

NUMBER GROUP CONNECTOR TEST

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1. GENERAL INFORMATION

1.1 Description of Test: This section describes a method of testing the number group connector circuit. The marker multiple and the associated cabling and wiring from the block relay frames to the number group and the VLDF are tested for continuity, crosses and grounds. The NC and NF cross-connections and the associated wiring from the block relay frames to the number group connector frames are tested for continuity, crosses and grounds. A check is made for false continuity at the marker connector (MC) and at the block relay twenty block (TB) relay contacts. The circuit numbers are SD-25276-01 & 25277-01.

1.2 Test Procedure

1.21 Cabling: The cables between the terminating markers and the marker connector (MC) relays of the number group connector frames should be left disconnected at the markers until the marker multiple test described in Paragraph 6 has been completed, and on additions until after the marker lockout and control test has been completed.

1.211 The marker multiple test should be made after the cables from the block relay frames to the number group and to the LDF are connected, in order to avoid interference and to make a check for crosses on these leads.

1.22 Cross-Connections: The NC and the NF cross-connections at the block relay frames and the NS cross-connections at the VLDF should be left disconnected until the marker multiple test described in Paragraph 6 has been completed.

1.23 During the job test interval the regular lockout circuit (MP relays) and the emergency lockout circuit (E relays) of the number group connector circuits should be used approximately the same amount of time as a means of exercising these circuits.

CAUTION: When using the test receiver as described in this section, do not place the receiver directly over the ear.

2. RECORDS AND REQUIREMENTS

2.1 Records - Forms SD-4-1313 and ID-2239 are required for recording the results of these tests.

2.2 Requirements - Section 5 lists all the tests to be made on number group connector circuits together with the associated performance requirements.

3. TEST EQUIPMENT

3.1 Test Sets Required

Amt	ITE	Description
Ø 1	4048	Number Group Test Set
1	4033B	Link Frame Test Set

Ø - Not to be requisitioned for jobs of less than 2500 terminals, and not on additions if block relay cross-connections are not installed by Western Electric Company.

3.2 Cords Required with ITE-4048

Amt	Code	Lgth	Cdrs	One End	Other End	With ITE
1	9598	12'	2	310 Plug	310 Plug	4048
4	9933A	12'	60	6 Rec. Plugs	T.S.Fixt. ITE-4527	4048
1	9547	12'	1	2455 Plug	2455 Plug	4023 ←

3.3 Cords Required with ITE-4033

Amt	Code	Lgth	Cdrs	One End	Other End	With ITE
1	9598	12'	2	310 Plug	310 Plug	4033B
3	9984	12'	10	REC.Plug	10 ITE-2455 Plugs	4033B

3.4 Accessories Required

Amt	ITE or Code	Description	With ITE
1	ITE-4034	Volt-Ohmmeter	
+1	ITE-2418	Buzzer Set	
	or		
	ITE-4137	A.C. Continuity Test Set	
1	ITE-4261A	Whistler Test Set	

<u>Amt</u>	<u>ITE or Code</u>	<u>Description</u>	<u>With ITE</u>
As Req.	ITE-8507	Alligator Clip	4023
As Req.	ITE-4069	Relay Blocking Tool	4023
→ 1	349A	Make Busy Plug	4023

+ Required for additions and small installations only.

4. FUSING

NOTE: On additions and small installations the marker multiple test should be completed before beginning the fusing test.

4.1 Fuse Installation and Cross Test

4.11 Using a volt-ohmmeter or test receiver check each fuse post for absence of battery and ground.

4.12 Using fuses of correct type as indicated by circuit drawings and fuse panel designations install the following fuses, one at a time, and check that each fuse is associated with the correct circuit and is free from crosses with other unfused posts on the fuse panel.

<u>Fuse</u>	<u>Equipment</u>
	<u>Number Group Connector Frame</u>
(A)0-9	Winding, relays (MCA)0-9
(B)0-9	" " (MCB)0-9
(C)0-9	" " (MCC)0-9
D	" , any relay (TR)1-5
E	RES. E
TBS	48V Terminal
	<u>Block Relay Frame</u>
(HB)0-7	Winding, relays (HB)0-7
K	" " (XG)1-3 or XGA
TBS	48V Terminal

5. CONTACT PROTECTION

→ 5.1 Contact protection tests need only be made on job wired equipment as described in Section 0.2, Handbook 61.

