

OFFICE LINK FRAME TEST

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1. GENERAL INFORMATION

1.1 Description of Test: This section describes a method of testing the office link and connector circuit SD-25033-01. The marker multiple leads between office link frames are tested for continuity, crosses and grounds, and a check is made for false continuity at the contacts of the marker connector (MC) relays. The conductors of the primary-secondary slip, the office junctors and the outgoing trunks to MDF are tested for continuity, crosses and grounds. A test is made to verify the crosspoints on the primary and secondary switches. The secondary hold magnets, the select magnets, and the trunk level relays (TL and TR) and associated S and S1 leads are verified for proper operation and wiring. Other tests are made to verify miscellaneous circuits and features.

1.2 Cabling

1.21 The cables between the originating marker and the marker connector (MC) relays of the office link frames should be left disconnected at the markers until after the marker multiple test has been made.

1.3 Test Procedure

1.31 The "Office OGT Test" described in this section should be made before ground is connected at the MDF to the sleeves of the trunk which are made busy in this manner.

1.32 During the tests of the originating markers the regular lock-out circuit (even office frame) and the emergency lockout circuit (odd office frame) should be used approximately the same amount as a means of exercising these circuits.

1.33 Test calls which interfere with the operation of the test set on the test of crosspoints, links, etc., may be blocked by making the frame busy (inserting make busy plug in OMB jack).

1.4 Test of Additions: The tests outlined in this section may be made on office link frames added to a working office. Any variations in the testing procedure that are necessary when testing additions are given in connection with the individual tests. All tests should be made before the O.J.G.F. transition.

2. RECORDS AND REQUIREMENTS

2.1 Records

Forms SD-4-1313 and SD-4-1315 are required for recording the results of these tests.

2.2 Requirements

For requirements see Section 10 of Handbook 61.

3. TEST EQUIPMENT

3.1 Test Sets Required

Amt	ITE	Description
1	4009	Crosspoint, Link and Junctor Test Set
1	4033B	Link Frame Test Set
1	4043	OGT Test Set
1	4261A	Whistler Test Set

3.2 Cords Required with ITE-4009

Amt	ITE	Lqth	Cdrs	One End	Other End	With ITE
1	9598	12'	2	310 Plug	310 Plug	4009
1	9601	12'	3	310 Plug	310 Plug	4023
2	9639	12'	3	310 Plug	3 ITE-2455 Plugs	4023 & 4009
2	9650	15'	4	Oper Tel. Set	396A Plug	4023
11	9690	12'	4	2 310 Plugs	351A Plug	4009
1	9947	12'	10	Yaxley Plug	10 ITE-2455 Plugs	4009

3.3 Cords Required with ITE-4033B

Amt	ITE	Lqth	Cdrs	One End	Other End	With ITE
8	9547	12'	1	ITE-2455 Plug	ITE-2455 Plug	4033B
1	9598	12'	2	310 Plug	310 Plug	4033B
2	9984	12'	10	Jones Plug	10 ITE-2461 Plugs	4033B

3.4 Cords Required

Amt	ITE	Lqth	Cdrs	One End	Other End	With ITE
1	9598	12'	2	310 Plug	310 Plug	4043
23	9637	12'	3	310 Plug	351A Plug	4043
2	9947	12'	10	Yaxley Plug	10 ITE-2455 Plugs	4023
2	9650	15'	4	396A Plug	Oper. Tel. Set	4023
4	9404	1'8"	1	Frankel Clip	59 Cord Tip	4043

3.5 Accessories Required

Amt	ITE or Code	Description	With ITE
9	258C	Fiber Dummy Plug	4023
10	349A	Make Busy Plug	4023
1	ITE-2260	Call Wire Telephone Jack	4023
1	ITE-2370	8 Point Gun Jig	4043
or			
1	ITE-4046	8 Point Gun Jig	4043
As Req.	ITE-2601	Rubber Insulators	4023
As Req.	ITE-8507	Alligator Clips	4023
1	R-1824	Portable Pencil Lamp	4023
As Req.	ITE-4085	Push on Clips	4023

4 Crossbar Test Accessory Set

4. FUSING

4.1 Fuses Installed by Shop

4.1.1 Observe each fuse block and fuse panel equipped with alarm type fuses and check that the fuses are correctly positioned, that the fuses are of the correct type and current carrying capacity and that there are no loose screws.

4.2 Fuses Not Installed by Shop

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

4.2.2 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.

Designation	Fuse	Equipment
(PS See Note(B))	0-9	PS magnets of primary switches 0-9 and relays (LC) 0-9
(PHOL-4L See Note(A))	0-9	(PH) mags. 0L-4L of primary sws. 0-9
(PH) OR-4R See Note(A)	0-9	(PH) mags. 0R-4R of primary sws. 0-9
(PH) 5L-9L See Note(A)	0-9	(PH) mags. 5L-9L of primary sws. 0-9
(PH) 5R-9R See Note(A)	0-9	(PH) mags. 5R-9R of primary sws. 0-9

<u>Designation</u>	<u>Fuse</u>	<u>Equipment</u>
(S)	0-9 (Without extension Frames)	SS and SH magnets on secondary switches 0-9
(S)	0-9 (With extension Frames)	Equipment on secondary switches 0 to 9 as follows: SS magnets on regular frame and SH magnets on the left half of both the regular and extension frames.
(S)	10-19 (With extension Frames)	Equipment on extension switches 0 to 9 as follows: SS magnets on extension frame and SH magnets on the right half of both the regular and extension frames.
(MC)	0-7  E(ON even numbered fr.) E (On odd numbered fr.) A See Note(B) B See Note(B) C See Note(B) D See Note(B) TBS	Relays (MCA) 0-7 and (MCB) 0-7  E resistance on odd frames relays (TR) 1-4 on even and odd frames. Relays (TL) 0-3, (TR) 0-3 and (SS) 0-3 Relays (TL) 4-9, (TR) 4-9 and (SS) 4-9 Relays (TL)10 & 11,(TR) 10 & 11 and (SS)0-3. Relays (TL)12-14,(TR) 12-14 and (SS) 4-9. 48 volt test battery supply on regular and extension frame.

**NOTE:** (A) Fusing of primary switch hold magnets when office line frames are not equipped with fuses is covered in the district link frame test method. When office link frames are equipped for fuses and district link and connector or trunk link and connector circuit fuses and OJGF cross-connections are installed, resistance battery will be present on the office link primary hold magnet fuse posts. Verify that each primary hold magnet fuse post at the office link frame is associated with its proper circuit at the district link or trunk link frames.

(B) When Marker Multiple Test is made per Paragraph 5 do not install fuses A, B, C, D and PS until completion of Marker Multiple Test.

(C) When Marker Multiple Test is made per Paragraph 5 fuses should not be installed until completion of Marker Multiple Test.

5. MARKER MULTIPLE TEST

- 5.1 The Marker Multiple test using ITE-4261A Whistler Test Set will check the multiple for continuity, reversals, crosses and false battery and ground.
- 5.2 At the first office link frame, connect the Whistler Test Set to 115V AC and allow about one minute to warm up.
- 5.3 Touch the test lead of the whistler to the 0 contact of the first marker MCA relay. A tone should be heard.
- 5.4 Adjust the volume control for sufficient volume.
- 5.5 At the next office link frame have an installer place ground on the 0 contact of the first marker MCA (other end of multiplied lead). The tone should be silenced.
- 5.6 Continue the test on each contact of the MCA and MCB relays for each marker between the first two office link 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.
- 5.7 The following leads are either grounded, unequipped or strapped.

	<u>MCA</u>	<u>MCB</u>
Grounded	-	3
Unequipped	45-47	0-1
Strapped	0,1	-

- 5.8 Upon completion of the test between the first two office link frames for all markers, repeat the tests on the second and third frames and continue in this manner until the complete multiple between all office link frames has been tested.
- 5.9 For further information on the use of the whistler test set, refer to Handbook 100,TMO 4261A.

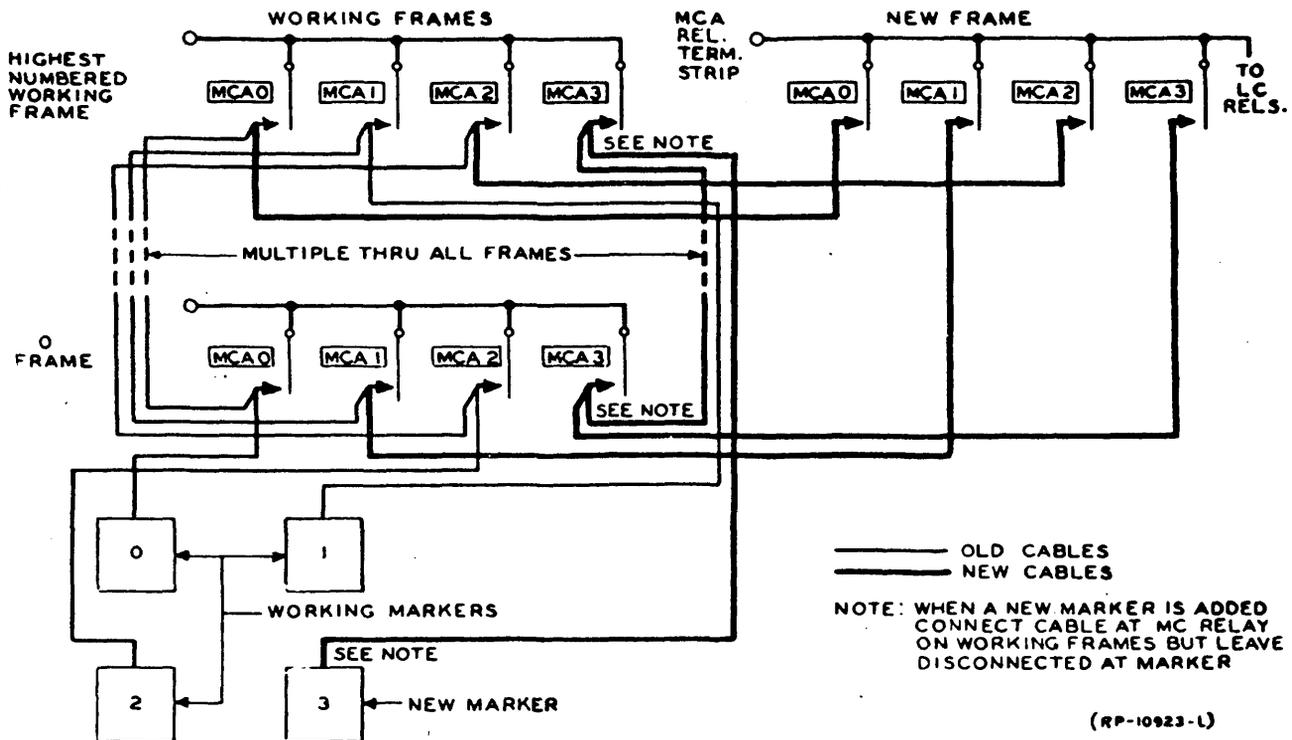


FIG. 1. SCHEMATIC OF MARKER MULTIPLE FOR ADDITIONS

6. CONTACT PROTECTION

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

7. MARKER LOCKOUT AND CONTROL CIRCUIT (See Figure 2)

7.1 Connect 48 volt battery and ground to the A jack of ITE-4033B, Link Frame Test Set using an ITE-9598 cord. Using ITE-9547 cords connect jacks (C) 0-7 to originating marker start leads, as equipped in the following manner.

Jack	O.M.	ST Leads	Misc. T.S.
		Even Fr.	Odd Fr.
C0	0	220	
C1	1		220
C2	2	221	
C3	3		221
C4	4	222	
C5	5		222
C6	6	223	
C7	7		223

NOTE: Equip the ITE-9547 cords with alligator clips for connecting to ST leads.

NOTE: On installations having more than 6 markers use an ITE-9639 cord to supply battery to the test set. Equip the T and S leads with alligator clips. Connect the S lead to ground and the T lead to a spare fuse equipped with a 2A fuse. After the test is completed remove the fuse.

