

INCOMING LINK FRAME TEST

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1. GENERAL INFORMATION

1.1 Description of Test: This section describes a method of testing incoming link and connector circuit SD-25457. The major tests are of the marker multiple, marker lockout and control, links and primary switches and secondary switches. Various other features are verified in conjunction with these tests and in separate minor tests. The leads from the incoming trunk frame are verified when the incoming trunks are tested.

1.2 Records and Requirements: ID-1313 and ID-2230 are required as outlined in Handbook 50, Section 3.

1.3 Cabling: The cables between the terminating markers and the marker connector (MC) relays of the incoming link frames should be left open at the markers until after the marker multiple test and on additions until after the marker lockout and control test has been completed.

1.4 Test Procedures: During the test of the terminating markers the regular lockout circuit (MP relays) and the emergency lockout circuit (E relays) should be used approximately the same amount as a means of exercising these circuits. Interference to the tests in this section from other test calls may be eliminated by blocking normal the marker preference relays (MP or E).

1.5 Test of Additions: The tests outlined in this section may be made on incoming 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 LJGF transition.

1.6 Special Test Connections: When circuits under test are equipped with CA6A and similar type wire wrap terminal strips, ITE-4026 multicontact relay T.S. fixture should not be used for making connections. Instead, ITE-4085 Push-on clips should be used at the terminal strip punchings as required and the test cord connected to these clips by means of alligator clips. Test cord must be supported in order to remove weight of cord from terminal strip connections.

2. TEST EQUIPMENT

2.1 Test Sets

	Amt	Code or ITE	Description
	1	4009	Crosspoint, Link and Junctor Test Set
	1	4010	Terminating Equipment Test Set
	1	4015	Continuity Test Set
	%2	4033	Link Frame Test Set
	1	4079	160 Circuit Link Crosspoint Test Set

% When the incoming link frames are not arranged for mate operation, only one ITE-4033 is required.

2.2 Cords

Req'd For	Amt	ITE	Lgth	Cdrs	One End	Other End	With ITE
4015	1	9639	12'	3	110	3 ITE-Plug	4009& 4023
4079						2455	
4015	2	9547	12'	1	ITE-4079	ITE-2455	4023
4079	1	9598	12'	2	110	110 Plugs	4023
4079	4	9708	12'	5	2 110	325B Plugs	4023

NOTE: Cords mentioned in the tests in this instruction and which are not listed above are furnished with the test set specified for the particular test.

2.3 Accessories

<u>Amt</u>	<u>Code or ITE</u>	<u>Description</u>	<u>With ITE</u>
1	ITE-4034	Volt ohmmeter	
1	ITE-2418	Buzzer Set	
	or		
	ITE-4137	A.C. Continuity Test Set	
1	ITE-8253	Contact Protection Test Set	4023
As Req.	ITE-8507	Alligator Clip	4023
10	298A	Make Busy Plug	4023

3. FUSING

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

3.1 Fuse Installation and Cross Test

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

3.12 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>
A	Winding, any relay (TR) 1-6
(P) 0-9	Winding, relays (LC) 0-9
(MC) 0-9	Winding, Relays (MC) 0-9

No Extension: Not Mated

(S) 0-9	Magnets on Secondary Switches 0-9
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Extension: Not Mated

(S) 0-9	SS and SH magnets on regular secondary switches 0-9 and SS magnets on extension secondary switches 0-9
(S) 10-19	SH magnets on extension secondary switches 0-9

Extension and Mated

(S) 0-9 (Even frame)	SH magnets, left half, regular secondary switches 0-9 on odd and even mate frames. Also SS magnets on regular and extension secondary switches 0-9 of even frame.
(S) 0-9 (Odd frame)	SH magnets, right half, regular secondary switches 0-9 on odd and even mate frames. Also SS magnets on regular and extension secondary switches 0-9 of odd frame.
(S) 10-19 (Even frame)	SH magnets, left half, extension secondary switches 0-9 of odd and even frames.

Fuse

Equipment

(S) 10-19 (Odd frame) TBS	SH magnets, right half, extension secondary switches 0-9 of odd and even frames. 48V terminal on regular and extension frames.
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3.2 Extension and Mate Frame Battery Feeder Test

3.21 Using an ITE-9639 cord connect battery (tip conductor) to the G terminal of the ITE-4015 test set and ground (sleeve conductor) to the B terminal of the test set.

3.22 Using an ITE-9547 cord, connect ground to the test set 1T terminal. The meter reads approximately 45 milliamperes to the left.

3.23 When extension switches are provided, use another ITE-9547 cord to connect the test set R terminal to the battery winding of each S select magnet on both the regular and extension secondary switches. The meter should deflect approximately 47.5 milliamperes to the right when it is connected to a select magnet battery winding, and any other reading is an indication of an open battery feeder.

3.24 When mate frame operation is provided, apply the test described in Paragraph 3.23 to the battery winding of each hold magnet of the regular and extension, if provided, secondary switches of both the even and odd frames.

4. CONTACT PROTECTION

Check the following contact protection circuits using the method described in Section 2, Handbook 50.

<u>C.P.Ckt.</u>	<u>Type</u>	<u>Connect to</u>
(A) 0-9	(A) 0-9 1 T wdg., relays (MC) 0-9	
(B) 0-9	(B) 0-9 2 Pchg. 30-39, TS for LC relays	
(C) 0-9	(C) 0-9 1 T wdg., relays (LC) 0-9	

<u>NET</u>	<u>CP Network Res. in Ohms</u>	<u>Cap in MF</u>	<u>Type Ckt.</u>	<u>Connect to</u>
A	160	0.5	2	3T REL FP

5. MARKER MULTIPLE TEST

5.1 The marker multiple test using ITE-4261 whistler test set will check the multiple for continuity, reversals, crosses and false battery and ground.

5.2 At the first incoming 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 O contact of the first marker MC relay. A tone should be heard.