6. MARKER MULTIPLE TEST

6.1 The Marker Multiple test using ITE-4261A whistler test set will check the multiple for continuity, reversals, crosses and false battery and ground.

6.2 At the number group connector frame, connect the whistler test set to 115V AC and allow about one minute to warm up.

6.3 Touch the test lead of the whistler to the 0 contact of the first marker MCA relay. A tone should be heard.

6.4 Adjust the volume control for sufficient volume.

6.5 At the next number group frame, have an installer place ground on the 0 contact of the first marker MCA (other end of multiple) lead. The tone should be silenced.

→ 6.6 Continue the test on each contact of the MCA, MCB, MCC and MCD relays for each marker between the first two number group connector frames as described in the preceding paragraphs. The tone on each lead should be approximately the same pitch. However, if a particular lead should have a different pitch, try the corresponding contact of the MC- relay of a different marker for comparison before deciding if it is a trouble condition. Two crossed leads should lower the tone about half an octave.

6.7 The following leads are either grounded, unequipped or strapped:

	<u>MCA</u>	<u>MCC</u>
Grounded	51	-
Unequipped	-	-
Strapped	53, 54, 58, 59	41-42

6.8 Upon completion of the test between the first two number group connector circuits for all markers, repeat the tests on the second and third circuits and continue in this manner until the complete multiple between all number group connector circuits have been tested.

6.9 For further information on the use of the whistler test set, refer to Handbook 50, Section 2, Paragraph 5.10 and Handbook 100, TMO 4261A.

7. MARKER LOCKOUT AND CONTROL

NOTE: See Figure 2. (On additions this test must be completed before closing down the cable to the markers.)

7.1 Using an ITE-9598 cord, connect 48V battery and ground to the A jack of the ITE-4033B test set. Also connect two ITE-9984 cords, equipped with alligator clips, as follows to the ITE-4033B link frame test set.

(1) Test set connector A, leads 0-9, to the marker start leads 0-9, as equipped at the frame MISC. T.S., terminals 00-09, respectively, for the first number group connector circuit on the frame and terminals 10-19, 20-29 and 30-39 for the second, third and the fourth circuits, respectively, on the frame.

(2) Test set connector S, leads 0-9, to the marker CK leads 0-9, terminal 55, of MCA T.S., 0-9, respectively, as equipped. (T.S. at top of frame).

7.2 Operate keys AB, SB and AO. Observe that relays MP 0 and MCA 0 operate and that lamp S 0 lights. Restore key AO and observe that relays MP 0 and MCA 0 release and that lamp S 0 is extinguished. Repeat this test using keys A (1-9) for lockout and control relays 1 to 9, as equipped.