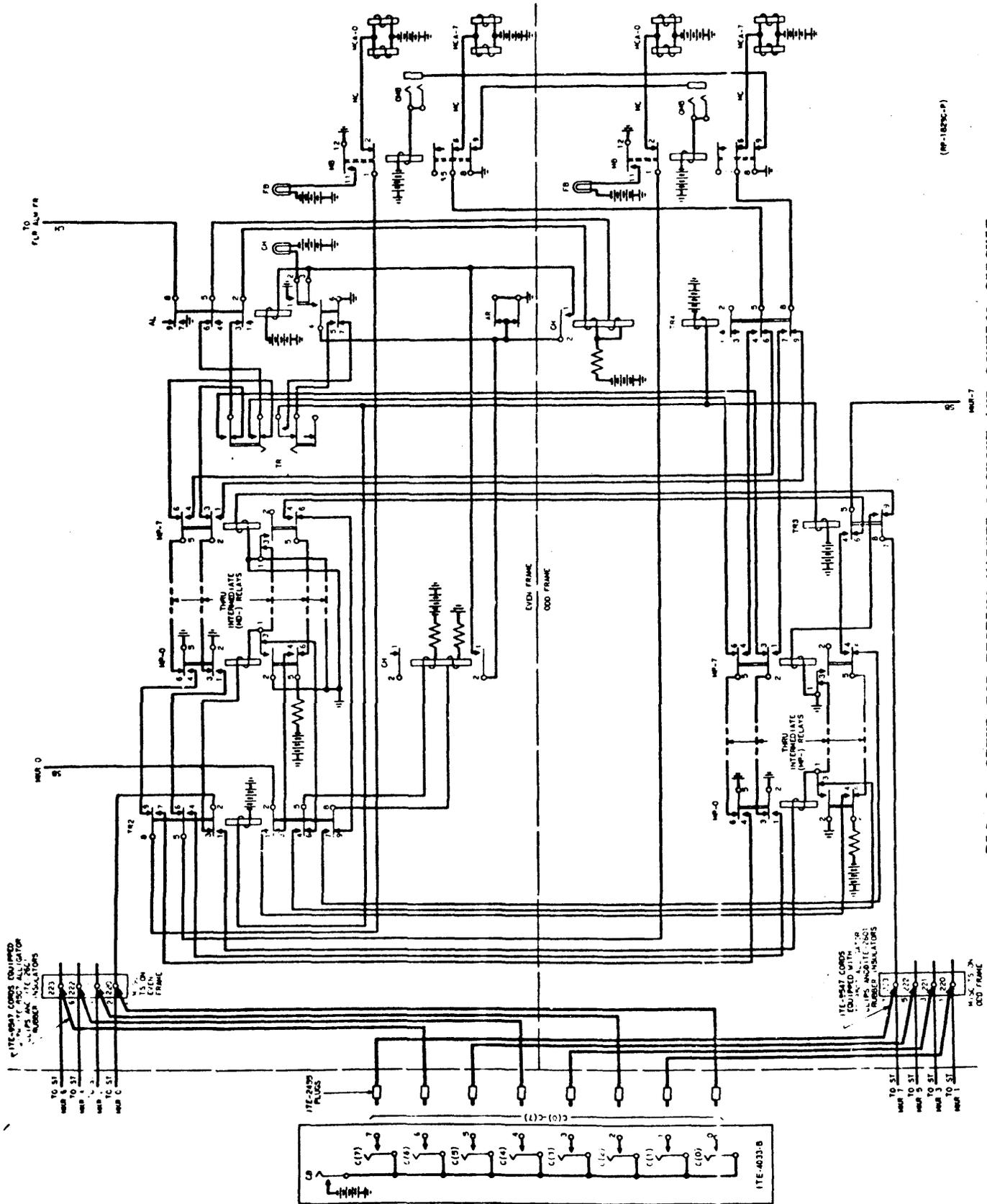


FIG. 2 SETUP FOR TESTING MARKER LOCKOUT AND CONTROL CIRCUIT

- 7.11 Operate and leave operated key CB. Operate key CO and observe that relay (MP) 0 and its associated MCA relays on the odd and even office frames operate. Operate in numerical order relays (MP) 1-7, as equipped, by operating keys (C) 1-7 and observe that the proper MP relays operate in each case but the associated MCA relays on the odd and even office frames do not. Release and reoperate key CO. Relays MCA-0 on the odd and even frames release and relays MCA-1 on both frames operate. Release and reoperate key C1. Relays MCA-1 on both frames release and relays MCA-2 operate. Continue in this manner checking all MCA relays on both frames. Release keys (C) 0-7.
- 7.2 Operate key TR on the even office frame. Relays TR1-TR4 operate and transfer the control to the odd office frame.
- 7.3 With the lockout circuit on the odd office frame effective, perform the tests per 8.11 on this circuit. The results in this case are the same as per 8.11.
- 7.4 Release key TR. Relays TR1-TR4 release and the control is transferred back to the even office frame.
- 7.5 Block the AL relay in the non-operated position to prevent a throw-over and to block the alarm. Perform the following operations at the (MP) 0 relay on the even office frame:

<u>Operation</u>	<u>Observe</u>
Break 5B & 6B	rel.CH, even off. fr., operates
Remake " " "	" " " " " releases
Break 1B & 3B	" " " " " operates
Remake " " "	" " " " " releases
Break 5T & 6T	" " odd " " operates
Remake " " "	" " " " " releases
Break 2T & 3T	" " " " " operates
Remake " " "	" " " " " releases

- Repeat this test on all other MP relays on the even office frame.
- 7.6 Remove the block from the AL relay. Make the marker lockout circuit on the odd office frame effective by operating the manual throw-over key TR. Block relay AL normal.
- 7.7 Break and release the 5 and 6 and 1 and 3 bottom springs and the 5 and 6 and 2 and 3 top springs on each MP relay on the odd office frame in a similar manner to that described in Paragraph 7.5 and observe that when the bottom springs

are used the CH relay on the even office frame operates and releases and that when the top springs are used the CH relay on the odd office frame operates and releases. Remove the block from the AL relay and make the marker lockout circuit on the even office frame effective by releasing the TR key.

- 7.8 Insert a make busy plug into jack OMB. Observe that the associated FB lamps at the frame and the floor alarm board light. Operate each MCA relay, one at a time, on the mate office frame and check that relay BE in the marker associated with the operated MCA relay operates if an even office frame has been made busy and that relay BO operates if an odd office frame has been made busy. With a make busy plug still in jack OMB of the frame under test, insert a make busy plug into jack OMB of the mate office frame. Observe that the FB lamp on the mate office frame does not light. Remove the make busy plugs from the OMB jacks.

8. O.G.T. TEST

NOTE: O.G.T. tests should be completed before MDF cross-connections are connected.

- 8.1 Setup for Test
- 8.11 Locate the O.G.T. Test Set, ITE-4043, at the pair of office link frames under test and connect 48V battery and ground to the BAT jack using an ITE-9598 cord.

NOTE: If the odd and even frames of a pair are located too far apart for the cords to reach both frames the two frames may be tested separately. Make only the even or odd frame connections per Paragraph 8.13 or 8.14 and test only even or odd frame trunks per Paragraph 8.27.

- 8.12 Check that the ST key is normal and then make the following connections:
- 8.13 O.G.T. on Split Levels
  - (a) Connect jacks 0-19 of the test set to verticals on the left and right halves of the secondary switches on the pair of frames under test using 20 ITE-9637 cords. The connections are made as indicated in the following chart and any vertical on a half switch may be used. These connections are used for

checking trunks 0 to 19 of all marker test groups on the pair of frames, that is, 200 trunks or 20 trunks per each marker test group TL0 to TL9 as equipped.

Jack No.	Even Frame		Jack No.	Odd Frame	
	LH	RH		LH	RH
0	0		1	0	
2		1	3		1
4	2		5	2	
6		3	7		3
8	4		9	4	
10		5	11		5
12	6		13	6	
14		7	15		7
16	8		17	8	
18		9	19		9

(b) The following connections should be made for checking trunks 20 to 39 of all marker test groups on the pair of frames, that is, 200 trunks or 20 trunks per each marker test group TL0 to TL9 as equipped.

Jack No.	Even Frame		Jack No.	Odd Frame	
	LH	RH		LH	RH
0		0	1		0
2	1		3	1	
4		2	5		2
6	3		7	3	
8		4	9		4
10	5		11	5	
12		6	13		6
14	7		15	7	
16		8	17		8
18	9		19	9	

8.14 O.G.T. on Non-Split Levels: Connect jacks 0-19 of the test set to verticals on secondary switches on the even and odd frames, or even and odd extension frames, using 20 ITE-9637 cords. The connections are made as indicated in the following chart and any vertical on a switch may be used.

Even Frame		Odd Frame	
Jack	Switch	Jack	Switch
0	0	1	0
2	1	3	1
4	2	5	2
6	3	7	3
8	4	9	4
10	5	11	5
12	6	13	6
14	7	15	7
16	8	17	8
18	9	19	9

8.15 Using ITE-9404 cords ground punchings 8 and 9 (leads SA and SB for regular frames and EA and EB for extension frames) on the terminal strip for MCB relays. The ground connection may be made to punching 2 on the terminal strip for MCA relays. These connections should be made at both frames of the pair under test.

8.16 Connect the receptacle plug of an ITE-9947 cord to the E connector on the test set. Connect leads 0-9 of this cord to the top winding terminals of relays (SS) 0-9 on the even numbered frame or extension frame of the pair under test.

8.17 Connect the receptacle plug of another ITE-9947 cord to the 0 connector. Connect leads 0-9 of this cord to the top winding terminals of relays (SS) 0-9 on the odd numbered frame or extension frame of the pair under test.

8.18 Connect jack JG to a spare trunk on another frame using an ITE-9637 cord. The select magnet associated with the spare trunk should be operated manually when the cord is connected to the vertical. Ground on the sleeve of jack JG operates the hold magnet and keeps the crosspoint closed. Connect jack JG1 to another spare trunk using an ITE-9637 cord. The select magnet associated with this spare trunk should be operated manually when the cord is connected to the vertical. Ground on the sleeve of jack JG1 operates the hold magnet and keeps the crosspoint closed. At the MDF the tips and rings of these two spare trunks should be connected to an 8 Point Gun Jig to give the following association:

NOTE: Use jig ITE-2370 when No. 92 or 93 terminal strips are installed at the MDF. Use jig ITE-4046 when No. 183A or 183B terminal strips are installed.

	Associated With
Ring of JG Jack	R punching on OGT terminal strip
Tip of JG Jack	T punching on OGT terminal strip
Ring of JG1 Jack	S1 punching on OGT terminal strip
Tip of JG1 Jack	S punching on OGT terminal strip

If three-wire office OGI are under test, the S lead is unequipped and this connection need not be made to the gun jig. The second row of terminals of the gun jig should be connected together and then connected to ground.

- 8.19 Set up a talking circuit to the MDF as follows: Connect jack CW to a spare trunk using an ITE-9637 cord. The select magnet associated with this trunk should be operated manually when the cord is connected to the vertical. Ground on the sleeve of the CW jack operates the hold magnet and keeps the crosspoint closed. An Operator's Telephone Set should be connected to the TEL jacks. At the MDF, the tip and ring of this spare trunk should be connected to a call wire telephone jack, ITE-2260, and an Operator's Telephone Set plugged into the call wire telephone jack.

## 8.2 Test Operations

- 8.21 When testing trunks 0 to 19 on split levels operate key SP 0-19. When testing trunks 20-39 on split levels operate key SP 20-39.
- 8.22 Operate key 3W when testing 3-wire OGT (S lead omitted).
- 8.23 Operate key ST. Do not operate this key slowly as a sufficient interval might not be allowed to operate the secondary select magnet before the hold magnet is operated.
- 8.24 When testing trunks on nonsplit levels or trunks 0 to 19 on split levels lamps (EF-SW NO) 0, (LEV) 0 and (TRK NO) T0 and U0 should be lighted to begin the test. If these lamps are not lighted, momentarily operate key RS and then operate ST key to light them. These lamps indicate that the first trunk to be tested is located on the even frame, switch 0, level 0 and that the trunk is numbered 0 at the MDF. The connection of the cord to the switch (for example, left half on switch 0) determines the half-switch location of the trunk under test when testing trunks on split levels.

When testing trunks 20 to 39 on split levels lamps (EF-SW NO) 0, (LEV) 1 and (TRK NO) T2 and U0 should be lighted to begin the test. If these lamps are not lighted momentarily operate key RS to reset the test circuit in the normal position and then operate and release key STP-W&Z twice to light lamp (LEV) 1 and extinguish lamp (LEV) 0.

These lamps indicate that the first trunk is located on the even frame, switch 0, level 1, and that the trunk is numbered 20 at the MDF. The connection of the cord to the switch (for example, right half on switch 0) determines the half-switch location of the trunk under test.

