"TOUCH-TONE" CALLING RECEIVER SD-67027-01 OR SD-98148-01 SOLID STATE CONVERTER SD-66887-01 AND ROTARY DIAL REPEATING AND INTERFACE CIRCUIT SD-66886-01 OPERATION TESTS USING SOLID STATE CONVERTER AND RECEIVER TEST SET CIRCUIT SD-66890-01 (J58847M) STEP-BY-STEP PBX SYSTEMS

1. GENERAL

1.01 This section describes a method of testing the above mentioned TOUCH-TONE receivers and associated circuits consisting of the solid state converter, rotary dial repeating and interface circuit, and trunk finder circuit SD-65906-01. The associated circuits are tested with the receivers. A separate test of each type receiver is described. When receiver SD-98148-01 is used, the applique circuit SD-66888-01 is tested as a functional part of the receiver.

1.02 The tests covered are:

A. TOUCH-TONE Calling Test: This test checks the ability of the TOUCH-TONE calling receiver, solid state converter, trunk finder, and the rotary dial repeating and interface circuits to receive, store, and convert TOUCH-TONE frequencies into dc pulses which are acceptable by step-by-step PBX equipment.

B. Rotary Dial Test Call: This test checks the ability of the interface circuit to repeat the first digit from a rotary type dial and to release upon outpulsing of the first digit.

C. Pretranslation Test: This test checks the ability of the solid state converter circuit to pretranslate certain dial codes and to release immediately after the last digit of the pretranslated dial code is outpulsed.

D. Time-out Test: This test checks the ability of the solid state converter to time out on codes which are not pretranslated and to release the solid state converter at a specified time after the last digit is outpulsed.

E. Percent Break Test: This test checks the percent break-to-make ratio of the PLS relay in the solid state converter circuit.

F. Receiving Circuit SD-67027-01: This test checks the ability of the receiving circuit to receive signals from a TOUCH-TONE telephone set and to translate the 4 by 3 TOUCH-TONE code into a 1 out of 10 code suitable for registration by the solid state converter.

G. Receiving Circuit SD-98148-01: This test checks the ability of the receiving circuit to receive signals from a TOUCH-TONE telephone set and to convert these signals into dc outputs suitable for translation into a 1 out of 10 code by the receiver applique circuit.

1.03 *Lettered Steps:* A letter a, b, c, etc, added to a step number in Part 4 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

2.01 The apparatus required for each test is shown in Table A. The details of each item are covered in the paragraph indicated by the number in parentheses.

TABLE A

APPARATUS	TESTS A	B	C	D	E	F	G
KS-3008 Stopwatch or equivalent	–	–	–	1	–	–	–
Pulse Repeating Test Set J34720A (SD-31667-01)	–	–	–	–	1	–	–
Solid State Converter and Receiver Test Set Circuit J58847M (SD-66890-01)	1	1	1	1	1	1	1
KS-14510 Volt-ohmmeter	–	–	–	–	–	–	1
*21-lead connecting cable (ED-1E021-01)	1	1	1	1	1	1	1
*P3E Testing Cord (2.02)	3	3	3	3	5	–	3
*P3H Testing Cord (2.03)	1	1	1	1	1	–	1
*W2M Testing Cord (2.04)	–	–	–	–	–	1	–
*53A Head Telephone Set	1	1	1	1	–	1	1
KS-16887-L1 (wedge blocking) Tool	–	–	–	–	–	–	2
508 (armature blocking) Tool	1	1	1	1	1	1	1

*Supplied with Solid State Converter and Receiver Test Set J58847M (SD-66890-01)

2.02 Testing cord, P3E, 6 feet long, equipped with two 310 plugs (3P7A cord).

2.03 Testing cord, P3H, 10 feet long, equipped with 310 plug and 240A plug (3P2C cord).

2.04 Testing cord, W2M, 9 feet long, equipped with 310 plug and one white and one red connecting clip (2W12A cord).

3. PREPARATION

STEP	ACTION	VERIFICATION
All Tests		
1	At solid state converter and receiver test set — Restore all keys to normal.	
2	At associated trunk finder for circuit to be tested — Operate MB key.	
3	At common group and subgroup circuit — Block nonoperated OB relay.	