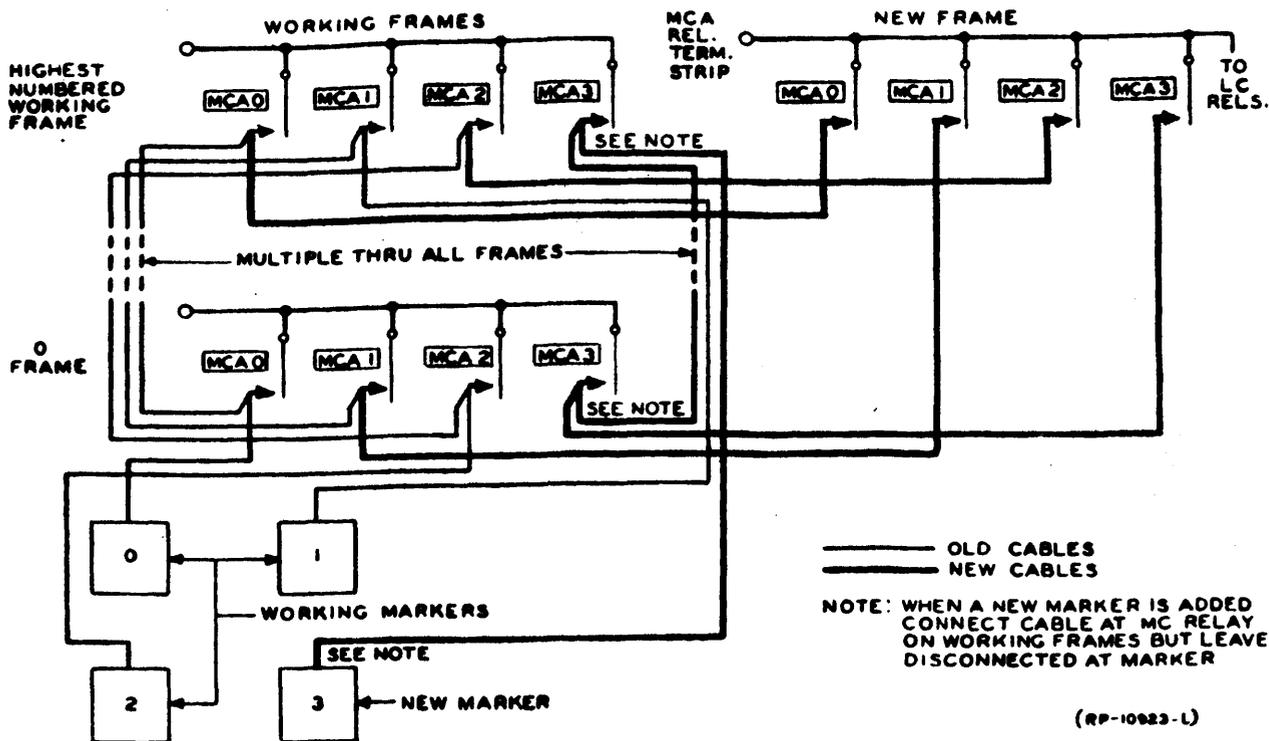


FIG. 1 SCHEMATIC OF MARKER MULTIPLE FOR ADDITIONS

7.21 Operate key A0. Observe that relays MP 0 and MCA 0 operate, lamp S 0 lights, and that lamp S1 0 does not light. Operate in numerical order keys A(1-9). Observe that relays MP 1 to MP 9 operate in the same order, relays MCA (1-9) do not operate and that lamps S (1-9) do not light.

7.22 Restore and reoperate key A 0. Observe that lamp S 0 is extinguished and that lamp S 1 lights. Restore and reoperate key A 1. Lamp S 1 is extinguished and lamp S 2 lights. Continue in the same manner until all A keys corresponding to equipped relays have been restored and reoperated. When the last A key has been restored and reoperated lamp S 0 should light. Restore keys A (0-9).

7.3 Operate the MTR key. Observe that the CH lamp lights and the connector circuit alarm operates. Release the MTR key and operate the SA key. The lamp and alarm are retired, and the emergency lockout circuit (E relays) is now effective.

7.4 With the E relay circuit effective, perform the tests per 7.2, 7.21 and 7.22 on this circuit. The results in this case are the same as for the MP relays except that the E relays are operated causing in turn the MC relays to operate.

7.5 Operate the MTR key. Observe that the CH lamp lights and the connector circuit alarm operates. Release the MTR key and then release the SA key. The lamp and alarm are retired and the MP relay circuit is effective.

7.6 Block the TR1 relay normal to prevent a throw-over and to block the alarm. Break the 2T and 3T contacts of the MP 0 relay and observe that the CH relay operates. Allow the 2T and 3T contacts to remake and observe that the CH relay releases. Break the 1B and 3B contacts of the MP 0 relay and observe that the CH relay operates. Allow the 1B and 3B contacts to remake and observe that the CH relay releases. Repeat this test on all other MP relays.

7.7 Remove the block from relay TR1. Make the E relay circuit effective by means of the manual throw-over as described in Paragraph 7.3 and then block the TR1 relay in the operated position.

7.8 Break the 2T and 3T contacts and the 1B and 3B contacts on each E relay in a manner similar to that described in Paragraph 7.6 for the MP relays and observe that in each case the CH relay operates and releases. Remove the blocks from the TR1 relay and the marker NK relay.