- 8.25 The M lamp is lighted indicating the hold magnet has operated to close the crosspoint to the trunk under test. Hold the gun jig against the punchings of the first trunk on the terminal strip associated with the outgoing trunks under test. Place the gun jig against the punchings in a manner that insures that the T, R and second row of terminals on the jig make before or at the same time the S and S1 terminals make. Lamps M, S, S1, R, R1, T and T1 light momentarily (S lamp does not light when testing 3-wire OGT), the buzzer operates and the test circuit advances if the trunk is continuous and free of crosses. The buzzer may be heard at the MDF over the talking circuit. If the buzzer fails to operate and the test circuit does not advance, the M, S, S1, etc., lamps indicate how far the test circuit progressed before trouble was encountered. If the X lamp lights a cross between leads S and R, S and T or T and R is indicated.
- 8.26 Key REP is provided for making repeat tests on a trunk. Key STP-W & Z operated and released actuates the W and Z combination in case these relays get out of step with the H selector. Keys STP-H and STP-S are provided to step the H and S selectors respectively.
- 8.27 Hold the jig against the punchings of the second trunk on the terminal strip. The buzzer operates as an OK signal and the test circuit advances. Continuing in this manner check the trunks associated with the pair of frames under test. The test set is automatically stepped to test the trunks in the order described below.
- (a) Trunks on Non-Split Levels: These trunks are tested in consecutive order as they appear on the terminal strips, that is, trunks 0 to 39, marker test groups (TL) 0, 2, 4, 6 and 8 for a pair of regular frames or (TL) 10 to 14 for a pair of extension frames. The following chart shows the sequence of test for test group TL0 or TL10. Test groups TL2, TL4, TL6 and TL8, or (TL) 11 to 14, are exactly the same as TL0

and TL10 except lamps (LEV) 2 and 3 light for test groups TL2 or TL11 instead of lamps (LEV) 0 and 1 respectively, lamps (LEV) 4 and 5 light for test groups TL4 or TL12 instead of lamps (LEV) 0 and 1 respectively, etc.

MARKER TEST GROUP TLO OR TL10

Trunk No.		Frame & Switch No.		Level No.
Lps. TRK No.		Lamps		Lamps
T	U	EF-SW NO	OF-SW NO	LEV
0	0	0		0
0	1		0	0
0	2	1		1
0	3		1	1
0	4	2		0
0	5		2	0
0	6	3		1
0	7		3	1
0	8	4		0
0	9		4	0
1	0	5		1
1	1		5	1
1	2	6		0
1	3		6	0
1	4	7		1
1	5		7	1
1	6	8		0
1	7		8	0
1	8	9		1
1	9		9	1
2	0	0		1
2	1		0	1
2	2	1		0
2	3		1	0
2	4	2		1
2	5		2	1
2	6	3		0
2	7		3	0
2	8	4		1
2	9		4	1
3	0	5		0
3	1		5	0
3	2	6		1
3	3		6	1
3	4	7		0
3	5		7	0
3	6	8		1
3	7		8	1
3	8	9		0
3	9		9	0

(b) Trunks 0 to 19 on Split Levels:  
 These trunks are tested in consecutive order 0 to 19, marker test groups TLO, TL2, TL4, TL6, TL8, TL1, TL3, TL5, TL7 and TL9. This makes it necessary to skip a terminal strip after testing each group of 20 trunks. After testing the 200 trunks of the even numbered test groups (TLO, TL2, etc.), or the odd numbered test groups (TL1, TL3, etc.) operate and release key STP-W&Z

twice in order to start the test of the next test groups on the proper level. The following charts show the sequence of test groups TLO and TL1. The other even numbered test groups (TL2, TL4, etc.) and odd numbered test groups (TL3, TL5, etc.) are exactly the same as TLO and TL1, respectively, except lamps (LEV) 2 and 3 light for test groups TL2 and TL3 instead of lamps (LEV) 0 and 1 respectively, lamps (LEV) 4 and 5 light for test groups TL4 and TL5 instead of lamps (LEV) 0 and 1 respectively, etc.

MARKER TEST GROUP TLO

Trunk No.		Frame & Switch No.		Level No.
Lps. TRK No.		Lamps		Lamps
T	U	EF-SW NO	OF-SW NO	LEV
0	0	0		0
0	1		0	0
0	2	1		1
0	3		1	1
0	4	2		0
0	5		2	0
0	6	3		1
0	7		3	1
0	8	4		0
0	9		4	0
1	0	5		1
1	1		5	1
1	2	6		0
1	3		6	0
1	4	7		1
1	5		7	1
1	6	8		0
1	7		8	0
1	8	9		1
1	9		9	1

MARKER TEST GROUP TL1

Trunk No.		Frame & Switch No.		Level No.
Lps. TRK No.		Lamps		Lamps
T	U	EF-SW NO	OF-SW NO	LEV
0	0	0		1
0	1		0	1
0	2	1		0
0	3		1	0
0	4	2		1
0	5		2	1
0	6	3		0
0	7		3	0
0	8	4		1
0	9		4	1
1	0	5		0
1	1		5	1
1	2	6		1
1	3		6	1
1	4	7		0
1	5		7	0
1	6	8		1
1	7		8	1
1	8	9		0
1	9		9	0

(c) Trunks 20 to 39 on Split Levels: These trunks are tested in consecutive order 20 to 39, marker test groups (TL) 0, 2, 4, 6, 8, 1, 3, 5, 7 and 9. This makes it necessary to skip a terminal strip after testing each group of 20 trunks. After testing the 100 trunks of the even numbered trunk groups (TL0, TL2, etc.) or the odd numbered test groups (TL1, TL3, etc.) operate and release key STP-W&Z twice in order to start the test of the next test groups on the proper level. The following charts show the sequence of test of trunks 20 to 39 for test groups TL0 and TL1. The other even numbered test groups (TL2, TL4, etc.) and odd numbered test groups (TL3, TL5, etc.) are exactly the same as TL0 and TL1 respectively except lamps (LEV) 2 and 3 light for test groups TL2 and TL3 instead of lamps (LEV) 0 and 1 respectively, lamps (LEV) 4 and 5 light for test groups TL4 and TL5 instead of lamps (LEV) 0 and 1 respectively, etc.

MARKER TEST GROUP TL0

Trunk No.		Frame & Switch No.		Level No.
Lps. TRK NO		Lamps		Lamps
T	U	EF-SW NO	OF-SW NO	LEV
2	0	0		1
2	1		0	1
2	2	1		0
2	3		1	0
2	4	2		1
2	5		2	1
2	6	3		0
2	7		3	0
2	8	4		1
2	9		4	1
3	0	5		0
3	1		5	0
3	2	6		1
3	3		6	1
3	4	7		0
3	5		7	0
3	6	8		1
3	7		8	1
3	8	9		0
3	9		9	0

MARKER TEST GROUP TL1

Trunk No.		Frame & Switch No.		Level No.
Lps. TRK NO		Lamps		Lamps
T	U	EF-SW NO	OF-SW NO	LEV
2	0	0		0
2	1		0	0
2	2	1		1
2	3		1	1
2	4	2		0
2	5		2	0
2	6	3		1
2	7		3	1
2	8	4		0
2	9		4	0
3	0	5		1
3	1		5	1
3	2	6		0
3	3		6	0
3	4	7		1
3	5		7	1
3	6	8		0
3	7		8	0
3	8	9		1
3	9		9	1

8.3

Test for Crosses: Check for crosses on the S1 leads by grounding each S1 lead at the MDF terminal strip and checking with a test receiver that the adjacent S1 punchings are free of ground.

9.

LINK TEST

NOTE 1: This test should be made within 3 weeks before turnover or 3 weeks before load tests when load tests are made in order to meet the 3 week interval on testing links and junctors (all office links are not used on the originating channel test).

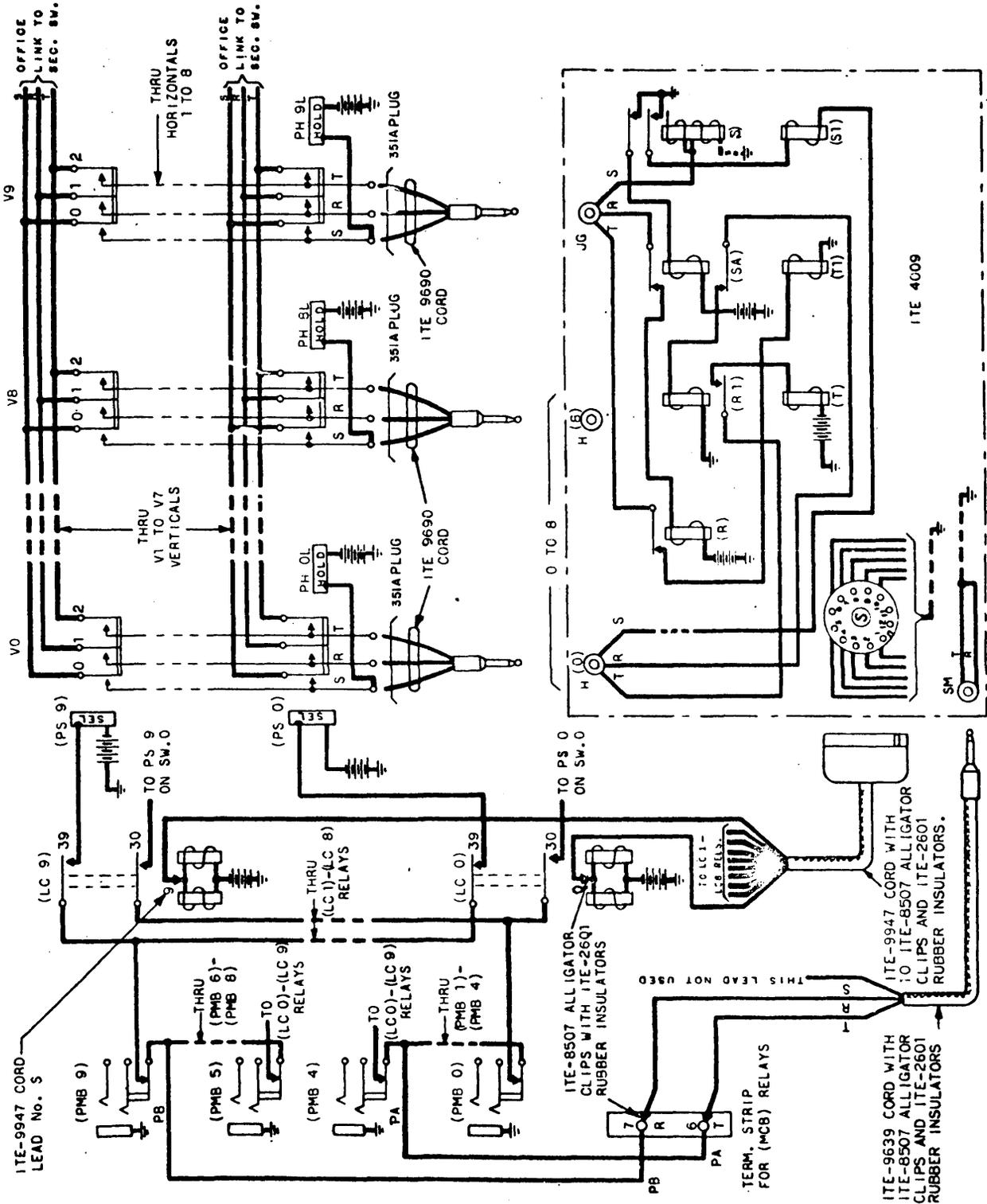
NOTE 2: When testing additions it will be necessary to provide temporary battery at the primary hold magnets.

9.1 - Setup for Test (See Figure 3)

9.11 Connect 48V battery and ground to the BAT jack of ITE-4009, crosspoint, link and junctor test set using cord ITE-9598.



PRI SW #9 LEFT HALF



(R P-12782)

FIG. 4 SETUP FOR CROSSPOINT TEST OFFICE LINK PRIMARY SWITCHES

9.12 Insert the H plug of ten ITE-9690 cords into jacks (H) 0-9 on the test set and connect the other end of the cords to vertical OL of primary switches 0 to 9 respectively.

9.13 Connect the receptacle plug of cord ITE-9947 to the S connector on the test set and connect leads 0 to 9 of this cord to the top winding contact of relays (LC0) to (LC9). Connect the 310 plug of an ITE-9639 cord to the SM jack on the test set and connect the tip and ring of this cord to punchings 6 and 7 respectively on the terminal strip for the (MCB) relays.

9.14 Insert the 310 plug of cord ITE-9690 into the JG jack on the test set.

9.15 Lamps H0 and S0 should be lighted to begin the test. Momentarily operate key RS to light these lamps if they are not lighted.

## 9.2 Test Operations

NOTE: Once or twice per day verify that the test circuit blocks when crosses between T, R and S conductors are encountered.

