5) Setting		2X(0.5)		2X(1.0)		20% of (1.0)						4X(0.5)
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	Min.	MAX.	2X(1.0)	4X(0.75)	6X(0.5)	4X(0.5)	
1	SECDY	0.250	0.300	.500	.600	0.90	1.10	0.100	0.120	1.00	1.50	1.50	1.00	
2	80	40	48	80	96	144	176	14.4	17.6	160	240	240	160	
3	150	75	90	150	180	270	330	27	33	300	450	450	300	
4	200	100	120	200	240	360	440	36	44	400	600	600	400	
5	300	150	180	300	360	540	660	54	66	600	900	900	600	
6	400	200	240	400	480	720	880	72	88	800	1200	1200	800	
7	600	300	360	600	720	1080	1320	108	132	1200	1800	1800	1200	
8	800	400	480	800	960	1440	1760	144	176	1600	2400	2400	1600	
9	1200	600	720	1200	1440	2160	2640	216	264	2400	3600	3600	2400	
10	1600	800	960	1600	1920	2880	3520	288	352	3200	4800	4800	3200	
11	2000	1000	1200	2000	2400	3600	4400	360	440	4000	6000	6000	4000	
12	3200	1600	1920	3200	3840	5760	7040	576	704	6400	9600	9600	6400	
13	4000	2000	2400	4000	4800	7200	8800	720	880	8000	12000	12000	8000	
14	5000	2500	3000	5000	6000	9000	11000	1000	1200	10000	15000	15000	10000	
15	2000	NEC GROUND SENSE ABOVE 2000AMP							360	440	GROUND TEST ONLY, APPLIES TO SEP. GRD. WDG.			

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

08		01		10/29/87		Confidential--Property of		Electrical Apparatus Division		SIMILAR TO	
08		LT		REDRAWN IN ACAD		1-PLACE DECIMAL ± .06		ANGULAR		DR DRB BULLETIN	
01/15/96		ECO LV9602 B-1		DRB		2-PLACE DECIMAL ± .03		1.0 DEG.		CH 01	
						3-PLACE DECIMAL ± .01		MACHINED SURFACE TEXTURE		APP 96	
MATERIAL		N-C		CURRENT DATE		PART NUMBER 9-19		ISS			
-		2		3-8		18-682-761-407		20-21			
TYPE		C		01-11-95				08			
22		REP.		N.M.		SCALE		CHARACTERISTICS		SHEET NO.	
-		23		44-48		1X		←		20-22	
PART NAME 24-43		-		49-53							
TEST SPEC LOW VOLTAGE											

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TABLE 6 STATIC TRIP III, C, CN, CP, CNP, CPX,CNPX
Communication board tests with PT Modules, NORMAL POLARITY

CT RATING	COMMUNICATION BOARD OUTPUT									
	CP,CNP,CPX & CNPX									
	C & CN		KVA		KW		KVAR		PF	
	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.
80	44	36	18	10	7	3	18	10	70	17
150	82	68	34	20	13	6	33	19	65	18
200	110	90	44	27	17	9	44	26	63	20
300	165	135	66	40	25	13	66	39	62	19
400	220	180	88	54	33	18	88	52	61	20
600	330	270	132	81	49	27	132	78	60	20
800	440	360	176	108	66	36	176	104	61	20
1200	660	540	264	162	99	54	264	156	61	20
1600	880	720	352	216	132	72	352	208	61	20
2000	1100	900	440	270	165	90	440	261	61	20
2400	1320	1080	525	325	200	110	530	315	61	20
3000	1650	1350	660	405	247	135	660	390	61	20
3200	1760	1440	704	432	264	144	704	417	61	20
4000	2200	1800	880	540	330	180	880	522	61	20
5000	2750	2250	1100	675	412	225	1100	652	61	20

USED ON:

2R:

* CAD GENERATED, DO NOT CHANGE MANUALLY.

09		12/10/98		DRB		A was 33 KVA		Added 3000A, 150		08 01/15/96		ECO LV9602 B-1		REDRAWN IN ACAD		01 02-25-91		Confidential-Property of		Electrical Apparatus Division		SIMILAR TO					
																		1-PLACE DECIMAL ± .06		ANGULAR							
																		2-PLACE DECIMAL ± .03		1.0 DEG.							
																		3-PLACE DECIMAL ± .01									
																		DATA BASE		186\82761407		MACHINED SURFACE TEXTURE		DR DRB BULLETIN			
																						CH 07		APP 01			
MATERIAL																		N-C		CURRENT DATE		PART NUMBER 9-19		ISS			
																		2		3-8		18-682-761-407		20-21			
																		C		07-11-01				09			
TYPE		REP.		PART NAME 24-43																N.M.		SCALE		CHARACTERISTICS		SHEET NO.	
				TEST SPECIFICATION LOW VOLTAGE																44-48		1X		21-22			
																				49-53							

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