7.9 Insert a 349A MB plug into the TMB jack of the number group connector under test. Observe that the associated TMB relays operate, the corresponding TMB lamp lights and the CFB lamp on the floor alarm cabinet lights. Remove the MB plug from the TMB jack and check that the TMB relay releases, the TMB and CFB lamps are extinguished.

8. WIRING AND CROSS-CONNECTION TEST

8.1 Setup for Test

8.11 Using Cord ITE-9598, connect 48 volt battery and ground to the BAT jack of ITE-4048, Number Group Test Set.

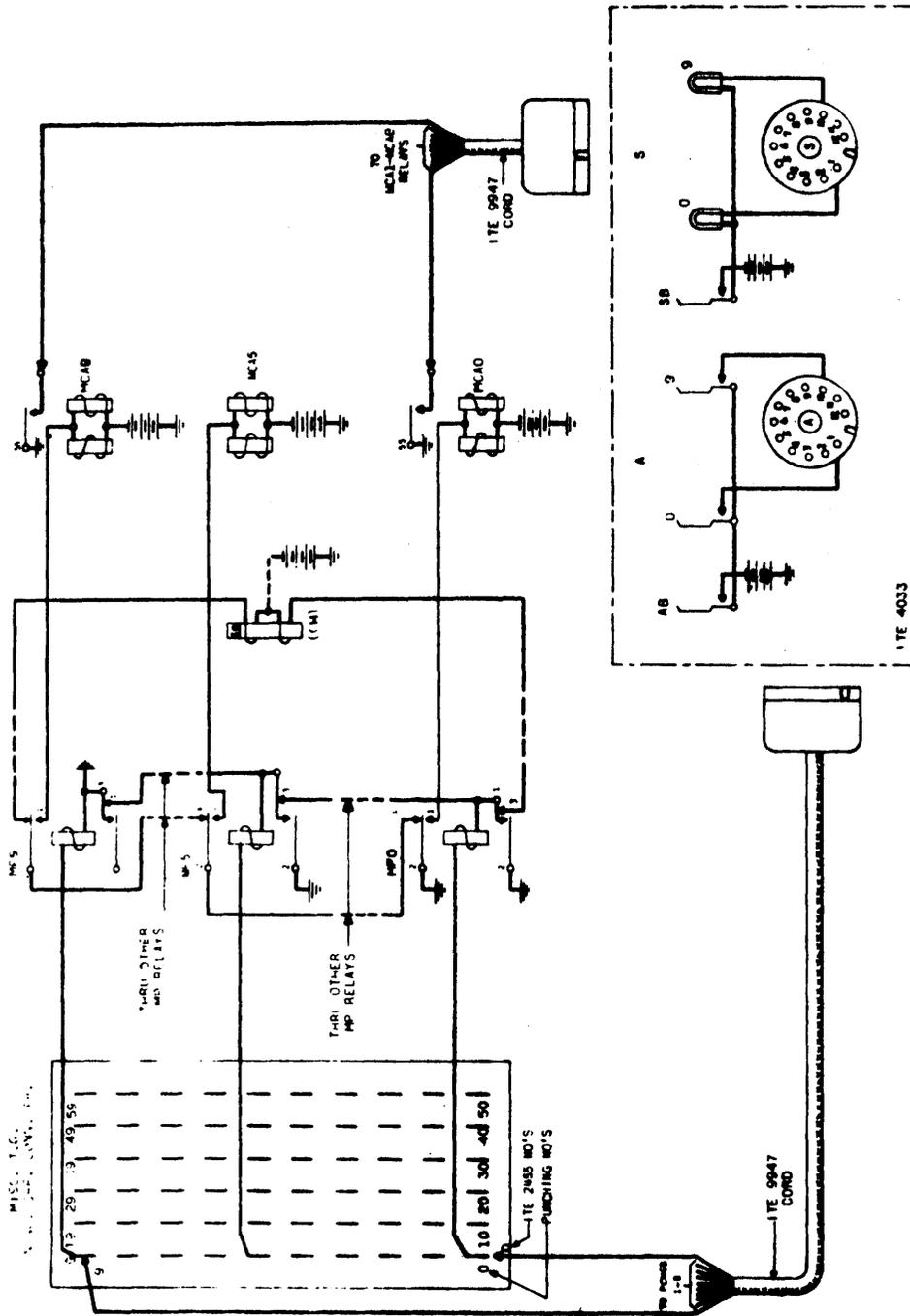


FIG. 2 SETUP FOR MARKER LOCKOUT AND CONTROL TEST

NOTE: Where leads are not used in the following setup, the connections may be omitted.