9.21 Operate and leave operated keys BZ and ST.

9.22 Place the 351A plug end of cord connected to JG jack against vertical OL, secondary switch 0. If the link from this vertical to left horizontal 0, primary switch 0, is continuous and free from trouble the buzzer operates. Remove the plug from vertical OL and connect it to the vertical 1L, secondary switch 0. If the link from this vertical to left horizontal 0, primary switch 1, is continuous and free from trouble, the buzzer operates. In this manner check the links from verticals (L) 0-9, secondary switch 0, to left horizontal 0, primary switches 0 to 9. When these ten links have been checked relay LC1 of the office link frame is operated in turn operating primary select magnet No. 1 on each primary switch. Check the ten links from verticals (L) 0-9, secondary switch 1, to left horizontal 1, primary switches 0 to 9 in a similar manner to the links from verticals (L) 0-9, secondary switch 0. Continuing in this manner check the 100 links on the left half of the frame.

9.23 When the links on the left half of the frame have been checked, move the ten ITE-9690 cords to vertical OR of primary switches 0 to 9 and test the links on the right half of the frame in the same manner as for the left half.

9.24 At completion of test remove test equipment.

9.25 If an office extension frame is installed the multiple cable from the secondary switches to secondary switches on the extension frame are checked in the crosspoint tests.

## 10. CROSSPOINT TEST - PRIMARY SWITCHES

### 10.1 Setup for Test (See Figure 4)

10.11 Connect 48V battery and ground to the BAT jack of ITE-4009, crosspoint, link and junctor test set using cord ITE-9598.

10.12 Insert the H plug of nine ITE-9690 cords into jacks (H) 0-8 on the test set. Connect the other end of these cords to verticals 0 to 8 respectively of the left half switch 9, under test.

NOTE 1: The ITE-9690 cords may be tagged and numbered for convenience when moving connections from one switch to another.

NOTE 2: When office frames are not equipped with PH fuses certain PH magnets are not fused if there are more office link frames than district link frames or if all junctors are not used as is the case for certain size jobs. Temporarily fuse these magnets at the office link frame or at the O.J.G.F. When testing additions, will be necessary to provide temporary battery to all PH magnets.

10.13 Insert the H plug of an ITE-9690 cord into the JG jack on the test set. Connect the other end of the cord to vertical 9 of the left half switch 9, under test.

10.14 Connect plugs 0-9 of an ITE-9947 cord to the top winding contact of relays (LC0) to (LC9). Connect the receptacle plug of this cord to the S connector on the set. Connect the 310 plug of an ITE-9639 cord to the SM jack on the test set and connect the tip and ring of this cord to punchings 6 and 7 respectively on the terminal strip for the (MCB) relays. These connections are used for operating the PS magnets on all ten primary switches.

OFFICE LINK SECONDARY SWITCH 9-LEFT HALF

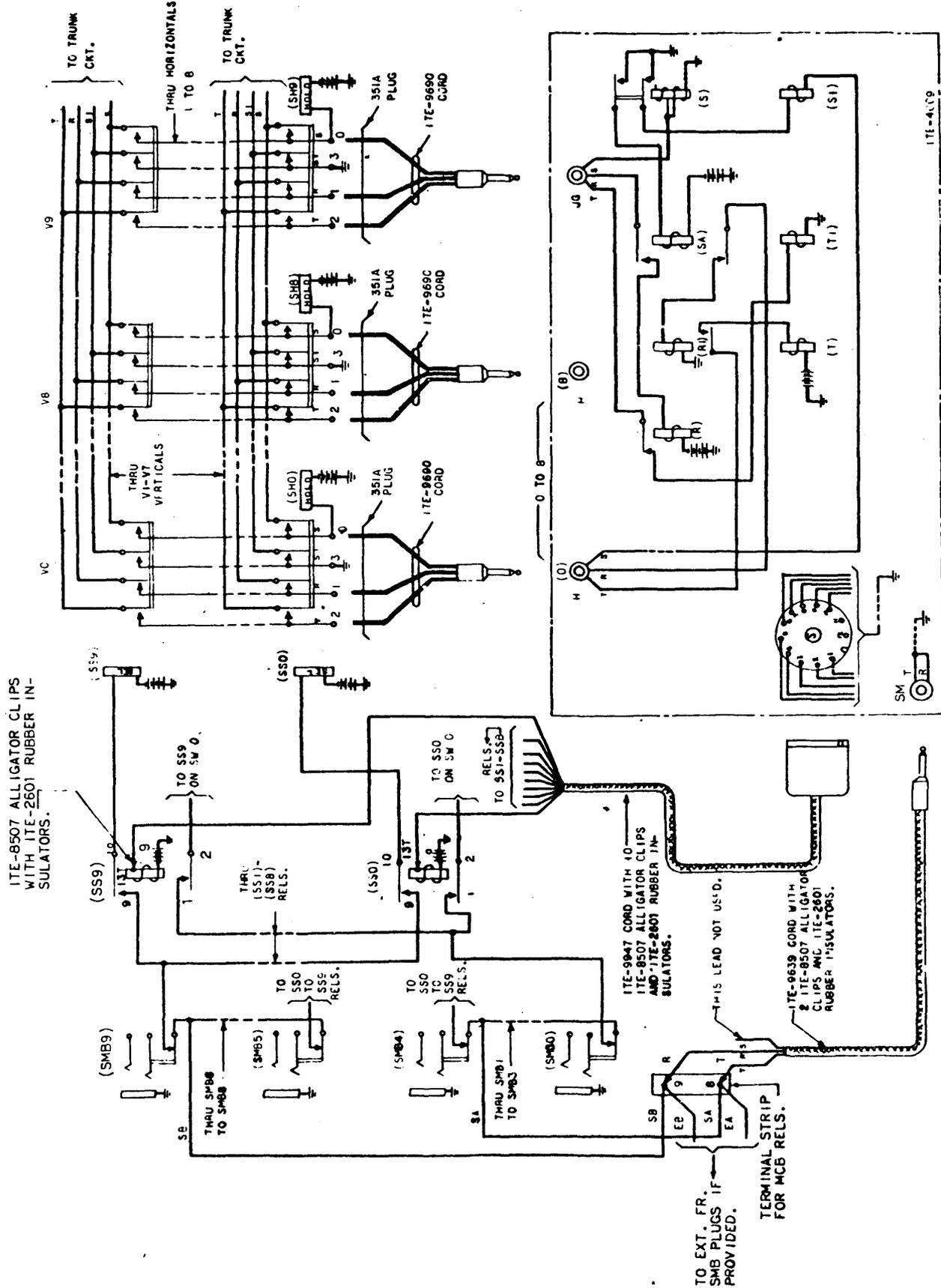


FIG. 5 SETUP FOR CROSSPOINT TEST OFFICE LINK SECONDARY SWITCHES T. R. & S. LEADS ONLY

(AP-12776-P)

10.15 Lamps HO and SO should be lighted to begin the test. Momentarily operate key RS to light these lamps if they are not lighted.

10.2 Test Operations

NOTE 1: In order to reduce wear on the contacts of the LC relays and heating of the test set SM relay, insert make busy plugs in all PMB jacks except the PMB jack associated with the switch under test.

NOTE 2: Once or twice per day verify that crosses between the T, R and S leads stop the test circuit.

10.21 Operate and leave operated keys XPT and PB9.

10.22 Operate the ST key. The set automatically checks the 100 crosspoints of the half switch under test. When lamp EC lights the test is completed.

10.23 Lamps S, S1, R, R1, T and T1 light momentarily as each crosspoint is tested. The lighted (S) 0-9 and (H) 0-9 lamps indicate respectively the operated select and hold magnets.

10.24 If the test set stops the following table shows typical troubles indicated by the lamps being lighted or extinguished for the crosspoint under test:

<u>Lamps</u>	<u>Trouble Indication</u>
X lamp lighted. S & S1 not lighted.	Cross between S and R or T leads.
None lighted.	Sleeve cross to ground or circuit to hold magnet open.
S not lighted.	Sleeve open
R and R1 not lighted.	Ring open
R1 not lighted.	Ring cross to ground.
R1 not lighted with X lighted.	Ring cross with tip.
T and T1 not lighted.	Tip open.

Lamps

Trouble Indication

T1 not lighted.

Tip Cross to ground

SMG lighted

False ground on select magnet lead.

Other trouble indications, such as crosses with battery may occur but are not listed above.

10.25 Move the 10 351 plugs of the ITE-9690 cords from the left half switch 9 and connect to corresponding verticals of right half switch 9. Repeat operations of Paragraphs 10.15 to 10.24 to test this half switch.

10.26 Continue in this manner testing half switches left and right 8, 7, 6, etc, down to 0. Remove the make busy plug from the PMB jack associated with the switch being tested and insert in that of the switch just tested.

10.27 At completion of the test remove the test leads from the (LC) relay windings and punchings 6 & 7 on terminal strip for the MCB relays. Remove the make busy plugs from the (PMB) jacks.

11. CROSSPOINT TEST - SECONDARY SWITCHES

11.1 T, R & S Leads, Secondary Switches

11.11 Setup for Test (See Figure 5)

11.111 Connect 48V battery and ground to the BAT jack of ITE-4009, Crosspoint, Link and Junctor Test Set using cord ITE-9598.

11.112 Insert the H plug of nine ITE-9690 cords into jacks (H) 0-9 on the test set. Connect the other end of these cords to verticals 0 to 8 respectively of the left half switch 9, under test.

11.113 Insert the H plug of an ITE-9690 cord into the JG jack on the test set. Connect the other end of the cord to vertical 9 of the left half switch 9, under test.

11.114 Connect the receptacle plug of an ITE-9947 cord to the S connector. Connect leads 0-9 of this cord to the 13 top contact (ground winding terminal) of relays (SS) 0-9, respectively.

NOTE: Equip leads of cord ITE-9947 with alligator clips for connecting to relay terminals.