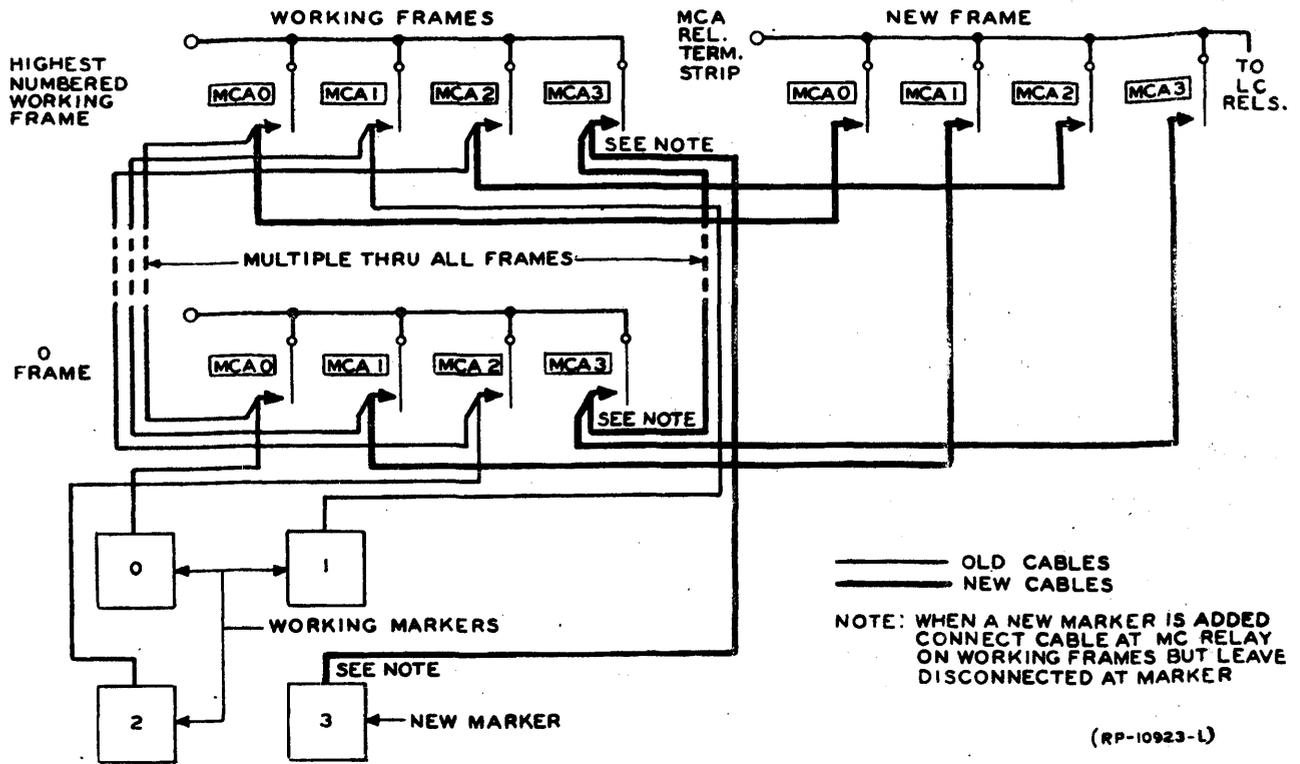


FIG. 1 SETUP FOR MARKER MULTIPLE TEST FOR ADDITIONS

- 5.4 Adjust the volume control for sufficient volume.
- 5.5 At the next incoming link frame, have an installer place ground on the 0 contact of the first marker MC relay (other end of multiple) lead. The tone should be silenced.
- 5.6 Continue the test on each contact of the MC-relays for each marker between the first two incoming 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 Contact 52 of the MC relay is grounded on the multiple side.
- 5.8 Upon completion of the test between the first two incoming link frames for all markers, repeat the test on the second and third frames and continue in this manner until the complete multiple between all incoming link frames has been tested.

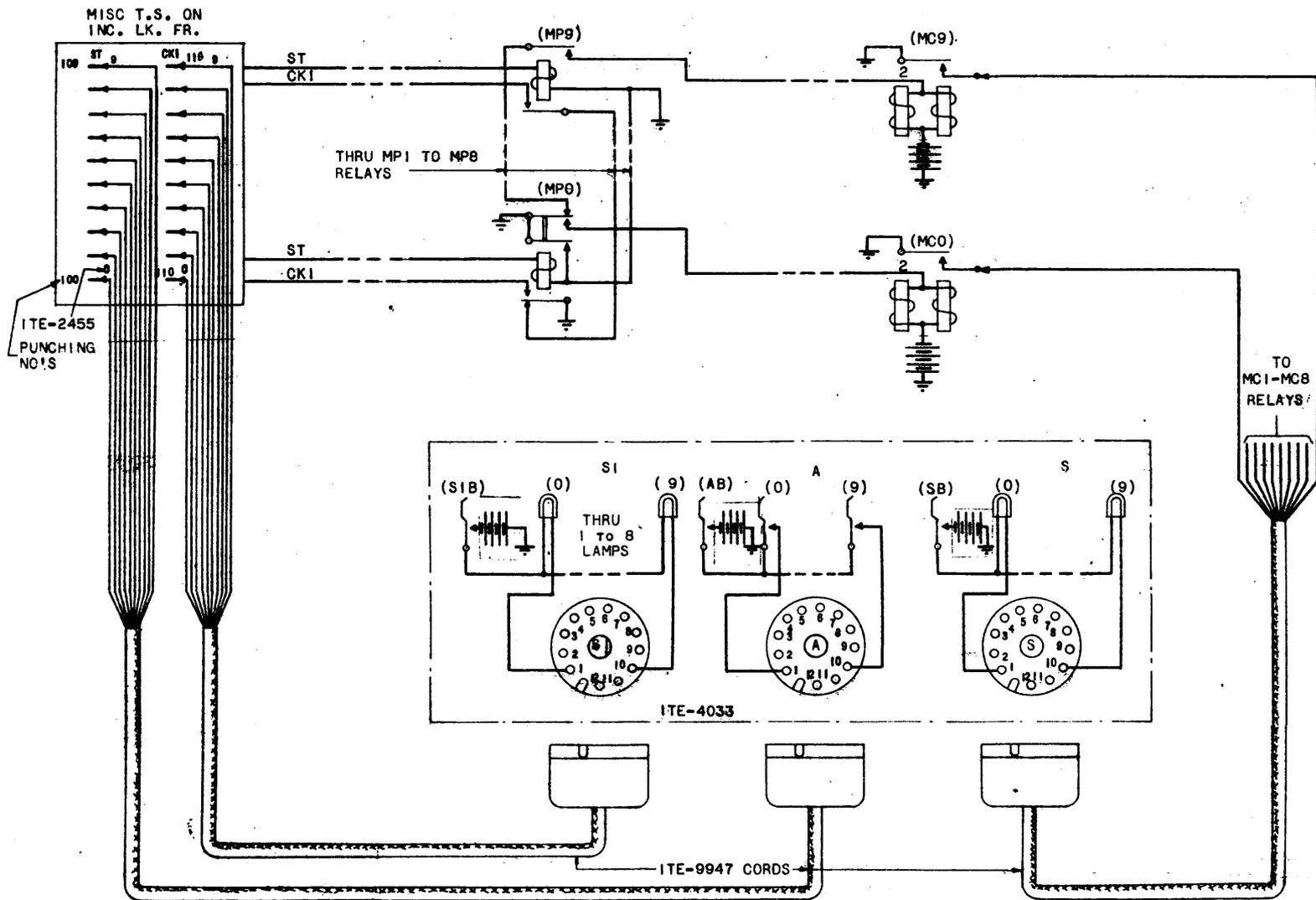
5.9 For further information on the use of the whistler test set, refer to Handbook 50, Section 2, Paragraph 5.10 and Handbook 100 TMO 4261A.

6. MARKER LOCKOUT AND CONTROL CIRCUITS

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

6.1 Using an ITE-9598 cord, supply 48V battery and ground to the A jack of the ITE-4033, Link Frame Test Set. Equip three ITE-9947 cords with alligator clips and make the following connections from the test set to the ST, CK and CK1 leads.

- (a) Test set connector A, leads 0 to 9 to the marker ST leads 0 to 9, as equipped, on the MISC terminal strip punchings 100 to 109, respectively.
- (b) Test set connector S1, leads 0 to 9, to the marker CK1 leads 0 to 9, as equipped, on the MISC terminal strip punchings 110 to 119, respectively.



→ FIG. 2 SETUP FOR MARKER LOCKOUT AND CONTROL CIRCUIT TEST

(c) Test set connector S1 leads 0 to 9, to the marker CK leads on make contact 2 of the MC (0-9) relays, as equipped, respectively.

6.2 Operate the test set AB, SB, S1B and A-0 keys. Observe that the MP-0 and MC-0 relays operate and that the test set S-0 and S1-0 lamps light. Operate in numerical order, keys A (1-9). Observe that relays MP (1-9), as equipped, operate in order but that no other S or S1 lamps light.

6.3 Release and reoperate the A-0 key. The S-0 and S1-0 lamps are extinguished, and the S-1 and S1-1 lamps light. Release and reoperate key A-1. Lamps S-1 and S1-1 are extinguished, and the S-2 and S1-2 lamps light. Continue in this manner until all A keys corresponding to equipped relays have been released and reoperated. When the last A key has been released and reoperated lamps S-0 and S1-0 should light again. Release the A (0-9) keys.

6.4 Operate the TR key and repeat the tests in Paragraphs 6.2 and 6.3. Restore TR key to normal.

6.5 Insulate 1 and 3 top contacts of any MP relay. Observe that the AL and TR1 to 6 relays, as equipped, operate, the CH lamp lights and the audible and visual alarms operate. Remove the insulation from the MP relay. Operate the AR key and check that the AL and TR- relays release, the CH lamp is extinguished and the alarms are retired.

6.6 Repeat the test in Paragraph 6.5, using 5 and 6 top contacts of the MP relay.

6.7 Operate the TR key and check that the TR- relays operate. Insulate 1 and 3 top contacts of any E relay. Observe that the AL relay operates, the CH lamp lights and the audible and visual alarms operate and the TR- relays release. Remove the insulation from the E relay. Operate the AR key and check that the AL relay releases, the TR- relays reoperate, the CH lamp is extinguished and the alarms are retired.

6.8 Repeat the test in Paragraph 6.7, using 5 and 6 top contacts of the E relay.

6.9 Restore the TR key to normal.

7. SECONDARY SWITCHES

7.1 Setup for Test (See Figure 6)

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

7.12 Insert the H plugs 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 switch half, left or right, under test. Start test at switch No. 9 and work down to switch No. 0.

NOTE: The 325A plugs of the ITE-9690 cords may be tagged and numbered as a convenient means of keeping connections straight when moving from one switch to another.

7.13 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 switch half, left or right, under test.