8.12 Using an ITE-9933A cord connect the terminal strip for MCA relays to connectors on the test set to give the following association:

Plug of Cord	Connector	Leads
0	HB	HB (0-9)
1	HB1	HB (10-19)
2	HB2	HB (20-24)TB(0-4)
3	JC	JC (0,2,---18)
4	JF	JF (0-4)

8.121 Using another ITE-9933A cord connect the terminal strip for MCB relays to connectors on the test set to give the following association:

Plug of Cord	Connector	Leads
0	HF	HF (0-9)
1	HF1	HF (10-19)
4	NF	NF (0-9)
5	NF1	NF (10-19)

8.122 Using another ITE-9933A cord connect the terminal strip for MCC relays to connectors on the test set to give the following association.

Plug of Cord	Connector	Leads
0	TF	TF (0-9)
1	TF1	TF (10-19)
2	RF	RF (0-9)
3	RF1	RF (10-19)
4	X	XG, PN, TN, PTN

8.123 Using another ITE-9933A cord connect the terminal strip for MCD relays to connectors on the test set to give the following association:

Plug of Cord	Connector	Leads
0	A	HG (A0-A9)
1	B	HG (B0-B9)
2	C	HG (C0-C9)
3	D	HG (D0-D9)
4	NC	NC (0-9)
5	NC1	NC (10-19)

8.2 Test Operations

NOTE: At the block relay frame cross-connection fields the NC and NF terminal strip punchings are numbered with the unit designation at the left, (VERTICAL), and the tens designation above or below the punchings dependent on whether the NC or NF terminal strip, is the upper or lower terminal strip, respectively. The numbers ending in units 0 to 4 appear in the lower terminal strip whereas those having units 5 to 9 appear in the upper terminal strip.

8.21 Operate key HBO to operate the first hundred block (HB) relay of the number group connector under test. Operate key TBO to operate the first twenty block (TB) relay of the hundred block under test.

8.22 Operate key N 0. This connects ground to the NF punching (directory number) for the first line on the operated twenty block relay; over the NF cross-connection back into the test set lighting an RF, HF or TF lamp and a 0-19 lamp. The lighted lamps agree with the cross connection information and indicate the party and the choice where the line is located. Thus, lamps RF 2 indicate that the cross-connection is NF-----to RF 2, a Ring Party and that the line is on line choice 2; lamps HF 5 indicate that the cross-connection is NF-----to HF 5 and that the line is in a hunting group in line choice 5. If two of the (RF, HF or TF) 0-19 lamps light a cross is indicated and if no lamp lights an open or unequipped line is indicated.

8.23 If the cross-connection is NF to XF an RF lamp and a 0-19 lamp should light. Operate key XG and observe that the TF (0-19) lamps are extinguished and the corresponding HF and 0-19 lamps light. Release XG key before operating the next N key. If the cross-connection is NF to JF check that the proper JF and 0-4 lamps light. JF lamps indicate that more lines in this hunting group are on TB relay 0-4 of the coded lines associated with this number group.

8.24 Operation of key N 0 also connects ground over the NC cross-connection for the first line on the operated twenty block relay lighting an A, B, C or D lamp and a 0-9 lamp. The lighted lamps agree with the cross-connection information and indicate the line link frame and horizontal line group where the line is located. Thus, lamps B 3 indicate that the cross-connection is NC----- to HG-B and that the line link frame B is the choice and on horizontal group 3. If two A, B, C or D or two of their associated numerical lamps light a cross is indicated and if no lamp lights an open or an unequipped line is indicated.

8.241 When LLP lines are tested, verify ground is present on the associated relays MCC terminal 50. Verify continuity from cross connect terminals "LS1" and "NS1" to terminals "LS" and "NS", respectively.