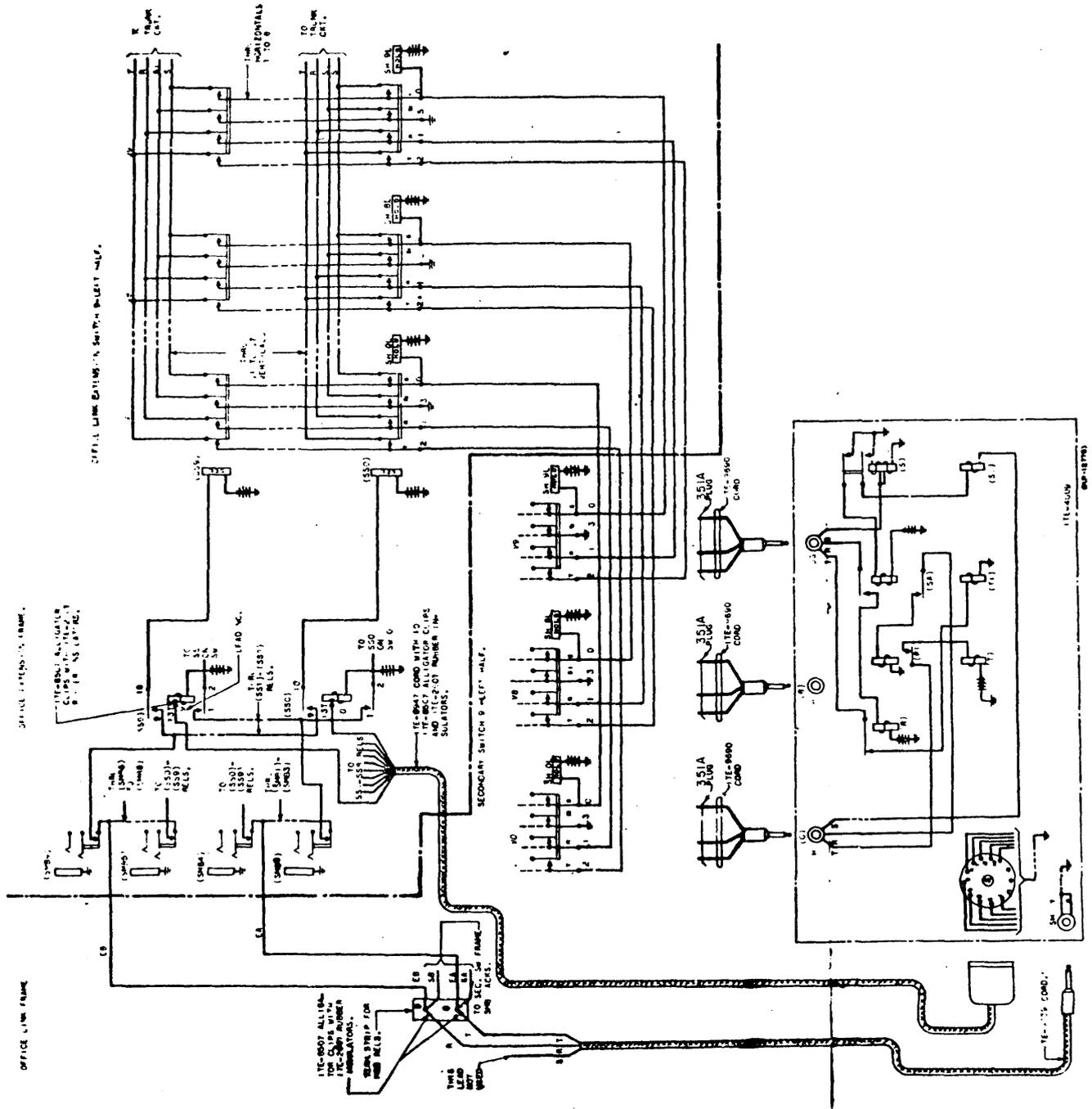


FIG. 8 SETUP FOR CROSSPOINT TEST, OFFICE LINK EXTENSION FRAME SWITCHES T.R. & S LEADS ONLY

- 11.115 Using an ITE-9639 cord connect the tip and ring of jack SM on the test set to punchings 8 and 9 respectively on the terminal strip for the MCB relays. These connections plus the connections described in Paragraph 11.114 are used for operating the SS magnets of all ten secondary switches.
- 11.12 Test Operations
- NOTE: In order to reduce wear on the contacts of SS relays and heating of the test set SM relay, insert 258C dummy plugs into all SMB jacks of the office link frame (and office extension frame if provided) except the SMB jack associated with the switch under test.
- 11.121 Lamps HO and SO should be lighted to begin the test. Momentarily operate key RS to light these lamps if they are not lighted.
- 11.122 Operate and leave operated keys XPT and PB9.
- 11.123 Operate the ST key. The S, R and T leads of the 100 crosspoints on the half switch under test are checked automatically for continuity and crosses. When lamp EC lights this test is completed.
- 1.124 Lamps S, S1, R, R1, T and T1 light momentarily as each crosspoint is tested. The lighted (S) 0-9 and (H) 0-9 lamps indicate respectively the operated select and hold magnets.
- 11.125 If the test set stops refer to Paragraph 10.24 for trouble indications.
- 11.126 When the crosspoint test of the S, R and T leads is completed on a half switch proceed to Paragraph 11.2.
- 11.2 S1 Leads Secondary Switch
- 11.21 Setup for Test (See Figure 6)
- 11.211 When the crosspoint test of the S, R and T leads is completed on a half switch change the test setup of Paragraph 11.11 and Figure 5 to conform to Figure 6 by making the following changes.
- (a) Remove the plug from the JG jack and place it in the H9 jack of the test set.
- (b) On the terminal strip for the MCA relays connect the 20 punchings 10 to 29 together, using strap wire, and connect them to the sleeve of jack GH of the test set using an ITE-9639 cord.
- (If more convenient strap punchings 00 to 19 on misc. T.S. on extension frame if provided.)
- 11.212 All TL and TR relays of the office link frame should be blocked operated, thus completing the connection to the test set of 100 S1 leads in case of non-split switches and 200 S1 leads in case of split switches. Check that these leads are not falsely grounded before the test is started.
- 11.213 Insulate the number 2 contacts of all TL relays and the number 5 contacts of all TR relays of the office link frame to prevent a back-up on the SS leads from operating several SS relays.
- 11.22 Test Operations
- 11.221 Release key PB9 and operate keys TR and OS. Release and reoperate the ST key. The set automatically checks the S1 lead of the 100 crosspoints on the half switch under test. The EC lamp lights at the completion of this test. The V lamp lights momentarily as each crosspoint is checked. Refer to Paragraph 10.24 for trouble indications. Release the ST key.
- 11.222 When the crosspoint test of the S1 leads is completed on a half switch proceed to Paragraph 11.3 if an extension frame is provided, if not provided, proceed to Paragraph 11.5.
- 11.3 S1 Leads Office Extension Switch (If Provided)
- 11.31 Setup for Test (See Figure 7)
- 11.311 When the crosspoint test of the S1 leads is completed on a secondary half switch, change the test setup of Paragraph 11.21 and Figure 6 to conform to Figure 7 by making the following changes:
- (a) Remove the plug of the ITE-9947 cord from the S receptacle of the test set.
- (b) Connect the leads 0-9 of another ITE-9947 cord to the 13 top contact (ground winding terminal) of relays (SS) 0-9 on the extension frame under test. Insert the receptacle plug of this cord into the S receptacle of the test set.
- 11.312 Remove the dummy plug from the SMB jack associated with the switch under test on the office extension frame and insert it in the SMB jack of the associated office link frame.



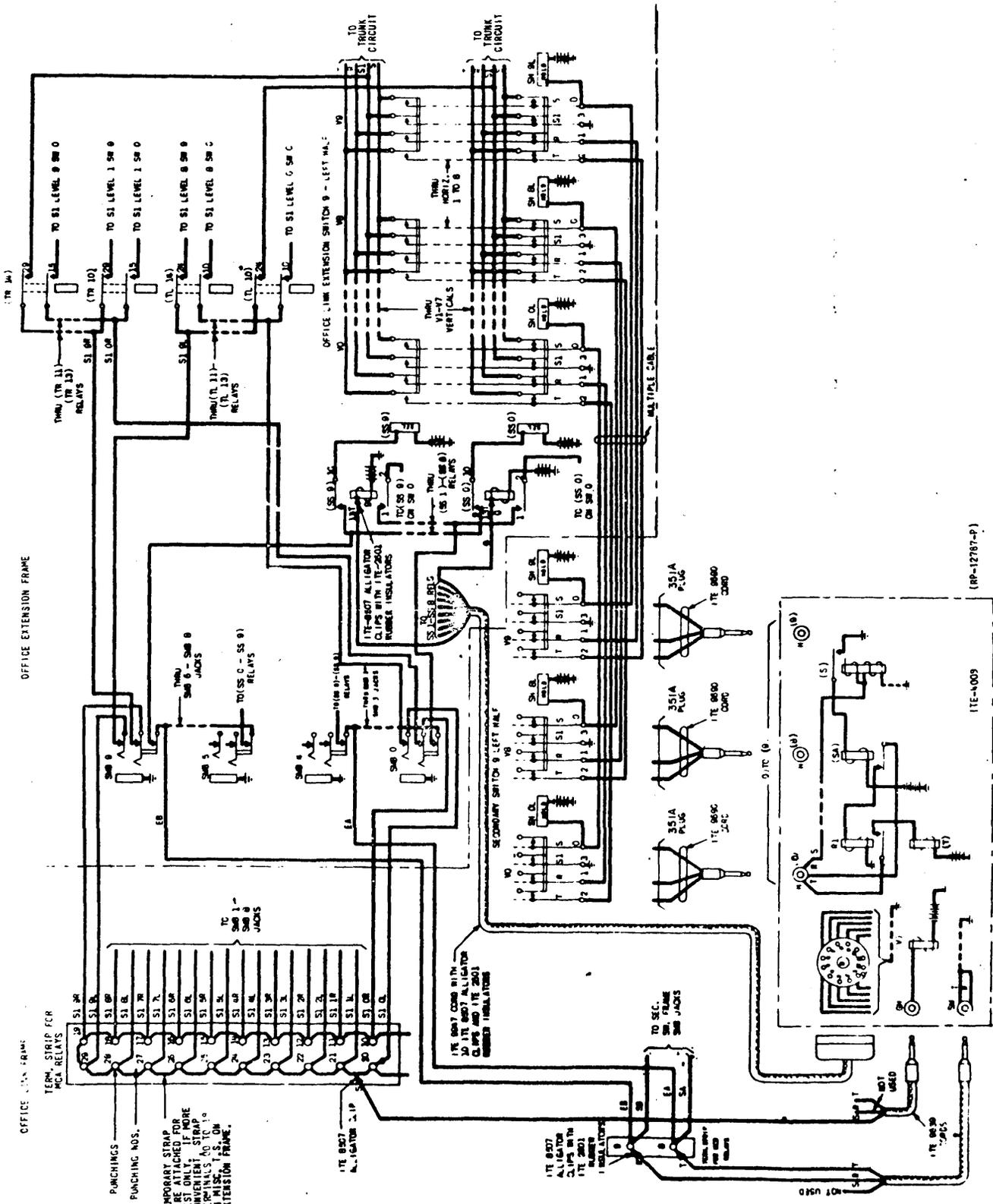


FIG. 7 SETUP FOR TEST OF S1 CROSSPOINTS ON OFFICE EXTENSION FRAME SWITCHES

- 11.313 Block operated all TL and TR relays associated with the office extension frame under test.
- 11.314 Insulate the number 2 contacts of all TL relays and the number 5 contacts of all TR relays of the office extension frame under test.
- 11.32 Test Operations
- 11.321 Momentarily operate key RS to light lamps HO and SO if they are not lighted. Operate the ST key. The set automatically checks the S1 lead of the 100 crosspoints on the half switch of the office extension frame. The V lamp lights momentarily as each crosspoint is checked. The EC lamp lights at the completion of this test.
- 11.322 At the completion of the test of the S1 crosspoints, release keys ST, TR and OS and proceed to Paragraph 11.4.
- 11.4 T, R and S Leads Office Extension Frame Switches (If Provided)
- 11.41 Setup for Test (See Figure 8)
- 11.411 When the crosspoint test of the S1 leads is completed on an office extension frame change the test setup of Paragraph 11.31 and Figure 7 to conform to Figure 8 by making the following changes:
- (a) Remove the ITE-9639 cord from the GH jack of the test set.
- (b) Remove the 310 plug from the H9 jack and insert it in the JG jack of the test set.
- 11.42 Test Operations
- 11.421 Lamps HO and SO should be lighted to begin the test. Momentarily operate key RS to light these lamps if they are not lighted.
- 11.422 Operate and leave operated key PB9.
- 11.423 Operate the ST key. The S, R and T leads of the 100 crosspoints of the extension frame half switch under test are checked automatically for continuity and crosses. When the EC lamp lights this test is completed.

- 11.424 Lamps S, S1, R, R1, T and T1 light momentarily as each crosspoint is tested. The lighted (S) 0-9 and (H) 0-9 lamps indicate respectively the operated select and hold magnets.
- 11.425 If the test set stops refer to Paragraph 10.24 for trouble indications.
- 11.426 At the completion of this test
- (a) Remove the receptacle plug of the ITE-9947 cord, connected to the extension frame (SS) 0-9 relays, from the S receptacle of the test set. Insert the receptacle plug of the ITE-9947 cord connected to the (SS) 0-9 relays of the office link secondary switches into the S receptacle of the test set.
- (b) Remove the dummy plug from the SMB jack of secondary switch 9 and insert in the SMB jack of extension switch 9.
- (c) Release keys XPT, PB9 and ST.
- 11.5 Perform the operations described in Paragraphs 11.1 to 11.426 for the right half of secondary switch 9 and, if provided, its associated right half extension switch.
- 11.6 Perform the operations described in Paragraphs 11.1 to 11.5 for the remaining secondary switches 8 to 0 and if provided, their associated extension switches 8 to 0.
- 11.7 Remove blocks and insulation from all relays and dummy plugs from SMB jacks. Remove test equipment.
12. SH HOLD MAGNET TEST
- 12.1 SH Magnets on Right Half Switches
- 12.11 Setup for Test (See Figure 9)
- 12.111 Connect 48 volt battery and ground to the A jack of ITE-4033B, Link Frame Test Set using an ITE-9598 cord.
- 12.112 Connect the receptacle plug of an ITE-9984 cord to the A connector on the set. Using push-on clips ITE-4085, connect leads 0-9 of this cord to punchings 10-19 of the terminal strip for the (MCB) relays.

