

ORIGINATING MARKER TEST

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1. GENERAL INFORMATION

1.1 Refer to Originating Marker Test per Section 172 for General Information, Test Procedure, Records and Requirements, Test Equipment and Test Setup.

NOTE 3: When the R-9572 Test Receiver is used, avoid placing it directly on the ear.

2. FUSE VERIFICATION

NOTE 4: Fuse verification is, ordinarily, only required on fuse panels wired by the installer.

2.1 Test Procedure - General

CAUTION: TO ELIMINATE A FIRE HAZARD, VERIFY THAT DIRECT GROUND IS NOT PRESENT ON THE ALARM BAR OR STUD ON A FUSE PANEL BEFORE INSTALLING ITS FEEDER FUSE. THIS SHOULD BE DONE USING THE ITE-4442 VOLT-OHMMETER. TO AVOID DAMAGING THE METER, FIRST VERIFY THAT BATTERY IS NOT PRESENT ON THE ALARM BAR BY USING THE VOLTMETER PORTION OF ITE-4442. IF CLEAR, SWITCH TO THE OHMMETER PORTION FOR THE RESISTANCE READING WHICH SHOULD BE EITHER INFINITY OR APPROXIMATELY 600 OHMS.

NOTE 5: On shop wired and fused fuse panels, inspect the panel for missing or operated fuses. If a fuse is missing or operated, test the fuse terminal for the absence of low resistance ground. Clear any grounded condition and install the proper fuse. At the completion of this test all fuse panels should be fully equipped with proper fuses. These may be either the proper specified type or a dummy.

NOTE 1: The operation of relays in circuits when fuses or potentials are applied is normal in some circuits. Oscillation, chatter and signs of overheating should be analyzed and cleared immediately.

2.2 Fusing Tests

2.21 Using fuses of the correct type, as indicated by the circuit drawing and fuse panel designations, install the fuses listed in Table A one at a time. Verify that each fuse is associated with the correct circuit and is free from cross with other unfused posts on the panel.

NOTE 2: ITE-4442 Volt-Ohmmeter should be used to verify all potentials at fused terminals to insure that polarity and voltages are correct. Many errors are caused by the use of the R-9572 Test Receiver on potentials other than -48 volts. Handbook 100, TMO-4442, provides full instructions for the use of the volt-ohmmeter.

3. CONTACT PROTECTION

3.1 For those contact protection networks installed on the job, test in accordance with Handbook 61, Section 0.2.

TABLE A

SD	FUSE DESIGNATION	POTENTIAL	AMPERAGE	TEST LOCATION
25016-01	*TP	+130V	1/2 HV	AHM Resistance
25054-01	*TBS	- 48V	1-1/3	48V Terminal
25054-01	*MISC	- 48V	1-1/3	AL Lamp

\* Located on the fuse bay.

4. CHANNEL SELECTION TEST

NOTE: These tests check the channel selection features and the chain circuits of the channel testing relays. The operation of the marker using the various channels is verified (1) on the routine tests of the markers and the district junctions by busying channels periodically and (2) on the originating channel test covered in a separate section.

4.1 Office Link Frames - LS Leads

4.11 Setup for Test

- 4.111 Block operated relay CHL of the marker to remove the operating battery from relays (CH) LO-R9.
- 4.112 Connect ground to 5M (HMT1) to provide operating ground for relays (CH) LO-R9.
- 4.113 Block operated the 5 and 6T contacts of relay STX to connect battery to the windings of relays (CT) LO-R9.
- 4.114 At terminal strip (OFF)E-B of marker under test, obtain the following association:

ITE-9984 LEADS	TERMINAL STRIP (OFF)E-B PCHG.	OFFICE LINK MCB RELAY
(A) 0-9	20-29	(LS) OL-9L 20-29M
(B) 0-9	10-19	(LS) OR-9R 10-19M

4.115 Connect the receptacle plug of an ITE-9984 cord to connector A on the Link Frame Test Set, ITE-4033B. Connect plugs 0 to 9 of this cord to terminals 20-29 of the (OFF)E-B terminal strip using ITE-4085 clips and insulated alligator clips. Connect the receptacle plug of another ITE-9984 cord to connector B on the ITE-4033B test set. Connect plugs 0 to 9 of this cord to terminals 10-19 of the OFF-E terminal strip using ITE-4085 push on clips and insulated alligator clips. Connect 48V battery and ground to the A jack of test set ITE-4033B using cord ITE-9598. Operate key AG and BG of the test set and leave them operated.

NOTE: This test may be performed to check the (LS) OL-9R leads cabled to a district link frame on the addition of a new marker. Perform the test by setting up the ITE-4033B to the make contacts of the associated MCB relay in an office link frame. The test should be performed on an even and odd office link frame.