7.14 Connect the receptacle plug of an ITE-9947 cord to the S connector on the test set and connect leads 0 to 9 of this cord to the top winding terminals, either magnet, of relays LC (0-9) as equipped, respectively. Block operated relays RS or ES to provide operating ground for the secondary switch select magnets. Test at least one secondary switch with only the RS relay blocked operated and one with only the ES relay blocked operated in order to check that each relay supplied the select magnet operating ground properly. Check that, with both the RS and ES relays normal, the leads to the secondary switch select magnets are free from ground (punchings 30 to 39 on the LC terminal strip). 298A MB plugs should be inserted in the MB (0-9) jacks except the MB jack associated with the switch under test in order to reduce the wear on the contacts of the LC relays.

7.2 Test Operations

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

7.21 If lamps HO and SO are not lit, momentarily operate the RS key which will cause them to light.

7.22 Operate the XPT, PB9, SM and ST keys. The set automatically checks the 100 crosspoints of the half switch under test. When lamp EC lights the test is completed.

7.23 Lamps S, S1, R, R1, T and T1 light momentarily as each crosspoint is tested. The S (0-9) and H (0-9) light to indicate the operated select and hold magnet.

7.24 If the test set stops with the X lamp lit, a cross between conductors of the crosspoint under test is indicated. If the test set stops without the X lamp lit, a cross to ground or an open is indicated. Lamps S, Sl R, R1, T and T1 indicate where the cross or open is located. If the test stops with the lamp SMG lit, a falsely grounded or open LC relay operate lead is indicated.

7.25 Remove the MB plugs and block from the ES or RS relay.

8. LINKS AND PRIMARY SWITCHES

NOTE: The test of 100 circuit incoming link frames (SD-25302) should be performed as described in Paragraph 8.6. Trunk fuses should be in place before starting test.

8.1 Setup For Test

NOTE: Interference from test calls may be eliminated by blocking the incoming link frame MP relays normal.

8.101 Locate the ITE-4079, 160 Circuit Link Crosspoint Test Set, at the incoming link frame under test.

8.102 On the LC terminal strip of the frame under test obtain the following association: (See Par. 1.6)

<u>ITE-9947 Leads</u>	<u>LC T.S. Punchings</u>
A (0-9)	40-49

8.103 Using an ITE-9947 cord connect terminals 40-49 to the test set SM connector. These connections provide access to the select magnet windings of any primary switch when the corresponding LC relay is operated.

8.104 Using another ITE-9947 cord equipped with alligator clips, connect respectively the top windings of the frame LC relays to the test set SW connector.

8.105 Using an ITE-9639 cord equipped with an insulated alligator clip on the T ITE-2455 plug, connect the tip of the test set AA jack to punching 9 on the LC terminal strip. This connection supplies battery to the windings of the primary switch select magnets. Also connect the ring and sleeve of jack AA to terminals 38 and 39 of LC T.S. These connections will provide ground for operating the desired select magnets on the 8 and 9 secondary switches.

8.106 Using four ITE-9708 or ITE-9690 cords, make the following connections from the test set to secondary switches 0 and 1 (see Figure 3).

<u>Test Set Jack</u>	<u>Sec. Sw. - Any Vert.</u>
EA	8 left
EB	8 right
OA	9 left
OB	9 right

8.107 Supply 48V battery and ground to the test set A jack using cord ITE-9598.

8.108 After each complete cycle of test (EC lamp lit) the connections to terminals 38 and 39 of LC T.S. should be moved to the next two lower numbered terminals and the connections to the secondary switches should be moved to the next two lower numbered secondary switches. The last cycle, then, will be made with connections to terminals 0 and 1 and with the secondary switch connections to switches 0 and 1.

8.109 Block operated the B and C relays of each timing circuit associated with trunks appearing on the incoming link frame under test. These relays are located on the associated trunk and auxiliary trunk frames. These relays are blocked operated to prevent the trunk S relays, operating on potentials from the test set, from grounding the trunk sleeve leads.

8.110 Since different trunks may apply different potentials through various values of resistance to the primary switch tips and rings, the test set is arranged to pass conditions of ground on the tip and 48V battery on the ring through 200 ohms or more. This arrangement cares for the majority of trunks likely to be encountered, but any trunk applying other potentials or the same potentials through lower values of resistance must have the tip and ring insulated or opened in order not to be indicated as trouble. Before the start of the test, each trunk of the types listed below appearing on the frame under test should be made ready as indicated. These trunks may be located on the auxiliary or supplementary as well as the associated trunk frame.

<u>SD</u>	<u>Type of Trunk</u>	<u>Insulate F Relay</u>
<u>Inc. from Pan. Sdr. Tan., Man. Tan. or Toll</u>		
25259	Ind. and 2-Party	9T and 8B
25295	4-Party Semi-Sel.	2T and 9B
25305	4-Party Sel.	2T and 9B
25875	"	2T and 9B
<u>Inc. from Toll or Cent. A Swbd.</u>		
25314	Ind. and 2-Party	9T and 8B
25302	4-Party and Semi-Sel.	2T and 9B
25307	4-Party Sel.	2T and 9B
25304	Full Sel.	2T and 9B

<u>SD</u>	<u>Type of Trunk</u>	<u>Block Operated</u>
25255	No Test from KP A Switchboard	TR relay
25351	No Test from DS A Switchboard	SD relay
25420	No Test from Cent. A Switchboard	C relay

8.2 Test Procedure

8.21 Key Operations

8.211 ST Key: The ST key is operated to start the test. The test may be stopped at any time by restoring the ST to normal. The ST key should always be restored to normal when the test set has stopped because of trouble in order to

prevent the test from advancing if the trouble is momentarily cleared. The ST key is reoperated to continue the test. When the trouble is due to false continuity (FC lamp lit) it is not necessary to restore the ST key to normal since the test set automatically blocks in order to catch momentary troubles. In this case the test set must be restored to normal, as explained under operation of the RS key, before the test can be continued.

8.212 RS Key: The operation of the RS key causes the test circuit to restore to normal (N lamp lights).

8.213 REP Key: The operation of the REP key causes the test to be repeated indefinitely on the particular switch under test at the time. The REP key should be operated for at least one cycle of test on a switch after trouble has been cleared.

8.214 FRN Key: When the FRN key is held operated, the test circuit SW selector is caused to spin. When the ST key is normal, the selector will stop in its normal position so that when the ST key is reoperated, the test will be applied to primary switch 0.

8.215 STP-SW Key: Each operation of the STP-SW key steps the test circuit SW selector to its next position. It may be used to locate the test circuit for the test of a particular primary switch. The ST key should be normal when using the STP-SW key.

8.22 Lamp Indications

8.221 N Lamp: The N lamp lights when the SM selector is in the normal position. This indicates that the next test will begin on the first trunk level (switch level 2) of the primary switch under test.

8.222 EC Lamp: The EC lamp lit indicates that the test has progressed through all primary switches. The EC lamp is extinguished and the test set prepared for the next cycle of test by operating the RS and FRN keys.

8.223 OE Lamp: The OE lamp lit indicates that the test is made with the 0 level crosspoint closed on the odd verticals and the 1 level crosspoint on the even verticals. When the OE lamp is extinguished the 0 level crosspoints are closed on the even verticals and the 1 level crosspoints are closed on the odd verticals.

8.224 SW (0-9) Lamps: The SW (0-9) lamps indicate the primary switch under test. Access to each switch is obtained by operating the associated frame LC relay.

8.225 SM (0-9) Lamps: The SM (0-9) lamps indicate the trunk level of the switch under test. Only lamps SM (2-9) are used on the test of primary switches of 160 trunk incoming link frames.

8.226 CT Lamp: The CT lamp lit indicates that all test paths have been found continuous and that the tips and rings have been found free of ground and battery respectively.

8.227 FC Lamp: The FC lamp indicates false continuity.

8.228 Test Lamps: The test lamps are T, R, S, T1, R1 and S1. Each of these lamps is associated with one of the paths under test. When the OE lamp is not lit, the T, R and S lamps are associated with the 3, 4 and 5 crosspoints of the even verticals and the even trunk, and the T1, R1 and S1 lamps are associated with the 1, 2 and 3 crosspoints of the odd verticals and the odd trunk (see Figure 4). When the OE lamp is lit, the even and odd indications are reversed. These lamps may be used as an aid in locating trouble as shown in Table 1.