8.242 When DID lines to a No. 101 ESS PBX are tested, verify ground is present on the associated relays MCC, Terminal 51. Verify continuity from cross connect terminal "BLS" to terminal "ALS".

8.243 When CLI lines are tested, verify ground is present on the associated relay MCC, Terminal 52. Verify continuity of the cross connections from CLI 1-5 terminals to assigned NC- terminals, from CLI NC 1-5 terminals to assigned HGA-, HGB-, HGC- or HGD- terminals, and from LI- terminals to LI NG terminals.

8.244 When AIS lines are tested without LLP, verify ground is present on the associated 000 to 009 terminals of the AIS frame. Verify continuity from cross

→ connected terminals OFI to OFT, NCI 0-5 to NC 0-5, NFI 0-5 to NF 0-5, NSI 0-5 to NS 0-5, RFI 0-9 to RFO-9, HGI 0-9 to HG 0-9 and LSI 0-9 to LS 0-9.

8.25 If the cross-connection is NC to JC check that the proper JC (0, 2, -----18) lamps light. This cross-connection arrangement is used for jump hunting and indicates the starting point for further terminal hunting in the new group of twenty coded terminals to which the call has jump hunted.

8.26 In offices containing physical and theoretical numbers, and where the service is restricted between these offices, the operation of an RB key will cause lamp PN to light for lines restricted to physical numbers, lamp TN for theoretical numbers and lamp PTN for non-discriminating numbers.

8.27 Operate keys N (0-19) in turn and check the cross-connections for the twenty lines associated with the operated twenty block relay. The cross-connections on the other twenty block relays of the operated hundred block relay are checked by operating keys TB (1-4) in turn and repeating the tests described for the first twenty block. All hundred blocks are checked in a similar manner. Keys HB (0-24) operated operate respectively the first to twenty-fifth hundred block relay of a number group. To test coded line cross-connections of the number group to which the test set is connected operate HB 24 key.

NOTE: When testing HB (20-24) it is necessary to hold down the operated HB- key when operating a TR (0-4) key.

→ 8.3 Equip an ITE-9547 cord with alligator clips. Connect one end of this cord to any NF terminal which is not cross-connected and operate the corresponding HB, TB and N keys. Connect the other end of the cord to each unequipped HF, RF, TF, JF, JC and HG terminal, in turn, and observe that the corresponding lamps light.

8.4 Cross-Connection Tests for Additions and New Installations of Less Than 2500 Terminals

8.41 At the terminating trouble indicator frame using the line assignment cross-connection list, write up the first number to be verified in the number group connector under test. Operate ST key (See Section 225, Paragraph 4 for details.) Observe that the call is completed correctly, as indicated by the lamps received. Momentarily operate RL key to restore circuit to normal.

8.42 Repeat tests as described in Paragraph 8.41 for each number in the number group. Then proceed with each group until all cross-connections have been tested.

8.5 Wiring Test Vacant Terminals for Additions and New Installations of Less Than 2500 Terminals

8.501 When there are no cross-connected lines in a number group, perform the following tests.

8.502 Using an ITE-9598 cord supply battery and ground to the A jack of the ITE-4033B link frame test set. Connect receptacle plugs 0,2,3 and 4 of cord ITE-9933A to the test set connectors A, B, S and S1 respectively. Connect the

T.S. fixture of this cord to an MCA multi-contact terminal strip. Operate test set keys AG, BG, SB and S1B.

8.503 Operate key AO. Verify that the first hundred block (HB) relay of the number group under test operates. Momentarily operate key B5. Verify that the first twenty block (TB) relay of the hundred block under test operates momentarily.

8.504 Momentarily operate the other twenty block relays, one at a time, of the hundred block under test by operating keys B (6-9).

8.505 All hundred blocks are checked in a similar manner per Paragraphs 8.503 - 8.504. When HB 9, if equipped, has been tested replace ITE-9933A receptacle plug 0 with plug 1. Proceed to test HB (10-19) by operating the associated A key. Relays HB (20-24) are tested by operating keys B (0-4). Table 1 is included to facilitate setting up the test.

→ 8.506 Equip an ITE-9547 cord with alligator clips. At the block relay frame associated with the number group connector under test, connect one end of the cord to ground.