4.12 Test Operations

- 4.121 Release relay CHL and observe that relay CH-LO operates. Reoperate relay CHL and observe that relay CH-LO releases.
- 4.122 Operate key A0 on the test set and observe that relay CT-LO operates. Release relay CHL and observe that relay CH-R0 operates. Reoperate relay CHL and observe that relay CH-R0 releases.
- 4.123 With key A0 and relay CT-LO still operated, operate key B0 and observe that relay CT-R0 operates. Release relay CHL and observe that relay CH-L1 operates. Reoperate relay CHL and observe that relay CH-L1 releases.
- 4.124 With keys A0 and B0 operated and relays CT-LO and CT-R0 operated, operate key A1 and observe that relay CT-L1 operates. Release relay CHL and observe that relay CH-R1 operates. Reoperate relay CHL and observe that relay CH-R1 releases.
- 4.125 Continue in a similar manner as described in the preceding paragraphs until all twenty channels have been tested. The following chart shows, in sequence, the operated keys and relays.

OPERATED KEYS		OPERATED RELAYS	
A	B	CT	CH
None	None	None	LO
0	"	LO	P0
0	0	LO, R0	L1
0-1	0	LO-1, R0	R1
0-1	0-1	LO-1, RO-1	L2
0-2	0-1	LO-2, RO-1	R2
0-2	0-2	LO-2, RO-2	L
0-3	0-2	LO-3, RO-2	R3
0-3	0-3	LO-3, RO-3	L4
0-4	0-3	LO-4, RO-3	R4
0-4	0-4	LO-4, RO-4	L5
0-5	0-4	LO-5, RO-4	R5
0-5	0-5	LO-5, RO-5	L6
0-6	0-5	LO-6, RO-5	R6
0-6	0-6	LO-6, RO	L7
0-7	0-6	LO-7, RO-6	R7
0-7	0-7	LO-7, RO-7	L8
0-8	0-7	LO-8, RO-7	R8
0-8	0-8	LO-8, RO	L9
0-9	0-8	LO-9, RO-8	R9
0-9	0-9	LO-9, RO-9	See

Note 2

NOTE 1: When marker is arranged for marker speed-up the CT-- relays are enclosed in cans making visual inspection of their operation impossible. However, if the proper CH-- relay is operated in each step, it verifies that the proper CT-- relays are operated.

NOTE 2: When all CT relays are operated check that relay CHL stays operated when the block is removed and that no CH relay operates.

- 4.13 Repeat the operations described under 4.11 and 4.12 using terminal strip (OFF-0) to verify leads (LS) OL-9L and (LS) OR-9R to the odd numbered office link frame.
- 4.14 Remove all test equipment and connections. Restore all relays to normal.
- 4.2 District Link Frames - LS Leads
- 4.21 Setup for Test
- 4.211 Block operated relay CHL of the marker to remove the operating battery from relays (CH) L0-R9.
- 4.212 Block operated relay AR2 to simulate channel selection on second trial calls.
- 4.213 Connect ground to 5M (HMT1) to provide operating ground for relays (CH) L0-R9.
- 4.214 Block operated the 5 and 6T contacts of relay STX to connect battery to the windings of relay (CT) L0-R9.
- 4.215 At terminal strip (DIST-A) of marker under test, obtain the following association:

DIST-A		DISTRICT	
TERMINAL STRIP	ITE-9984	ITE-4033B	LINK
PCHGS	LEADS	LEADS	CONNECTOR MCA RELAY
20-29	(LS) OL-09	0-9	A 20-29M
10-19	(LS) OR-09	0-9	B 10-19M
			See NOTE

NOTE: This test may be performed to check the LS-- leads cabled to a district link frame on the addition of a new marker. Perform the test by setting up the ITE-4033B to the make contacts of the associated MCA relay in a district link frame.

- 4.216 Connect -48 volt battery and ground to the A jack of the Link Frame Test Set, ITE-4033B, using cord ITE-9598. Operate keys AG and BG on the test set and leave them operated.
- 4.22 Test Operations
- 4.221 Release relay CHL and observe that relay CH-L5 operates. Reoperate relay CHL and observe that relay CH-L5 releases.

- 4.222 Operate key A5 on the test set and observe that relay CT-L5 operates. Release relay CHL and observe that relay CH-R5 operates. Reoperate relay CHL and observe that relay CH-R5 releases.
- 4.223 With key A5 and relay CT-L5 still operated, operate key B5 and observe that relay CT-R5 operates. Release relay CHL and observe that relay CH-L6 operates. Reoperate relay CHL and observe that relay CH-L6 releases.
- 4.224 With keys A5 and B5 operated and relays CT-L5 and CT-R5 operated, operate key A6 and observe that relay CT-L6 operates. Release relay CHL and observe that relay CH-R6 operates. Reoperate relay CHL and observe that relay CH-R6 releases.
- 4.225 Continue in a similar manner as described in the preceding paragraphs until all twenty channels have been tested. The following chart shows, in sequence, the operated keys and relays.