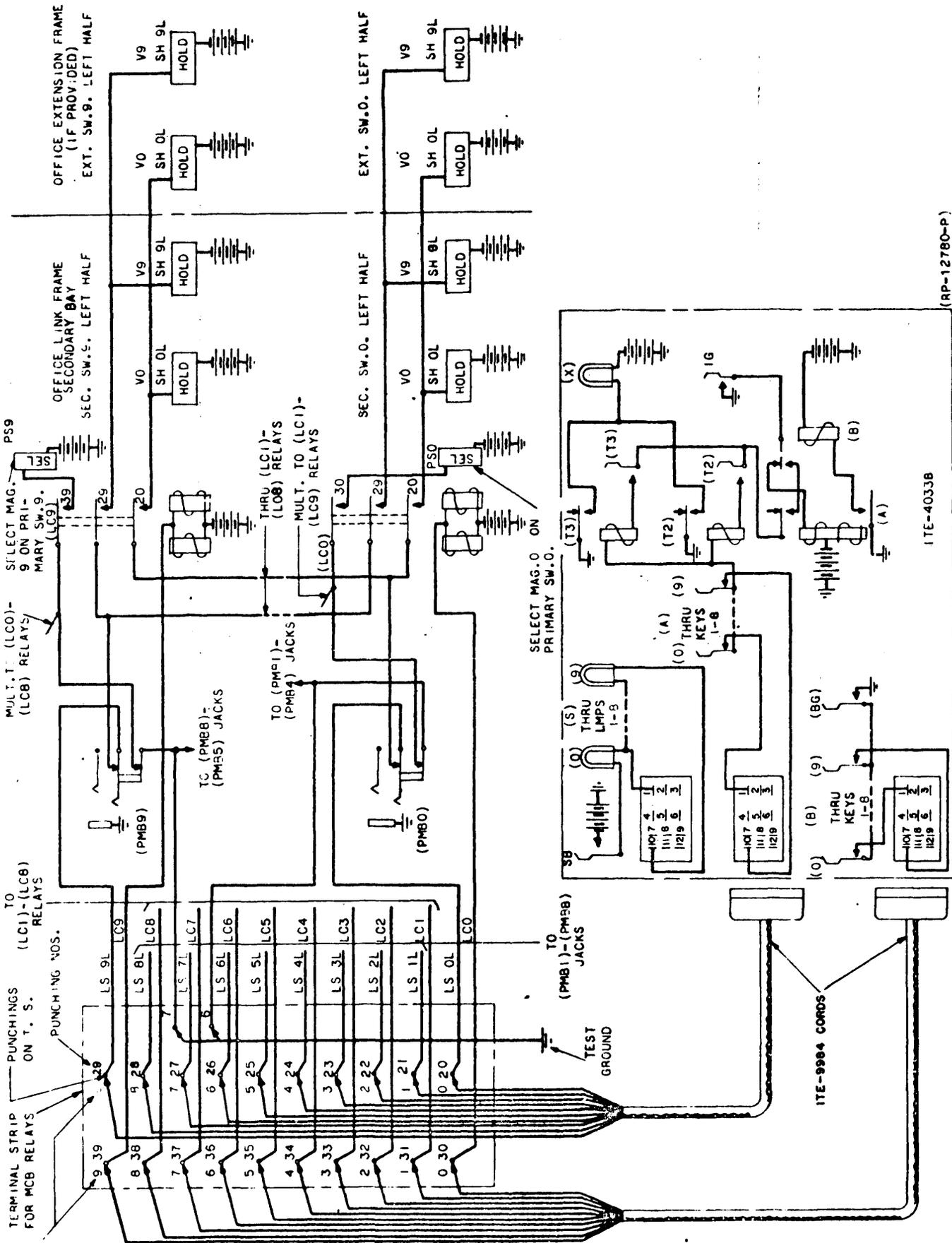


FIG. 10 SETUP FOR TEST OF SH LEADS LEFT HALF SWITCH AND LEFT HALF OF EXTENSION SWITCH (RP-12780-P)

ITE-9984 LEAD COS.

ITE-4033B



12.113 Connect the receptacle plug of an ITE-9984 cord to the B connector on the set. Using push-on clips ITE-4085, connect leads 0-9 on this cord to punchings 30-39 of the terminal strip for the (MCB) relays.

## 12.12 Test Operations

12.121 If an office extension frame is not provided, operate keys IG, T3, BG and X and leave them operated. Key IG operated starts the interrupter circuit of the test set.

12.122 If an office extension frame is provided operate keys IG, T2, GB and X and leave them operated. Key IG operated starts the interrupter circuit of the test set.

12.123 Operate key B0 to operate relay (LC) 0. Operate key A0 and observe that the secondary hold magnet SH-OR, switch 0, operates and releases from interrupted ground provided by the test set. If this magnet (or magnets) is crossed with another magnet a marginal relay in the test set operates and the X lamp flashes at the same rate as the hold magnet. In order to detect that the test set relays will operate on a cross, momentarily cross two magnets by operating keys A0 and A1 at the same time, noting that X lamp flashes. Release keys A0 and A1.

12.124 The following chart shows the keys that are operated and released and the magnets on the right half of secondary switch 0 that are tested when relay (LC) 0 is operated.

<u>Keys</u>	<u>SH Magnet</u>	<u>Sec. Sw.</u>
A0-A9	OR-9R	0

12.125 When the ten hold magnets on the right half of secondary switch 0 have been checked, release key B0 and operate key B1 to operate relay (LC) 1. Check the ten hold magnets on the right half of switch 1 by operating and releasing keys (A) 0-9, in turn. Continuing in this manner check the hold magnets on the right half of all secondary switches.

12.126 When the SH magnets on the right half of the secondary switches have been checked move the receptacle plug from the A connector to the S connector on the test set. Operate key SB and then insert a make busy plug into jacks (PMB) 0-9, in turn, and observe that lamps (S) 0-9, respectively, light while the plug is in the jack. This verifies the make busy feature on leads (LS) OR-9R.

12.127 Remove the plug from the S receptacle and insert in the A receptacle of the test set.

## 12.2 SH Magnets on Left Half Switches

### 12.21 Setup for Test (See Figure 10)

12.211 Change the setup of Paragraph 12.11 and Figure 9 to conform to Figure 10 by making the following changes:

- (a) Move the leads 0-9, on the cord connected to the A plug of the test set, from the 10-19 punchings to the 20-29 punchings on the terminal strip for the MCB relays.

### 12.22 Test Operations

12.221 Perform operations described in Paragraph 12.121 to 12.125 to test the hold magnets on the left half of all secondary switches.

12.222 When the SH magnets on the left half of the secondary switches have been checked move the receptacle plug from the A connector to the S connector on the test set. Operate key SB and then insert a make busy plug into jacks (PMB) 0-9, in turn, and observe that lamps (S) 0-9, respectively, light while the plug is in the jack. This verifies the make busy feature on leads (LS) OL-9L.

12.223 Verify that there are no reverses in the primary select magnet leads at the LC relays as follows. Insert make busy plugs in jacks (PMB) 1-9. Ground leads PA and PB at punchings 6 and 7, terminal strip for MCB relays. Operate keys (B) 0-9, one at a time, to operate and release relays (LC) 0-9 respectively and observe that select magnets 0 to 9 respectively on primary switch 0 operate and release. Repeat this test on each primary switch. When testing switch 1 make busy plugs are inserted in all PMB jacks except (PMB) 1; when testing switch 2, in all PMB jacks except (PMB) 2; etc. Remove make busy plugs, test equipment, and ground from leads PA and PB.

## 13. S AND S1 LEADS

### 13.1 S and S1 Leads Associated with TR Relays

#### 13.11 Setup for Test (See Figure 11)

- 13.111 Connect 48 volt battery and ground to the A jack of ITE-4033B, Link Frame Test Set using cord ITE-9598.
- 13.112 Equip the 0-9 leads of 4 ITE-9984 cords with push-on clips ITE-4085. Connect the 0-9 leads and the receptacle plugs of these cords to the punchings and test set receptacles, respectively, to obtain the following association:

Terminal Strip	Punchings	Leads	Insert Connector into Receptacle
MCA	30-39	(TL) 0-9	B
MCA	10-19	(S1)OR-9R	S1
MCB	40-49	(S)OR-9R	S
MCB	30-39	(LC)0-9	A

The connections to leads TL-0 to TL-9 are used to operate the TR and TL relays, as follows:

TL Lead	Split Levels		Non-Split Levels	
	TL Relay	TR Relay	TL Relay	TR Relay
0	0	1	0	1
1	1	0	-	-
2	2	3	2	3
3	3	2	-	-
4	4	5	4	5
5	5	4	-	-
6	6	7	6	7
7	7	6	-	-
8	8	9	8	9
9	9	8	-	-

If both split and non-split levels are used on the office link frame, relays TL1-TRO, TL3-TR2, TL5-TR4, etc., as required, are provided for the split levels.

- 13.113 Connect ground to punching 10 (lead LS-OR) on the terminal strip for LC relays. This connection is made to operate magnet SH-OR on switches 0 to 9.
- 13.114 Connect ground to punching 5 (lead SMR) on the terminal strip for TR relays. This ground operates the SS relays when their associated TR relays are operated.
- 13.115 Connect ground to punchings 8 and 9 (leads SA and SB, and EA and EB for extension frame) on terminal strip for MCB relays. This ground operates the SS magnets.
- 13.116 Operate keys AG, BG, SB and S1B and leave them operated.

13.12 Test Operations

- 13.121 Operate key B0 to operate relays TLO and TR1. The ground on the SMR lead operates relay SS1 which in turn operates magnets SS1 on switches 0 to 9.
- 13.122 Operate key A0 to operate relay (LC)0. This connects the ground on lead LS-OR to hold magnet SH-OR, switch 0, which operates causing lamps (S) 0 and (S1) 0 to light. Should any other lamp or lamps light, a cross is indicated. Release key A0 to release relay (LC) 0 and extinguish lamps (S) 0 and (S1) 0.
- 13.123 Operate key A1 to operate relay (LC) 1. This causes hold magnet SH-OR, switch 1, to operate and this in turn causes lamps (S) 1 and (S1) 1 to light. Release key A1 to release relay (LC) 1.
- 13.124 Continuing as in 13.122 and 13.123 operate and release keys A2 to A9 and observe that the corresponding lamps (S) 2-9 and (S1) 2-9 light. This checks the S and S1 leads on level 1 of switches 0 to 9. These leads are associated with relay TR1.
- 13.125 Release key B0 to release relay TR1. If relay TRO is provided operate key B1 to operate this relay. If relay TRO is not provided, operate key B2 to operate relay TR3. Refer to Paragraph 13.112. As described in 13.122 to 13.124 use keys A0 to A9 to operate and release relays (LC) 0-9 and check the S and S1 leads associated with the operated TR relay. Continuing in this manner check the S and S1 leads associated with all TR relays.
- 13.126 Verify the make busy feature on leads (S1) OR-9R as follows. Insert a make busy plug in jacks (SMB) 0-9, one at a time, and observe that lamps (S1) 0-9 respectively light while the plug is in the jack.

13.2 Extension Frame (If Provided) - S and S1 Leads - Odd Levels Associated with TR10 - TR 14 Relays

- 13.21 Setup for Test (See Figure 12)
- 13.211 Change the test setup of Paragraph 13.11 to conform to Figure 12 by making the following change:
  - (a) Remove the 0-9 leads of the ITE-9984 cord from the 30-39 punchings on the MCA terminal strip and attach the 0-4 leads of this cord to punchings 40-44 on the same terminal strip.

13.22 Test Operations

- 13.221 Operate key B0 to operate relays TR10 and TL10. The ground on the SMR lead operates relay SS1 which in turn operates magnets SS1 on extension switches 0 to 9.
- 13.222 Operate key A0 to operate relay LCO. This connects the ground on lead LS OR to hold magnet SH OR, extension switch 0, which operates causing lamps (S) 0 and (S1) 0 to light. Should any other lamp or lamps light a cross is indicated. Release key A0 to release relay LCO and extinguish lamp (S) 0 and (S1) 0.
- 13.223 Operate key A1 to operate relay LC1. This causes hold magnet SH OR, extension switch 1, to operate and this in turn causes lamps (S) 1 and (S1) 1 to light. Release key A1 to release relay LC1.
- 13.224 Continuing as in 13.222 and 13.223 operate and release keys A2 to A9 and observe that the corresponding lamps (S) 2-9 and (S1) 2-9 light. This checks the S and S1 leads on level 1 of extension switches 0 to 9. These leads are associated with relay TR10.
- 13.225 Release key B0 to release relay TR10. Operate key B1 to operate relay TR11. As described in 13.222 to 13.224 use keys A0 to A9 to operate and release relays (LC) 0-9 and check the S and S1 leads associated with the operated TR11 relay. Continuing in this manner check the S and S1 leads on the odd levels associated with the TR12 to TR14 relays.
- 13.226 Verify the make busy feature on leads (S1) OR-9R, extension frame, as follows. Insert a make busy plug in jacks (SMB) 0-9, one at a time, and observe that lamps (S1) 0-9 respectively light while the plug is in the jack.

13.3 S and S1 Leads Associated With TL Relays13.31 Setup for Test (See Figure 13)

- 13.311 Move the leads, as required, from the setup of Paragraph 13.11 or 13.21 to obtain the following association (shown in Figure 13).