8.507 Connect the other end to each associated JC or JF terminal in turn. Observe that the corresponding S or S1 lamp on ITE-4033B lights. Refer to Table 1 for association.

8.508 When the JC and JF leads have been tested perform similar tests on the HF, NS, NF, TF, RF, PN, TN, PTN, HG and NC leads using Table 1 as a guide.

8.509 Check the operation of the XGA relays by momentarily grounding through a test receiver terminal 41 of an MCC multi-contact terminal strip. Verify the operation of the associated XG1 to XG3 relays.

8.510 Repeat tests per Paragraphs 8.501 - 8.509 on other number group connectors.

9. MISCELLANEOUS FEATURES

9.1 Trouble Make Busy

9.11 Check that solid ground is present at 10B of TMB relays.

→ 9.12 Insert a 349A plug into the TMB jack. Check that the TMB relays operate, the TMB lamp lights, and the CFB lamp at the floor alarm frame lights.

9.13 At the trouble indicator frame, using the line assignment list, set up a number located in the number group under test. Observe that the trouble indicator lamps TC, RV, RC, CON, GT2 and RL followed by TRL lights.

9.14 Momentarily operate RL key to restore the circuit to normal.

9.15 Repeat test 9.13 on all markers and NGS.

→ 9.16 Remove 349A plug from TMB jack.

TABLE 1

Multi-Contact T.S.		Leads	ITE-9933A Recep. Plugs to ITE-4033 Connectors			
Desig.	Pchgs.		A	B	S	S1
MCA	0-9	HB(0-9)	0			
"	10-19	HB(10-19)	1			
"	20-24	HB(20-24)		2		
"	25-29	TB(0-4)		2		
"	30-39	JC(0,2,--18)			3	
"	45-49	JF(0-4)				4
MCB	0-19	HF(0-19)			0	1
"	+%20-39	NS(0-19)			2	3
"	%40-59	NF(0-19)			4	5
MCC	0-19	TF(0-19)			0	1
"	20-39	RF(0-19)			2	3
"	46-48	PN, TN, PTN, PN1, TN1, PTN1			4	
MCD	0-19	(HGA, HGB)0-9; H(A&B) (0-9); EH(A&B)(0-9)			0	1
"	20-39	(HGC, HGD)0-9; H(C&D) (0-9); EH(C&D)(0-9)			2	3
"	%40-59	NC(0-19)			4	5

+ The NS leads are tested from the LDF instead of the block relay frame.

% The associated TB relay must be blocked operated by means of the multi-contact relay blocking tool ITE-4069.

9.2 Traffic Registers

9.21 Peg Count (Lead NP): Operate the BAT key at the traffic register rack. Momentarily connect ground to punching 59 of the terminal strip for MCC relays and observe that the PC register associated with the number group connector under test operates. Release the BAT key.

9.22 Subscriber Line Overflow (Leads SOF, MF and CT): These registers are checked per Section 225.8.

10. MISCELLANEOUS CIRCUITS

10.1 Check miscellaneous circuits on the number group connector and block relay frames not checked on other tests as follows: (1) test battery supply (2) fuse alarm. Check that the fuse alarm is not stopped when the FA lamp is burned out or removed; (3) spare jack to MDF, and (4) frame line circuit.

→ Arrowed lines indicate new or changed information.

NOTE: The test of the remote control jack (F) is covered in Section 226, Terminating Trouble Indicator Test Method.

10.2 Check the continuity of the wire from the OFT terminal on the block relay frame to armature contact #45 on the MCC relay of the number group connector.

11. CHECK OF H.B. RELAY SECONDARY WINDINGS

11.1 Connect ground through a test receiver to each HB relay secondary winding terminal (8 TR). Observe that each HB relay operates.

12. TEST OF TB LEADS

12.1 Make a continuity test of the TB leads between punchings 40-44 and 25-29 respectively, on the terminal strip for the (MCA) relays. This test is necessary only when adding a NG connector to an existing frame.

Manager, Crossbar Product Engineering
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Reason for Reissue:
To make revisions and additions to include testing of (1) AIS and (2) CLI.