8.3 Test Paths

8.31 Operate the ST key. The test set proceeds to test the 0 primary switch 8L and 8R verticals and links using the crosspoints of the 0 level and the 9L and 9R verticals and links using the crosspoints of the 1 level. The heavy lines of Figure 4 indicate test paths. After the ninth level has been tested, the test set repeats the test using the 1 level crosspoints with the even verticals and the 0 level crosspoints with the odd verticals. When the ninth level has been tested under these conditions, the test set advances to test the corresponding verticals of the other primary switches.

TABLE 1

Trouble	Lamps							
	T	R	S	T1	R1	S1	CT	FC
Even crosspoint open								
Odd crosspoint open	X	X	X					
T open or grd		X	X	X	X	X		
R open or bat	X		X	X	X	X		
S open	X	X						
T1 open or grd	X	X	X		X	X		
R1 open or bat	X	X	X	X		X		
S1 open	X	X	X	X	X			
T bat or cross	X	X	X	X	X	X	X	X
R grd or cross		X	X	X	X	X	X	X
T1 bat or cross			X	X	X	X	X	X
R1 grd or cross			X		X	X	X	X
S grd	X	X	X					X
S1 grd				X	X	X	X	X
False continuity			ANY				X	X

8.32 As the test proceeds, the test set also makes a test for false continuity at the crosspoints normal and for crosses between adjacent horizontal switch levels. The test for these crosses is made to the level below the one under test. Figures 3, 4 and 5 have been added to facilitate testing; continuity paths during different portions of the test are shown. A circuit similar to Figure 2 (using the OS, OH, OA & OB relays) is set up to cut through the odd test path.

8.4 Primary Hold and Select Magnets

8.41 As the test advances check that the proper primary hold magnets operate on each switch. When the connections are on secondary switches 0 and 1 (see Figure 4, 5 or 6), the OL, 1L, OR and 1R primary hold magnets should be used; connections to secondary switches 2 and 3 cause primary hold magnets 2L, 3L, 2R and 3R to be used; etc. Note that no primary hold magnets other than those being used for test operate.

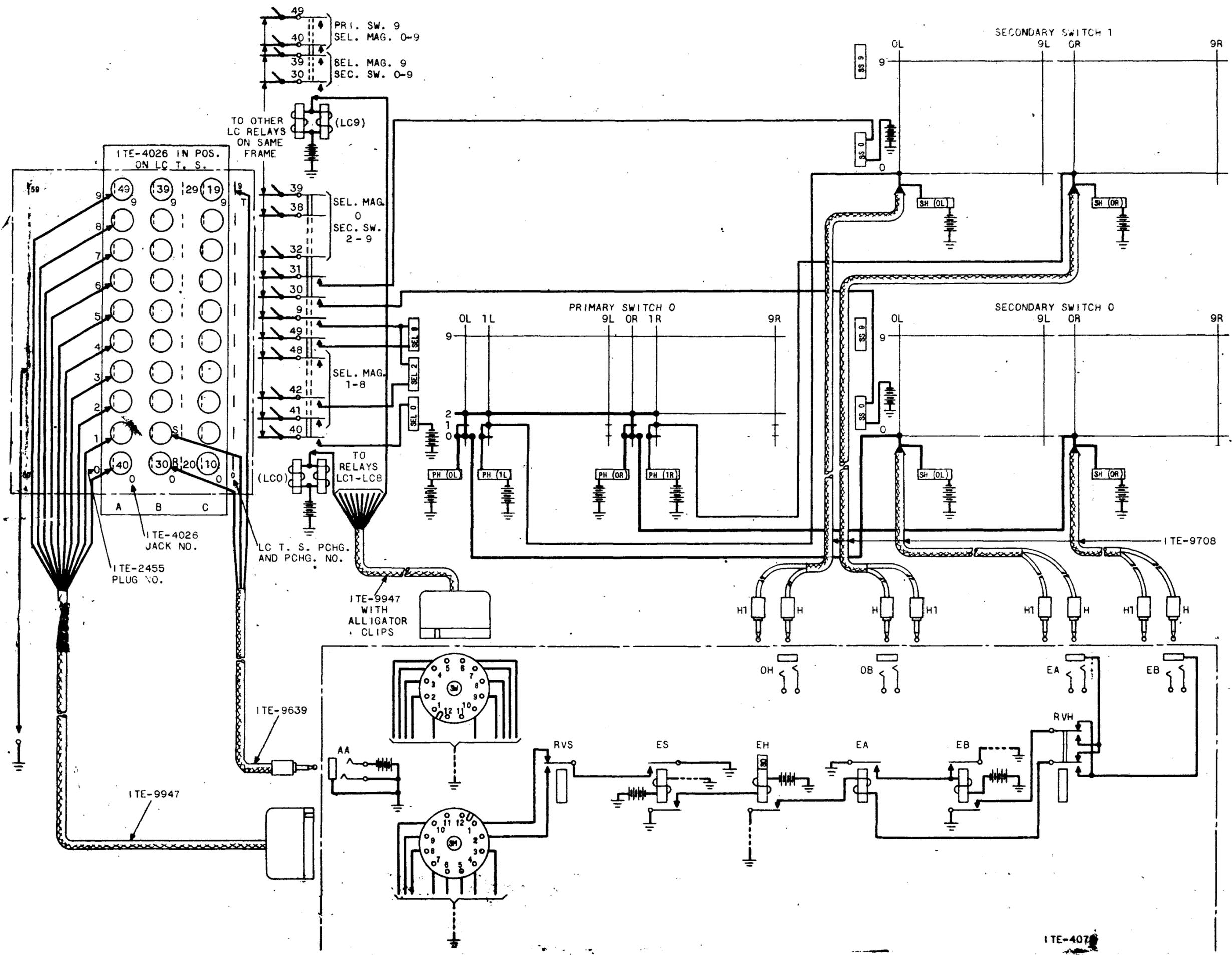
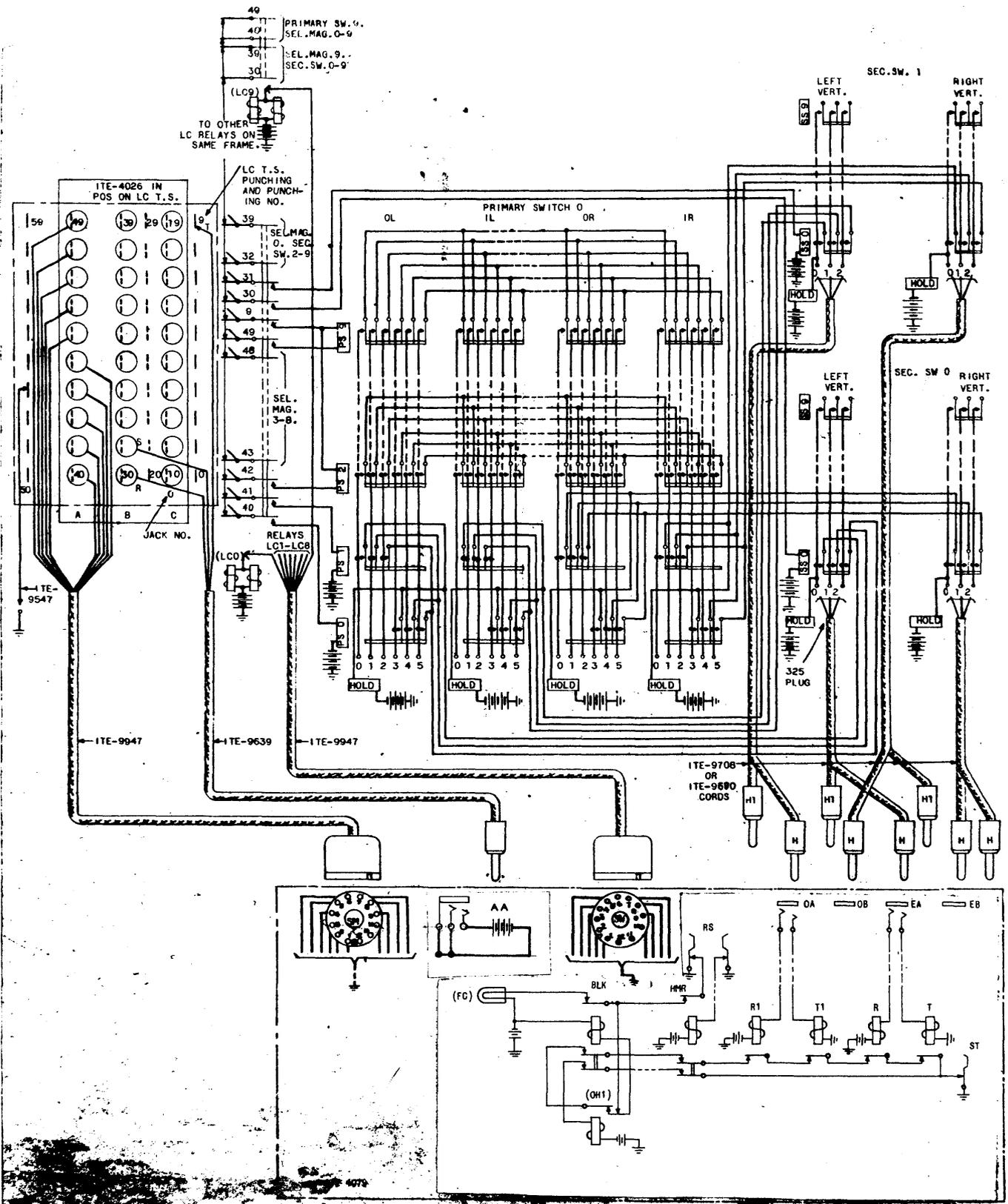
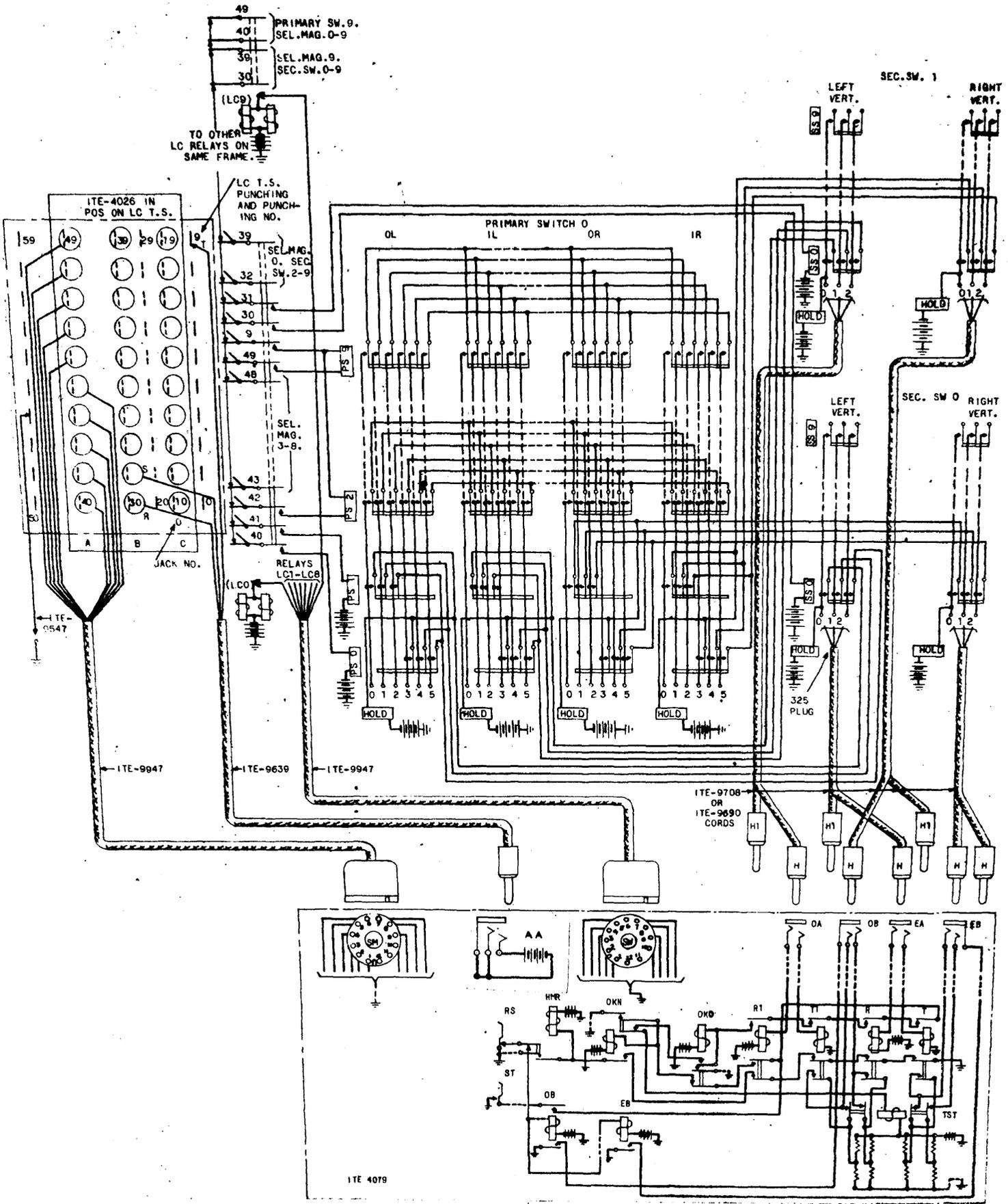