Terminal Strip	Punchings	Leads	Insert Connector into Receptacle
MCA	30-39	(TL)0-9	B
MCA	20-29	(S1)0L-9L	S1
MCB	50-59	(S)0L-9L	S
MCB	30-39	(LC)0-9	A

- 13.312 Disconnect the ground from punching 10, terminal strip LC and connect it to punching 20 (lead LS 0L) on the same terminal strip.
- 13.313 Disconnect the ground from punching 5, terminal strip for TL and TR relays, and connect it to punching 2 (lead SML) on the same terminal strip.
- 13.32 Test Operations
- 13.321 Operate key B0 to operate relays TL0 and TR1. The ground on the SML lead operates relay SS0 which in turn operates magnets SS0 on switches 0 to 9.
- 13.322 Operate key A0 to operate relay (LC) 0. This connects the ground on lead LS-0L to hold magnet SH-0L, switch 0, which operates causing lamps (S) 0 and (S1) 0 to light. Should any other lamp or lamps light, a cross is indicated. Release key A0 to release relay (LC) 0 and extinguish lamps (S) 0 and (S1) 0.
- 13.323 Operate key A1 to operate relay (LC) 1. This causes hold magnet SH-0L, switch 1, to operate and this in turn causes lamps (S) 1 and (S1) 1 to light. Release key A1 to release relay (LC) 1.
- 13.324 Continuing as in 13.322 and 13.323 operate and release keys A2 to A9 and observe that the corresponding lamps (S) 2-9 and (S1) 2-9 light. This checks the S and S1 leads on level 0 of switches 0 to 9. These leads are associated with relay TL0.

- 13.325 Release key B0 to release relay TL0. If relay TL1 is provided operate key B1 to operate this relay. If relay TL1 is not provided, operate key B2 to operate relay TL2. Refer to paragraph 13.112. As described in 13.322 to 13.324 use keys A0 to A9 to operate and release relays (LC) 0-9 and check the S and S1 leads associated with the operated TL relay. Continuing in this manner check the S and S1 leads associated with all TL relays.

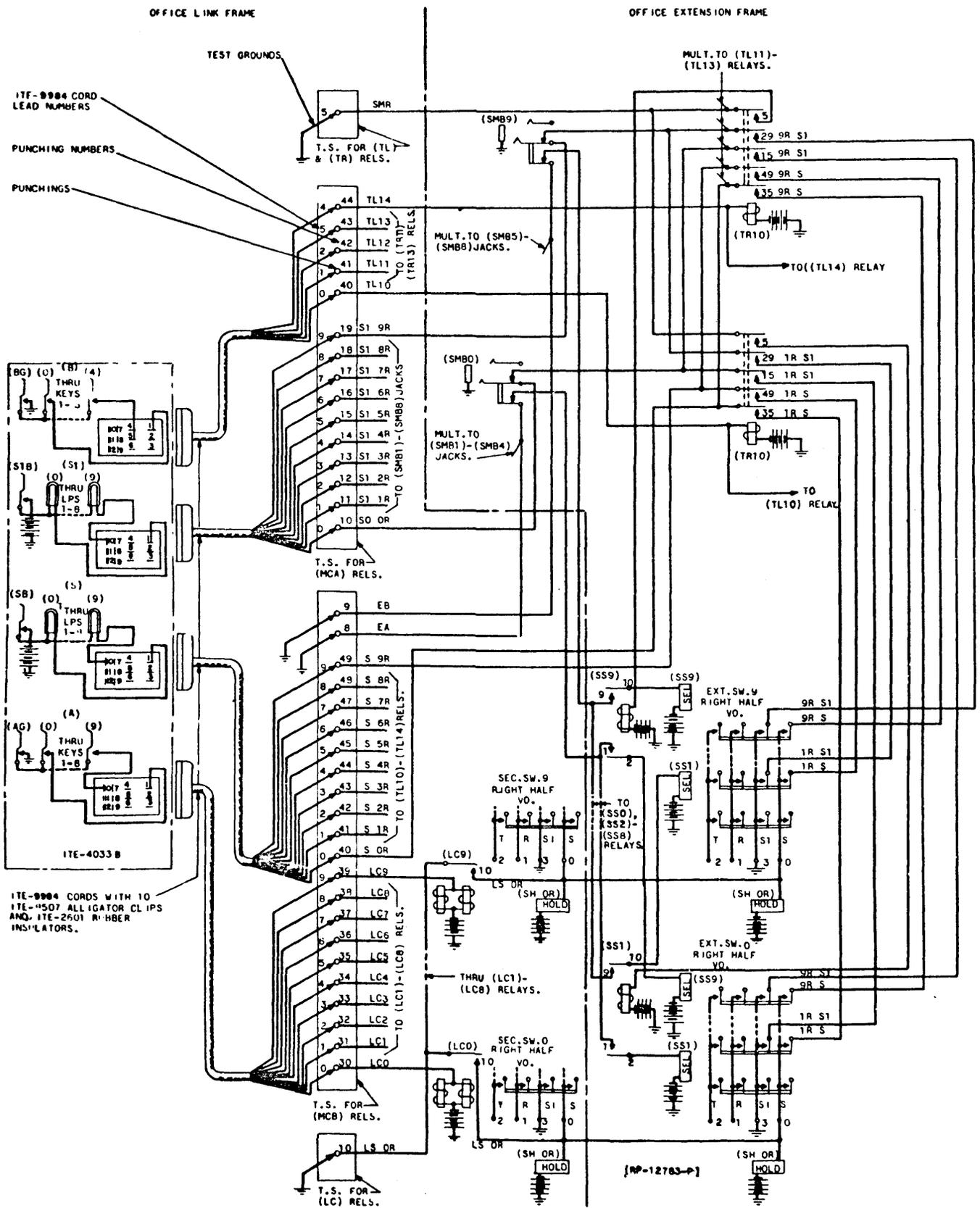


FIG. 12 SETUP FOR TEST OF S AND S1 LEADS,  
OFFICE EXTENSION FRAME, ODD LEVELS

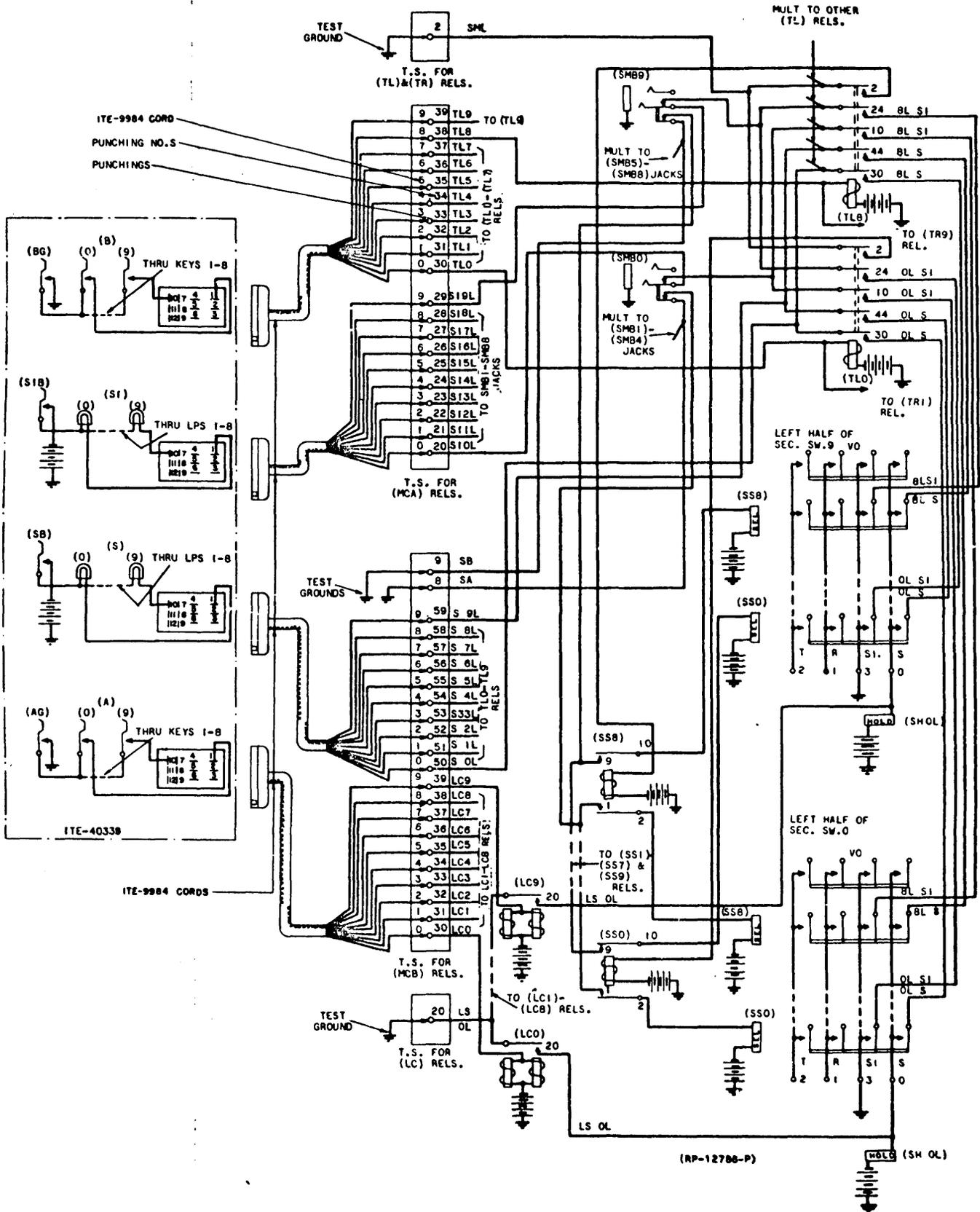


FIG. 13 SETUP FOR TEST OF S AND S1 LEADS, LEFT HALF SWITCHES



- 13.326 Verify the make busy feature on leads (S1) 0L-9L, as follows. Insert a make busy plug in jacks (SMB) 0-9, one at a time, and observe that lamps (S1) 0-9 respectively light while the plug is in the jack.
- 13.4 Extension Frame (If Provided) - S and S1 Leads - Even Levels Associated with TL10 - TL14 Relays
- 13.41 Setup for Test (See Figure 14)
- 13.411 Change the test setup of Paragraph 13.311 and Figure 13 to conform to Figure 14 by making the following change:
- (a) Remove the 0-9 leads of the ITE-9984 cord from the 30-39 punchings on the MCA terminal strip and attach the 0-4 leads of this cord to punchings 40-44 on the same terminal strip.
- 13.42 Test Operations
- 13.421 Operate key B0 to operate relays TL10 and TR10. The ground on the SML lead operates relay SSO which in turn operates magnets SSO on extension switches 0 to 9.
- 13.422 Operate key A0 to operate relay (LC) 0. This connects the ground on lead LS-0L to hold magnet SH-0L, extension switch 0, which operates causing lamps (S) 0 and (S1) 0 to light. Should any other lamp or lamps light, a cross is indicated. Release key A0 to release relay (LC) 0 and extinguish lamps (S) 0 and (S1) 0.
- 13.423 Operate key A1 to operate relay (LC) 1. This causes hold magnet SH-0L, extension switch 1, to operate and this in turn causes lamps (S) 1 and (S1) 1 to light. Release key A1 to release relay (LC) 1.
- 13.424 Continuing as in 13.422 and 13.423 operate and release keys A2 to A9 and observe that the corresponding lamps (S) 2-9 and (S1) 2-9 light. This checks the S and S1 leads on level 0 of extension switches 0 to 9. These leads are associated with relay TL10.
- 13.425 Release key B0 to release relay TL10. Operate key B1 to operate the TL11 relay. As described in 13.422 to 13.424 use keys A0 to A9 to operate and release relays (LC) 0-9 and check the S and S1 leads associated with the operated TL11 relay. Continuing in this manner check the S and S1 leads associated with the TL12 - TL14 relays.
- 13.426 Verify the make busy feature on leads (S1) 0L-9L, extension frame, as follows: Insert a make busy plug in jacks (SMB) 0-9, one at a time, and observe that lamps (S1) 0-9 respectively light while the plug is in the jack.
- 13.5 Remove all test equipment and test grounds.
- 13.6 SS Magnets: Ground leads SA and SB (EA and EB for extension frame). Check for false continuity at SS relays and verify that there are no reverses in the secondary select magnet leads at the SS relays as follows: Insert make busy plugs in jacks (SMB) 1-9. Operate relays (SS) 0-9, one at a time, and observe that select magnets 0 to 9, respectively on switch 0 operate and release. Repeat this test on each secondary switch. When testing switch 1 make busy plugs are inserted in all SMB jacks except (SMB) 1; when testing switch 2, in all jacks except (SMB) 2; etc. Remove ground from leads SA and SB, and EA and EB for extension frames. Remove test grounds, and make busy plugs.
14. EXTENSION FRAMES (ADDED TO WORKING FRAMES).
- NOTE 1: Before starting test operations verify that ends of open leads at OGT terminal strips and open multiple leads to associated working office frame are not crossed or grounded.
- 14.1 Test Setup, T.R. & S Crosspoints
- 14.11 Connect ITE-4009 test set to office link extension switch under test as shown in Figure 15.
- 14.12 Connect 48V battery and ground to BAT jack of test set using ITE-9598 cord.
- NOTE: Insert 258C dummy plugs into all SMB jacks of office link extension frame except SMB jack associated with switch under test.
- 14.2 Test Operations
- 14.21 Momentarily operate RS key to light H0 and S0 lamps if they are not already lighted. Operate keys PB9 and XPT.
- 14.22 Operate ST key. Leads T, R and S of the 100 crosspoints of extension frame half switch under test are checked automatically for continuity and crosses. Lamp EC lights when test is completed.