<u>OPERATED KEYS</u>		<u>OPERATED RELAYS</u>	
<u>A</u>	<u>B</u>	<u>CT</u>	<u>CH</u>
None	None	None	L5
5	None	L5	R5
5	5	L5,R5	L6
5-6	5	L5-6,R5	R6
5-6	5-6	L5-6,R5-6	L7
5-7	5-6	L5-7,R5-6	R7
5-7	5-7	L5-7,R5-7	L8
5-8	5-7	L5-8,R5-7	R8
5-8	5-8	L5-8,R5-8	L9
5-9	5-8	L5-9,R5-8	R9
5-9	5-9	L5-9,R5-9	L0
5-9,0	5-9	L5-9,0;R5-9	R0
5-9,0	5-9,0	L5-9,0;R5-9,0	L1
5-9,0-1	5-9,0	L5-9,0-1;R5-9,0	R1
5-9,0-1	5-9,0-1	L5-9,0-1;R5-9,0-1	L2
5-9,0-2	5-9,0-1	L5-9,0-2;R5-9,0-1	R2
5-9,0-2	5-9,0-2	L5-9,0-2;R5-9,0-2	L3
5-9,0-3	5-9,0-2	L5-9,0-3;R5-9,0-2	R3
5-9,0-3	5-9,0-3	L5-9,0-3;R5-9,0-3	L4
5-9,0-4	5-9,0-3	L5-9,0-4;R5-9,0-3	R4
5-9,0-4	5-9,0-4	L5-9,0-4;R5-9,0-4	See Note 2

NOTE 1: When marker is arranged for marker speed-up the CT-- relays are enclosed in cans making a visual inspection of their operation impossible. However, if the proper CH-- relay is operated, in each step, it verifies that the proper CT-- relays are operated.

NOTE 2: When all CT relays are operated check that relay CHL stays operated when the block is removed and that no CH relay operates.

4.226 Remove all test equipment and connections. Restore all relays to normal.

4.3 District Link Frames - S Leads

NOTE: To prevent the trouble indicator from being called in, block nonoperated relay XK of the marker under test or insulate springs 0 on relay MCB when testing even numbered markers or springs 5 on relay MCB when testing odd numbered markers.

4.31 Setup for Test

4.311 Block operated relay CHL of the marker to remove the operating battery from relays (CH) L0-R9.

4.312 Connect ground to 5M (HMT1) to provide operating ground for relays (CH) L0-R9.

4.313 Block operated the 5 and 6T contacts of relay STX to connect battery to the windings of relays (CT) L0-R9.

4.314 When testing an even numbered marker, obtain the following association at the marker under test terminal strip (DIST-B).

DIST-B		DISTRICT		
TERMINAL STRIP	ITE-9984	ITE-4033B	LINK	MCB RELAY
PCHGS	LEADS	LEADS	CONNECTOR	
40-44 (S)	5L-9L	5-9	A	40-44M
30-34 (S)	0L-4L	0-4	A	30-34M
20-24 (S)	5R-9R	5-9	B	20-24M
10-14 (S)	0R-4R	0-4	B	10-14M

4.315 When testing an odd numbered marker, obtain the following association at the marker under test terminal strip (DIST-B):

DIST-B		DISTRICT		
TERMINAL STRIP	ITE-9984	ITE-4033B	LINK	MCB RELAY
PCHGS	LEADS	LEADS	CONNECTOR	
40-44 (S)	5L-9L	5-9	A	45-49M
30-34 (S)	0L-4L	0-4	A	35-39M
20-24 (S)	5R-9R	5-9	B	25-29M
10-14 (S)	0R-4R	0-4	B	15-19M

See NOTE

NOTE: This test may be used to check the S-- leads cabled to a district link frame on the addition of a new marker. Perform the test by setting up the ITE-4033B to the make contacts of the associated MCB relay in a district link frame.

4.32 Test Operations

4.321 Test operations are the same as Paragraph 4.12.

4.322 Remove all test equipment and connections. Restore all relays to normal.

4.4 Relays SPL and SPR

4.41 Block operated contacts 5 and 6T of relay STX and block operate relay SPL of the marker. If marker not arranged for marker speed-up visually verify relays (CT) L0-L9 operate. If marker arranged for marker speed-up verify ground present on pin 8 of relays CTLO-9.

4.42 Release relay SPL. Verify relays CTLO-9 release (without marker speed-up) or ground is absent from pin 8, relay CTLO-9 (with marker speed-up).