4. METHOD

STEP	ACTION	VERIFICATION
	A. TOUCH-TONE Calling Test	
4	Establish connections as shown in Figure 1.	
5a	If BY lamp is lighted at test set — Wait until BY lamp is extinguished before continuing.	
6	Operate TT DL key.	
7	Operate CONVER TST key.	
8	Operate DPI key.	
9	Operate and hold nonlocking TF key.	At trunk finder — Vertical and rotary stepping initiated.

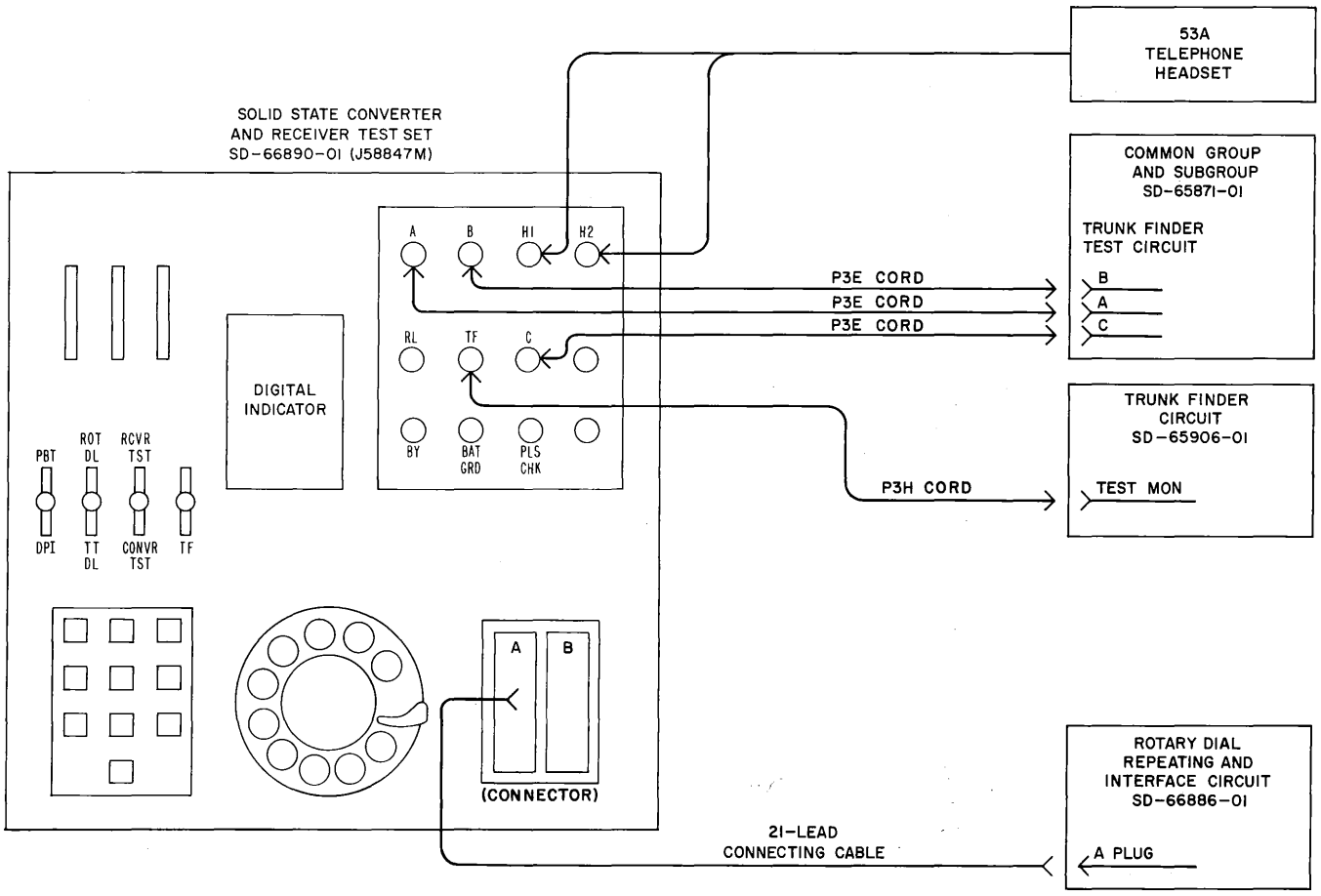


Fig. 1 — Tests A, B, C, D, and G Connections

STEP	ACTION	VERIFICATION
10	When rotary stepping is completed — Release TF key.	
11b	If trunk finder released and test set RL lamp momentarily lighted in Step 9 — Repeat Steps 9 and 10.	
12	Starting with a digit that is not pretranslated — TOUCH-TONE dial all digits (0-9). *Note:* The receiver-converter generally has 0 and 9 pretranslated; however, an installation may have other digits pretranslated. If the first TOUCH-TONE dialed digit is a pretranslated digit, the receiver-converter will disconnect necessitating repeating Steps 9 and 10.	At test set — TOUCH-TONE signals heard. TOUCH-TONE dialed digits momentarily displayed on digital indicator.
13	Restore all keys to normal.	
14c	If no other tests are to be performed — Remove connections made in Step 4. At common group and subgroup circuit — Remove blocking tool from OB relay. At associated trunk finder — Restore MB key.	

B. Rotary Dial Test Call

4	Establish connections as shown in Figure 1.	
5a	If BY lamp is lighted at test set — Wait until BY lamp is extinguished before continuing.	
6	Operate ROT DL key.	
7	Operate CONVER TST key.	
8	At test set — Operate DPI key.	
9	Operate and hold nonlocking TF key.	At trunk finder — Vertical and rotary stepping initiated.
10	When rotary stepping is completed — Release TF key.	

STEP	ACTION	VERIFICATION
11b	If trunk finder released and test set RL lamp momentarily lighted in Step 9 — Repeat Steps 9 and 10.	
12	Using rotary dial, dial any one of ten digits (0-9). Repeat Steps 9 through 11b for each digit dialed.	At test set — Dialed digit momentarily displayed on digital indicator. RL lamp momentarily lighted.
13	Restore all keys to normal.	
14c	If no other tests are to be performed — Remove connections made in Step 4. At common group and subgroup circuit — Remove blocking tool from OB relay. At associated trunk finder — Restore MB key.	

C. Pretranslation Test