FIG. 3 EVEN TEST PATH AND SLEEVE CONTINUITY



→ FIG. 4 TEST PATH DURING TEST FOR FALSE CONTINUITY



→ FIG. 5 PATH WHILE TESTING FOR CROSSES, REVERSES AND SLEEVE FALSE GROUNDS

8.42 Observe that the select magnets on each primary switch are used for test in the proper order as indicated by the test set lamps SM (2-9). Also check that select magnets on primary switches other than the one under test as indicated by the SW (0-9) lamps do not operate.

8.43 Note that the primary switches are tested in proper order as indicated by the SW (0-9) lamps. Also observe that no select magnet operates on secondary switches other than those switches to which the EA, EB, OA and OB test set connections are made.

8.44 When primary switch 9 has been tested, the test set stops with the EC lamp lit. Operate the test set RS key and hold the FRN key operated until the EC lamp is extinguished. Move the connections as explained in Paragraph 7.108. Re-operate the ST key. The test will automatically test the crosspoints of the 2L, 2R, 3L and 3R verticals of all primary switches. Five setups are necessary to test all the crosspoints of the primary switches and they are as follows:

Sec. Sw.	Test Set	ITE-4026	Pri. Sw.	
Any Vert.	Jacks	T.S.	Jacks	Verts. Tested
8 left	EA			
8 right	EB	B (0)		8L,8R,9L,9R
9 left	OA	B (1)		
9 right	OB			
6 left	EA			
6 right	EB	B (2)		6L,6R,7L,7R
7 left	OA	B (3)		
7 right	OB			
4 left	EA			
4 right	EB	B (4)		4L,4R,5L,5R
5 left	OA	B (5)		
5 right	OB			
2 left	EA			
2 right	EB	B (6)		2L,2R,3L,3R
3 left	OA	B (7)		
3 right	OB			
0 left	EA			
0 right	EB	B (8)		0L,0R,1L,1R
1 left	OA	B (9)		
1 right	OB			

8.5 Test of Leads to the Trouble Indicator

8.51 The M (0-9), LC (0-9) and F leads to the terminating trouble indicator may be checked by observing the M (0-9), LC (0-9) and IF lamps on the trouble indicator as the ITE-4079 proceeds through a cycle of test of the ten primary switches. Supply battery for lighting the lamps by blocking the trouble indicator LP relay operated. Also on the trouble indicator block the GD relay normal to prevent possible interference. Insulate 1-2B of the IF relay on TTI frame.

8.52 Using an ITE-9547 cord equipped with alligator clips, supply ground to punching 53 of the incoming link MC terminal strip thus causing the TI relay to operate.

8.53 As a cycle of test progresses, observe at the trouble indicator that IF lamp is lit, the proper LC (0-9) lamp lights, as each incoming primary switch is tested, the MO and M1 lamps alternately flash, and the M (2-9) lamps flash as each level of each switch is tested in the order 2, 3, 2, 4, 3, 5, 4, 6, 5, 7, 6, 8, 7, 9, 8 and repeat.

8.54 After the proper lighting of the M and LC lamps has been observed for all ten switches, disconnect the ground connection from contact 53 of the MC terminal strip and remove the blocks from the trouble indicator LP and GD relays and insulator from 1-2B of IF relay on TTI frame, the blocks from the B and C relays of timing circuit and from the MP relays.