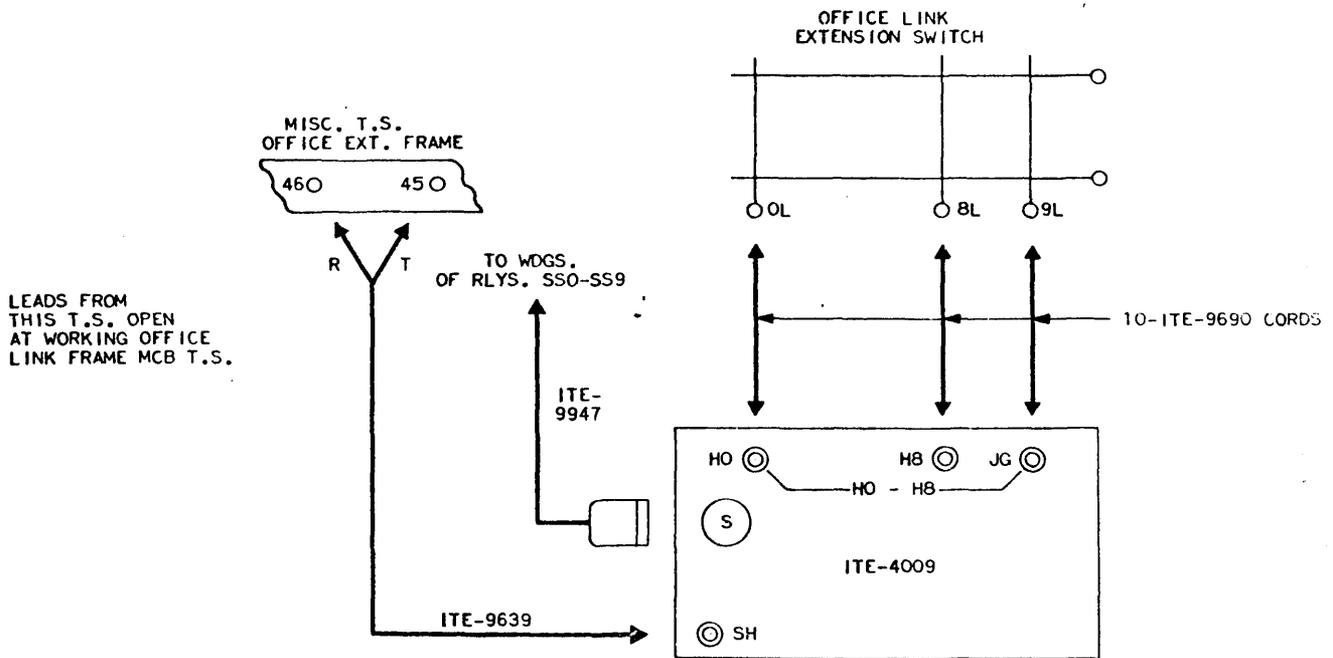


FIG. 15 SETUP FOR CROSSPOINT TEST, OFFICE LINK EXTENSION FRAMES ADDED TO WORKING FRAMES, T, R & S LEADS ONLY (#1 CROSSBAR)

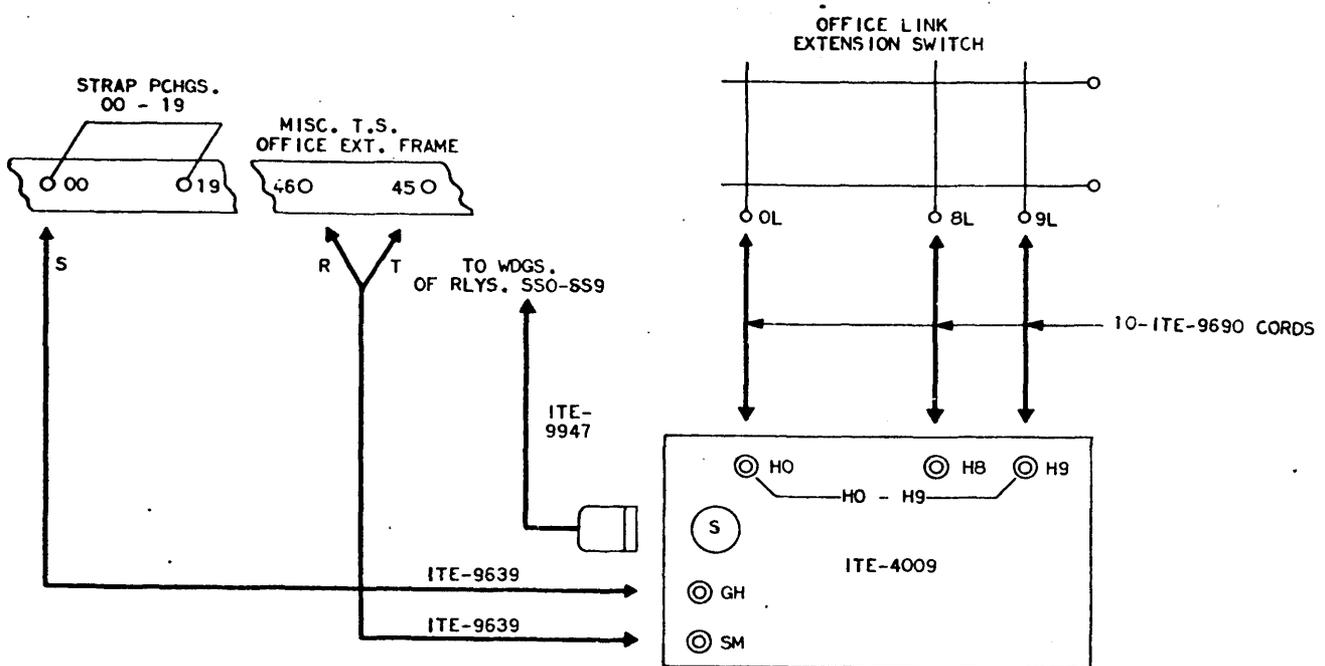


FIG. 16 SETUP FOR TEST OF S1 LEAD CROSSPOINTS ON EXTENSION FRAME (#1 CROSSBAR)

14.23 Release ST key and relocate ITE-9690 test cords to verticals of next extension switch to be tested. Remove plug from associated SMB jack as required and replace in SMB jack associated with switch previously checked.

14.24 Repeat test operations of preceding paragraphs as required in order to check T, R and S crosspoints of all switches on extension frame under test.

14.25 When tests have been completed on extension frame under test, rearrange test setup in accordance with Paragraph 14.3 in order to check S1 lead crosspoints before proceeding to next frame.

#### 14.3 Test Setup, S1 Lead Crosspoints

14.31 Make necessary changes in setup as indicated in Figure 16.

NOTE: Move test cord from jack JG to H9.

14.32 All TL- and TR- relays of office link extension frame should be blocked operated in order to complete the connections of S1 leads from switches to punchings 00-19 of MISC T.S.

14.33 Insulate number 2 contact of all TL relays and number 5 contact of all TR relays in order to prevent a backup on SS leads from operating several SS relays.

#### 14.4 Test Operations

14.41 Release PB9 key and operate keys TR and OS. Release and reoperate ST key to start test.

14.42 The test set automatically checks the S1 lead of crosspoints on switch under test and lamp EC lights at completion of cycle. Lamp V lights momentarily as each crosspoint is checked.

14.43 Change test cord connections as required in order to check S1 crosspoints of remaining switches on extension frame under test.

14.44 Remove all connections and relay blocks when tests have been completed. Remove temporary strapping at MISC T.S. punchings 00-19.

#### 15. OFFICE JUNCTOR TEST

NOTE 1: This test is made to localize trouble only, since a retest is made on the channel test per Section 142 and

may therefore be omitted. When testing additions, these tests may be made from new district to new office frames as a preliminary test prior to making channel tests.

NOTE 2: In case there are more office link frames than district link frames, there will be unassigned leads from the office link frames to the office junctor grouping frame and these leads should be checked for continuity, crosses and location using ITE-4009, Crosspoint, Link and Junctor Test Set. The test setup and operation is similar to the office junctor test described in the following paragraphs, except the DS key should be operated as there will be no battery on the unused PH magnets on the office link frames.

#### 15.1 Setup for Test

15.11 Locate the Crosspoint, Link and Junctor Test SET, ITE-4009, at the district link frame and connect 48V battery and ground to the BAT jack using cord ITE-9598.

15.12 Insert the plug of an ITE-9690 cord into jack JG. Using cord ITE-9601 patch the H0 jack on the set to spare jack (B) on the district junctor frame and at the MDF temporarily crossconnect this spare jack to spare jack (B) on the office link frame. Insert the plug of another ITE-9690 cord into jack B at the office link frame.

15.13 Where required, a talking circuit and a means of extending the buzzer signal may be setup by connecting the CW binding posts of ITE-4009 to a Call Wire Telephone jack, ITE-2260, and connecting operator telephone sets to ITE-2260 and to the TEL jacks of ITE-4009.

15.14 Lamp H0 should be lighted. If necessary step selector H using key STP-H or RS to light this lamp.

#### 15.2 Test Operations

15.21 Operate and leave operated key REP to prevent the H selector from stepping after each OK test. Operate keys BXM, BZ and ST.

15.22 Using the Office Junctor Assignment Chart to determine the associated verticals on the district secondary switch and on the office primary switch, connect the 351A plug end of the two ITE-9690 cords to these verticals. If the

sleeve, ring and tip of the junctor between these verticals are continuous and free from crosses, the buzzer operates. Move the plugs to two other associated verticals on the frames under test and check this junctor. Continue in this manner to check all junctors between all district link frames and all office link frames.

### 15.3 Test for Crosses

15.31 Using a test receiver check that all T and R punchings on the terminal strips at the office junctor grouping frame are free from battery. A battery indication on one of these punchings indicates a cross with an S punching, which would be battery through a district secondary hold magnet and an office primary hold magnet in parallel.

15.32 Strap together all T and R punchings on a terminal strip at the office junctor grouping frame and then ground the strap wire. Check that all punchings are grounded. Remove the strap from the punchings one at a time and after the strap is removed from each punching check that the punching is free from ground.

## 16. MISCELLANEOUS CIRCUITS

### 16.1 Fuse Alarms

16.11 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 aisle pilot light. Lamp FA and AL do not light.

6.12 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.

6.13 Connect -48 volt battery through test receiver R-9572 to the frame fuse panel alarm bar. Observe that the major alarm sounds, that lamp FA and the associated aisle pilot lights. Lamps 20A and AL do not light.

*No changes indicated due to extensive revision*

6.14 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 to extinguish lamp AL.

### 16.2 Test Battery Jack and Supply

16.21 Using the R-9572 Test Receiver, check test battery terminals and the tip of jack A for presence of -48 volts.

16.22 Using R-9572 Test Receiver, check test terminal G for direct ground and terminal HRG for a high resistance ground.

### 16.3 Remote Control Jack

16.31 Using R-9572 Test Receiver, check the sleeve of jack F for direct ground.

16.32 Make a continuity and cross test of the tip and ring leads of the F jack to all associated F jacks and to the Terminating Trouble Indicator Circuit.

### 16.4 Spare Jack

16.41 Make a continuity and cross test of the tip, ring and sleeve leads of the B jack to all associated B jacks and to the Main Distribution Frame.

### 16.5 Frame Line Telephone Jacks

16.51 Connect an operator's telephone set (ITE-9650) to the frame line telephone jack and to any multiple frame line telephone jack. Make a talking test of the circuit.

16.52 Repeat Paragraph 6.41 to all other multiple frame line telephone jacks.

16.6 Refer to Section 172.6 for check of traffic registers associated with office link frames.

Manager, Crossbar Product Engineering  
Control Center

Reason for Reissue:

To update to current engineering standards.