4.43 Block operated relay SPR and verify relays CTRO-9 operate (without marker speed-up) or ground present on pin 8, relays CTRO-9 (with marker speed-up).

4.44 Release relay SPR and contacts 5 and 6T, relay STX. Verify relays CTRO-9 release (without marker speed-up) or ground absent from pin 8, relays CTRO-9 (with marker speed-up).

NOTE: The channel busying features from pattern relays are covered in another section.

4.5 Reverse Winding Check (App. Fig. BQ)

4.51 Block operated the 5 and 6T contacts of relay STX.

4.52 Momentarily ground at the same time winding terminals 4TR and 3TF of relay AB-L0. Observe that relay AB-L0 operates while both windings are grounded. This verifies that the windings are not connected differentially. If they were connected differentially the relay would not operate when both windings are grounded simultaneously.

4.53 Repeat this test on all BC and C relays. Remove block from relay STX.

4.6 Originating Trouble Indicator - CH Leads

NOTE: Make the OTI busy to all in service markers by inserting 322A Make Busy Plugs into the associated TIB jacks. Remove the make busy plugs upon completion of tests of this paragraph.

- 4.61 Block operated the CIB relay of the marker under test and the LP relay of the trouble indicator.
- 4.62 Apply ground to the top winding terminal, spring 7T of relays (CH) L0-R9, one at a time, and observe that lamps (CH) L0-R9 respectively light. Release relays CIB and LP.
- 4.63 Check that relays (CH) L0-R9 of the trouble indicator lock to relay GD1 operated.
- 4.7 Locking Path for CH Relays
- 4.71 Cross 1B and 2B contacts of ST1 relay.
- 4.72 Manually operate relay CH-L0 and check that it locks.
- 4.73 Manually operate relay CH-R0 and observe that it locks and that relay CH-L0 releases.
- 4.74 Manually operate relay CH-L1 and observe that it locks and relay CH-R0 releases.
- 4.75 Continue in this manner to the end of the chain. Release ST1 relay.
- 4.8 Locking Path for Relay CHL
- 4.81 Check that relay CHL locks through contacts 3 and 7 of relay CHT to ground on contacts 4 and 5B of relay JD operated.
5. MISCELLANEOUS CIRCUIT, SD-25054-01
- 5.1 Verify the below listed features of the Miscellaneous Circuit, not checked on other tests, as follows.
- 5.11 Test Battery Jack and Supply
- 5.111 Check 48V test battery terminals and tip of the A jack for presence of 48 volts.
- 5.112 Check the G test terminals for direct ground.
- 5.113 Check the HBG test terminals for high resistance ground (12000 ohms).
- 5.114 Check for direct ground on the A jack sleeve.
- 5.12 Spare Jack B to MDF
- 5.121 Make a continuity test of Jack B to the MDF.
- 5.13 Frame Line Jacks
- 5.131 Make a continuity and cross test of the tip and sleeve leads of Jacks TEL (A and B) to all associated TEL jack appearances and to the MDF.
- 5.14 Remote Control Jack
- 5.141 Make a continuity test of Remote Control Jack F to the OTI.
- 5.15 Fuse Alarm
- 5.151 Connect 48V battery through test receiver R-9572 to the alarm bar for the 20 ampere frame fuse. Observe that the major alarm sounds and that lamps 20A, and the associated red aisle pilot light. Lamp FA and AL do not light.
- 5.152 Disconnect the battery from the alarm bar and observe that the alarm is silenced, the lighted lamps extinguished and lamp AL lights. Momentarily operate key AR to extinguish lamp AL.
- 5.153 To check the 20A resistance shunt, remove lamp 20A and repeat the test described in Paragraphs 5.151 and 5.152. Replace the lamp at the completion of the test.
- 5.154 To verify the presence of the 350 ohm resistance between the 20 ampere alarm and the 20A lamp, proceed as follows: Connect 48V battery through test receiver R-9572 to the alarm bar for the 20A fuse, using another test receiver, R-9572, connect to the same point and the fuse mounting side of the 20A lamp. Check for an appreciable receiver click in both receivers.
- 5.155 Connect 48V through test receiver R-9572 to the frame fuse panel alarm bar. Observe that the major alarm sounds, and that lamp FA and the associated red aisle pilot light. Lamps 20A and AL do not light.
- 5.156 Remove the battery and observe that the alarm is silenced, the aisle pilot and FA lamps are extinguished and lamp AL lights. Momentarily operate key AR.

No Changes Indicated Due  
To Extensive Revision

Reason for Reissue:

1. Revise Paragraph 4 to include Marker Speedup.
2. Add Paragraph 5.
3. Incorporate T.I. 172.1, Dated 4-10-69.
4. Make corrections and clarifications.
5. Make a general revision to update to current Engineering Standards.

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