8.6 100 Circuit Incoming Link Frames (SD-25302)

8.61 The ITE-4009 test set should be used in testing the primary switch crosspoints in a manner similar to that followed for the secondary switch test outlined in Paragraph 8.

8.62 Setup ITE-4009 per Paragraphs 8.11-8.13 and insulate the tip and ring leads, at the F relay of the associated trunks.

8.63 Connect the receptical plug of an ITE-9947 to the S connector on the test set and connect leads 9 to 0 of this cord to the top winding terminals, either magnet, of relays LC (0-9) respectively. Using an ITE-9639 cord equipped with insulated alligator clips connect the sleeve to punching 40 of the LC T.S. to provide operating ground for the select magnets and the tip to punching 7 of the LC T.S. to provide battery for operating the select magnets. Insert the 110 plug into a convenient A jack.

8.64 Test leads to TTI per Paragraph 7.5 except that in 7.53 the M (0-9) lamps will flash in order as each level of each switch is tested.

8.65 Perform test operations per Paragraph 8.2. The test should then be repeated using punchings 41 to 49 of the LC T.S.

8.66 Remove the insulation from the associated trunk F relays.

9. PRIMARY HOLD MAGNETS

9.1 Setup for Test (See Figure 7)

9.11 Connect 48 volt battery and ground to the A jack of ITE-4033, Link Frame Test Set using an ITE-9598 cord.

9.12 On terminal strip MC obtain the following association: (See Par. 1.6)

ITE-9947 Leads	MC T.S.	
	Pchg.	Leads
S 0-9	20-29	OL-9L
A 0-9	10-19	OR-9R

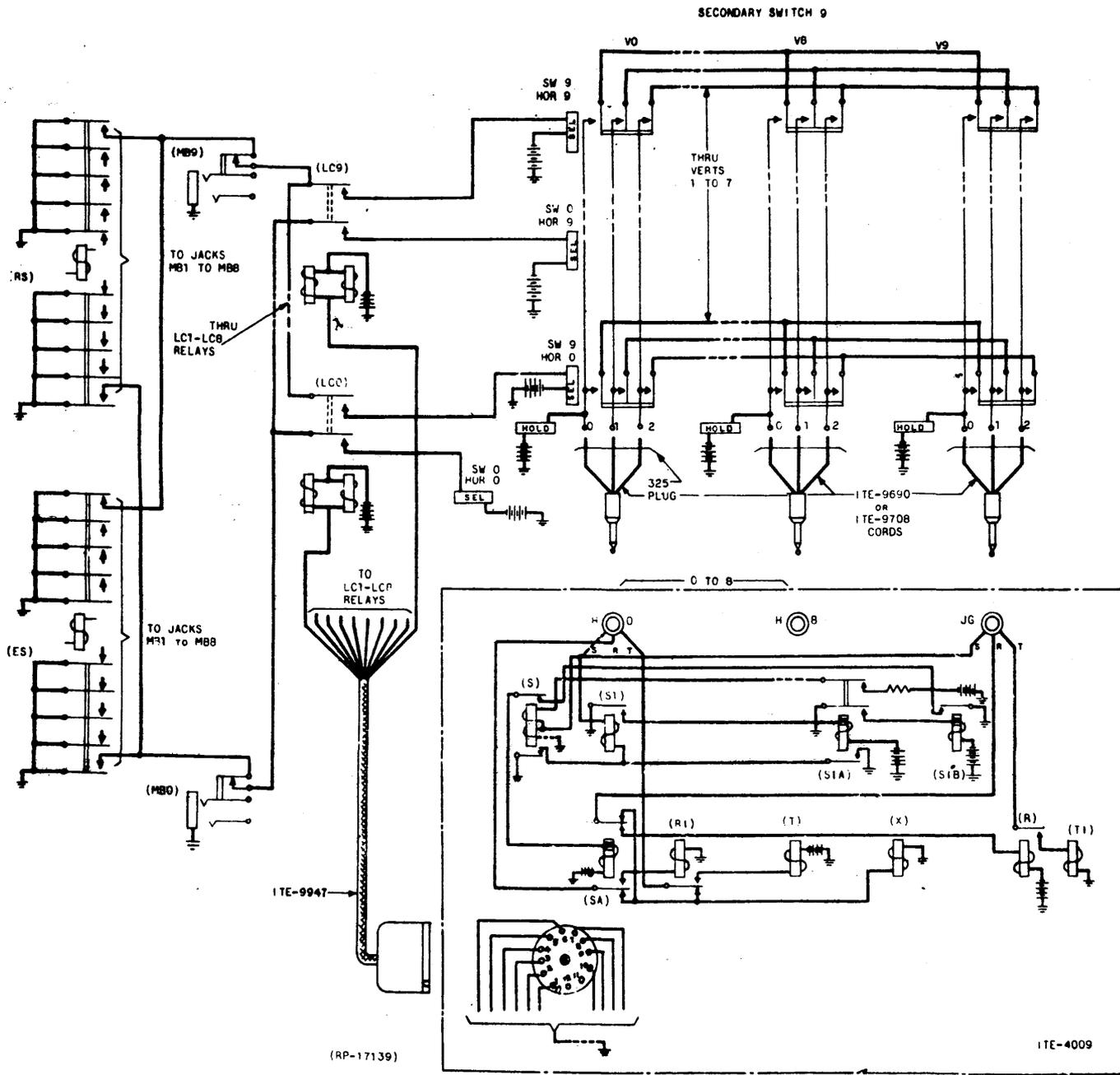
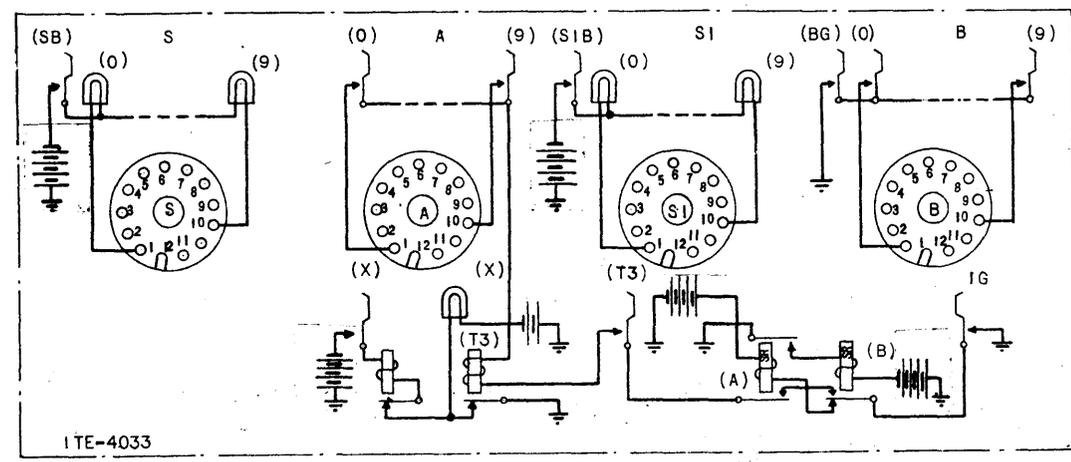
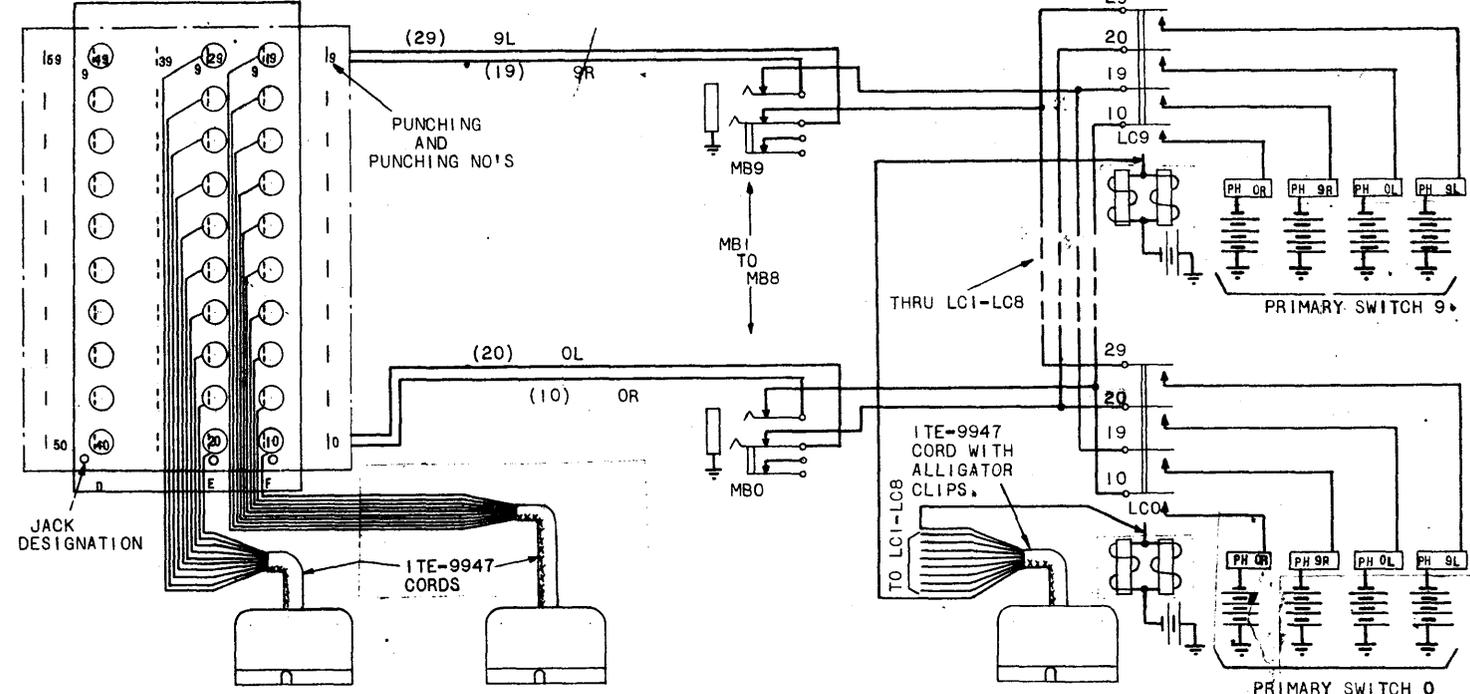


FIG. 6 SETUP FOR TESTING SECONDARY SWITCHES

ITE-4026 IN POSITION ON MC T.S.



→ FIG. 7 SETUP FOR TESTING PRIMARY HOLD MAGNETS

9.13 Connect the receptacle plug of an ITE-9947 cord to the A connector on the set. Connect plugs 0-9 of this cord → to terminals 10-19 on MC T.S.

9.14 Connect the receptacle plug of an ITE-9947 cord to the S connector on the set. Connect plugs 0-9 of this cord → to terminals 20-29 on MC T.S.

9.15 Connect the receptacle plug of an ITE-9947 cord to the B connector on the set. Connect leads 0-9 on this cord to the top winding terminal, either magnet, of relays (LC) 0-9 respectively.

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

9.2 Test Operations

9.21 Operate keys IG, T3, BG and X and leave them operated. Key IG operated starts the interrupter circuit of the test set.

9.22 Operate key B0 to operate relay LC-0. Operate key A0 and observe that the primary hold magnet, PH-OR, switch 0, operates and releases from the interrupted ground. Release key A0. If this magnet → should be falsely grounded, it will not release and if it should be crossed with another magnet the T3 relay in the test set will operate and the X lamp will flash. In order to detect that the T3 relay will operate if two magnets are crossed, momentarily cross two magnets by operating keys A0 and A1 at the same time. Note that the X lamp flashes and buzzer operates. Release keys A0 and A1.

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

Keys	PH Magnet	Pri.Sw.
A0-A9	OR-9R	0

9.24 When the ten hold magnets on the right half of primary 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 A0 to A9, in turn.

9.25 Continuing as described in the preceding paragraphs check the hold magnets on the right half of all primary switches.

9.26 When the magnets on the right half of the frame have been checked, interchange the receptacle plugs connected to connectors A and S and check the PH magnets on the left half of the frame in the same manner as for the right half.

9.27 When all PH magnets on the frame have been checked remove the receptacle plug from connector A and connect it to connector S1. Jacks (E)0-9 and (F) 0-9 are now connected to connectors

S1 and S respectively. Operate keys SB and S1B and insert a 298A MB plug into jacks (MB) 0-9, one at a time, and observe that S and S1, lamps light as indicated below while the plug is in the jack.

MB Plug in Jack	S and S1 Lamps Lighted
MB-0	S0 and S10
MB-1	S1 and S11
MB-2	S2 and S12
MB-3	S3 and S13
MB-4	S4 and S14
MB-5	S5 and S15
MB-6	S6 and S16
MB-7	S7 and S17
MB-8	S8 and S18
MB-9	S9 and S19

9.28 Remove MB plug and disconnect test set.

10. T. R AND S LEADS BETWEEN MATE FRAMES

NOTE: This test is made only when the frames are equipped for mate operation.

10.1 Setup for Test

NOTE: The circuit in the ITE-4009 test set between the HO and JG jacks is the same as the one shown in Figure 6 (Setup for Testing Secondary Switches).

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

10.12 Insert the H plug of an ITE-9690 cord into jack JG. Insert the H plug of another ITE-9690 cord into jack HO.

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

10.2 Test Operations

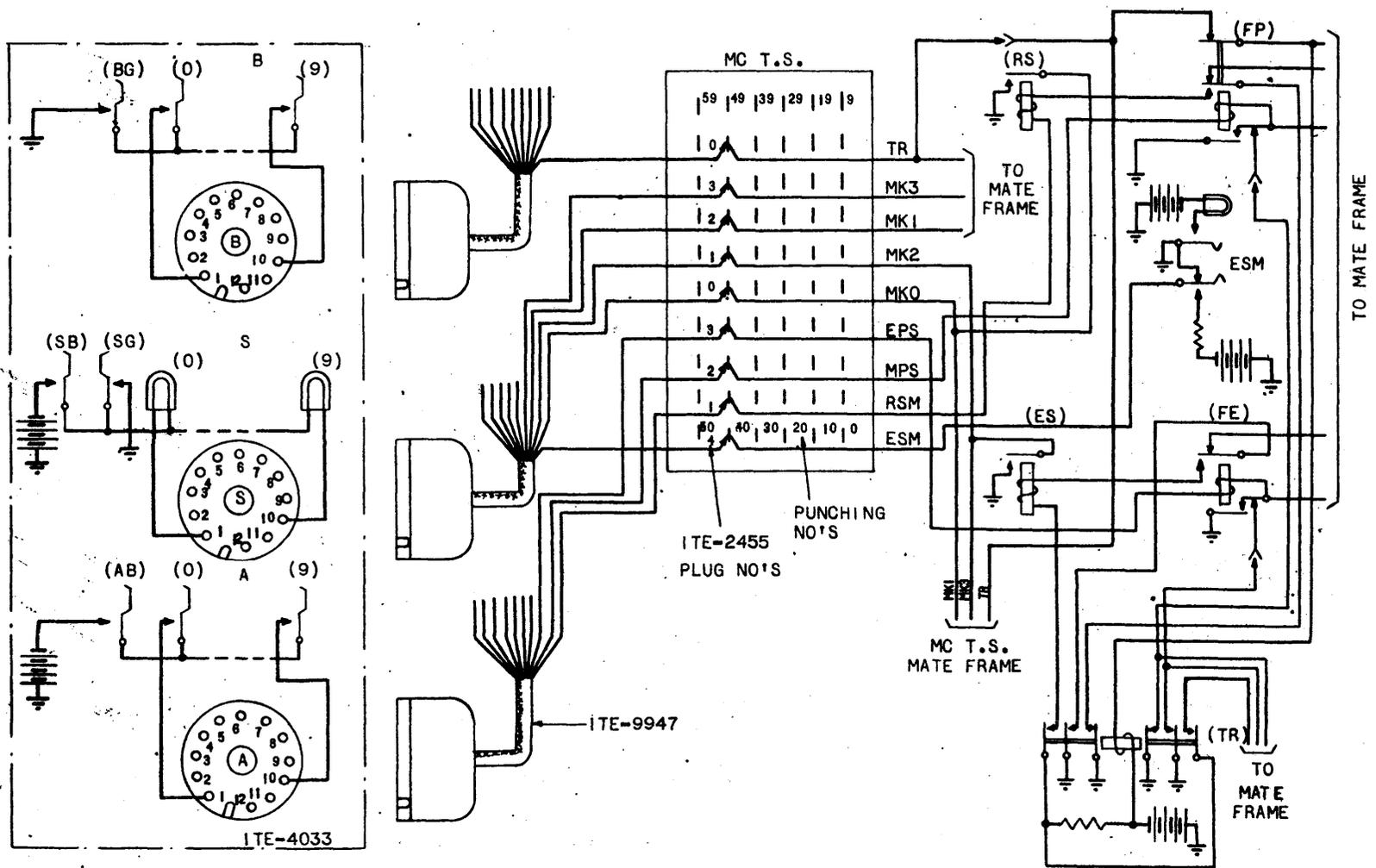
10.21 Operate and leave operated keys BSM, REP, BZ and ST.

10.22 Place the 325A plug ends of the two cords against associated verticals, secondary switches, on the mate frames under test. If the sleeve, ring and tip between the two verticals are continuous and free from crosses, the buzzer operates. Move the plugs to the next two associated verticals on the frames under test. Continue in this manner checking the leads between all associated verticals. Similar verticals on mate frames are associated, as for example: verticals L0, switches 0, mate frames are associated; verticals L, switches 0, mate frames are associated, etc.

11. FRAME PREFERENCE AND LOCKOUT CIRCUIT

11.1 Non-Mate Frame Operation

Momentarily connect battery to punching 42, terminal strip for MC relays, and check that relay RS operates connecting ground to punching 44 while battery is connected to punching 42. Repeat this test by connecting battery to punching 43 and checking that relay ES operates connecting ground to punching 45 while the battery is applied.



→ FIG. 8 SETUP FOR TESTING FRAME PREFERENCE AND LOCKOUT CIRCUIT

11.2 Mate Frame Operation

11.21 Setup for Test (See Figure 8)

11.211 Connect 48V battery and ground to the A jack of ITE-4033, Link Frame Test Set, using cord ITE-9598.

11.212 Connect the Link Frame Test Set, ITE-4033, to the MC terminal strip of the even mate frame using three ITE-9947 cords equipped with insulated alligator clips to obtain the following association.

MC T.S.		ITE-4033	
Pchg.	Lead	Conn.	Lead
40	ESM	S	4
41	RSM	A	1
42	MPS	A	2
43	EPS	A	3
44	MKO	S	0
45	MK2	S	1
46	MK1	S	2
47	MK3	S	3
48	TR	B	0

11.213 Connect 48V battery and ground to another ITE-4033 Link Frame Test Set and make connections to this set and the odd mate frame exactly as described in the preceding Paragraphs 11.211 and 11.212. As a means of identification the ITE-4033 test set connected to the even mate frame will be referred to as the even test set and the ITE-4033 test set connected to the odd mate frame will be referred to as the odd test set.

11.22 Test Operations

11.221 Operate keys AB, BG and SB on both ITE-4033 test sets. The S4 lamp on the test set lights.

11.222 Test of ESM Key

(a) Operate the ESM key on each of the two frames and observe that the S4 lamp is extinguished on the associated ITE-4033 and the ESM lamp on the frame is lighted.

(b) Release the ESM keys. The ESM lamps are extinguished and the S4 lamps light.

(c) Release the SB key and operate the SG key on the ITE-4033 test sets. The S4 lamps are extinguished.

(d) Operate the ESM keys on each of the two frames and observe that the associated S4 and ESM lamps light.

(e) Release the ESM keys. The S4 and ESM lamps are extinguished.

(f) Release the SG key and operate the SB key on the ITE-4033 test sets. Remove the connection to punching 40 MC T.S., lead ESM.

11.223 Even Frame - Regular Lockout

(a) Operate key A2 on even test set. Relay FP of even frame operates.

(b) Operate key A1 on even test set. Relay RS of even frame operates, lamp S0 of even set and lamp S2 of odd set light.

(c) Operate key A2 on odd test set. Relay FP of odd frame operates.

(d) Operate key A1 on odd test set. Relay RS of odd frame should not operate and no additional S lamps should light.

(e) Operate keys A3 and B0 on both test sets. No results.

(f) Release keys (A) 1-3 and B0 on both sets. All relays should release and the lamps on both sets should be extinguished.

11.224 Even - Frame - Emergency Lockout

(a) Operate key B0 on even set. Relay TR operates.

(b) Operate key A3 on even set. Relays FE and ES of even frame operate, lamp S1 of even set and lamp S3 of odd set light.

(c) Operate key A3 on odd set. Relay FE of odd frame operates. Relay ES of odd frame should not operate and no additional S lamps should light.

(d) Operate keys A1 and A2 on both sets. No results.

(e) Release keys (A) 1-3 on both sets and key B0 on the even set. All relays should release and the lamps on both sets should be extinguished.

11.225 Odd Frame - Regular Lockout

(a) Operate key A2 on odd set. Relay FP of odd frame operates.

(b) Operate key A1 on odd set. Relay RS of odd frame operates, lamp S0 on odd set and lamp S2 on even set light.

(c) Operate key A2 on even set. Relay FP of even frame should not operate.

(d) Operate key A1 and B0 on even set. No results.

(e) Release keys (A) 1-2 on both sets and key B0 of even set. All relays should release and the lamps on both sets should be extinguished.

11.226 Odd Frame - Emergency Lockout

(a) Operate key B0 on odd set. Relay TR operates.

(b) Operate key A3 on odd set. Relays FE and ES of odd frame operate, lamp S1 of odd set and lamp S3 of even set light.

(c) Operate key A3 on even set.
Relay FE of even frame
should not operate.

(d) Release key A3 on both sets
and key B0 on odd set. All
relays should release and the lamps on
both sets should be extinguished.

11.227 Odd Frame Not Equipped -
Regular Lockout

(a) Operate the A2 key and note
that the FP relay operates.

(b) Operate the A1 key and note
that the RS relay operates
and that the S0 lamp lights.

(c) Operate the B0 and A3 keys.
No relays should operate and
no lamps should light.

(d) Restore the A (1-3) and B0
keys to normal. All relays
should release and lamps on the test set
should be extinguished.

11.228 Odd Frame Not Equipped -
Emergency Lockout

(a) Operate key B0 on the test
set. Relay TR operates.

(b) Operate the A3 key and note
that the FE and ES relays
operate and the S1 lamp lights.

(c) Operate the A2 and A1 keys.
No relays operate and no
lamps light.

(d) Restore the A (1-3) and B0
keys to normal. All relays
should release and lamps on the test set
should be extinguished.

12. CROSS-CONNECTIONS

12.1 "CL" to "FS" or "MAN" or "TOL" and
"PT" to "IP" or "IT" or "IPT"
Cross-Connections: Select an assigned line
number associated with the trunks under
test. At the block relay frame, cross the
RF terminal of this line with the RF ter-
minal of any other line in the same twenty

→ Arrowed lines indicate new
or changed information.

block. Use the terminating equipment test
set ITE-4010 to start a test call to the
selected line number from one trunk in each
trunk sub-group or one trunk associated
with each primary switch horizontal level,
as required, for 100 or 160 trunk incoming
link frames, respectively. The crossed RF
terminals prevent completion of the test
calls and produce a trouble indicator
record. Observe that trouble indicator
(Class FS-MAN-TOL) and Office (IP-IT-IPT)
lamps, one of each, light to agree with
the incoming link CL to FS or MAN or TOL
and PT to IP or IT or IPT cross-connections
respectively, as specified.

NOTE: This test should be performed
in conjunction with the incoming
trunk routine tests described in
Section 203 of this handbook.

12.2 Remove the cross from the RF
terminals.

13. TRAFFIC REGISTERS

13.1 Peg Count: Operate the BAT key at
the traffic register rack. Momen-
tarily connect ground to punching 50 of the
terminal strip for MC relay, and observe
that the peg count register (PC) associated
with the incoming link frame under test
operated.

13.2 Overflow Register: Repeat operation
covered in Paragraph 13.1 using
terminal #49. Observe that overflow regis-
ter associated with frame under test oper-
ates. Restore the BAT key to normal.

14. MISCELLANEOUS CIRCUITS

14.1 Check miscellaneous circuits not
checked on other tests as follows:

(1) Test battery supply.

(2) FA and 20A fuse alarm - check
that the fuse alarm is not
stopped when the FA or 20A lamp is burned
out or removed.

NOTE: The test of the remove
control jack (F) is covered
on the terminating trouble in-
dicator test method.

R. E. RAHMES

Engineer of Installation

Reason for Reissue:
To revise Marker Multiple Test.

Replaces Section 211 dated 7-19-56.