4	Establish connections as shown in Figure 1.	
5a	If BY lamp is lighted at test set — Wait until BY lamp is extinguished before continuing.	
6	Operate TT DL key.	
7	Operate CONVER TST key.	
8	At test set — Operate DPI key.	
9	Operate and hold nonlocking TF key.	At trunk finder — Vertical and rotary stepping initiated.
10	When rotary stepping is completed — Release TF key.	
11b	If trunk finder released and test set RL lamp momentarily lighted in Step 9 — Repeat Steps 9 and 10.	
12	TOUCH-TONE dial digit or digits (0-9) for which pretranslation has been provided.	At test set — RL lamp momentarily lighted. TOUCH-TONE signal heard. TOUCH-TONE dialed digit momentarily displayed on digital indicator.
13	Restore all keys to normal.	

STEP	ACTION	VERIFICATION
14c	If no other tests are to be performed — Remove connections made in Step 4. At common group and subgroup circuit — Remove blocking tool from OB relay. At associated trunk finder — Restore MB key.	
	D. Time-out Test	
4	Establish connections as shown in Figure 1.	
5a	If BY lamp is lighted at test set — Wait until BY lamp is extinguished before continuing.	
6	Operate TT DL key.	
7	Operate CONVER TST key.	
8	Operate DPI key.	
9	Operate and hold nonlocking TF key.	At trunk finder — Vertical and rotary stepping initiated.
10	When rotary stepping is completed — Release TF key.	
11b	If trunk finder released and test set RL lamp momentarily lighted in Step 9 — Repeat Steps 9 and 10.	
12	TOUCH-TONE dial any digit not associated with pretranslation. When digit is displayed — Start timing.	TOUCH-TONE signal heard. TOUCH-TONE dialed digit momentarily displayed on digital indicator. After approximately 10 seconds — RL lamp momentarily lighted.
13	Restore all keys to normal.	
14	Remove connections made in Step 4.	
15c	If no other tests are to be performed — At common group and subgroup circuit — Remove blocking tool from OB relay. At associated trunk finder — Restore MB key.	

STEP	ACTION	VERIFICATION

E. Percent Break Test

4 At pulse repeating test set —
Using P3E cord, insert 310 plug on one end of cord into B jack and shunt tip to ring on 310 plug on other end of cord.

5 ***Caution: To avoid possible grounding of —48 volt battery, connect P3E cord to pulse repeating test set first.***

Establish connection designated (1) as shown in Figure 2.

6 Establish connections designated (2) as shown in Figure 2.

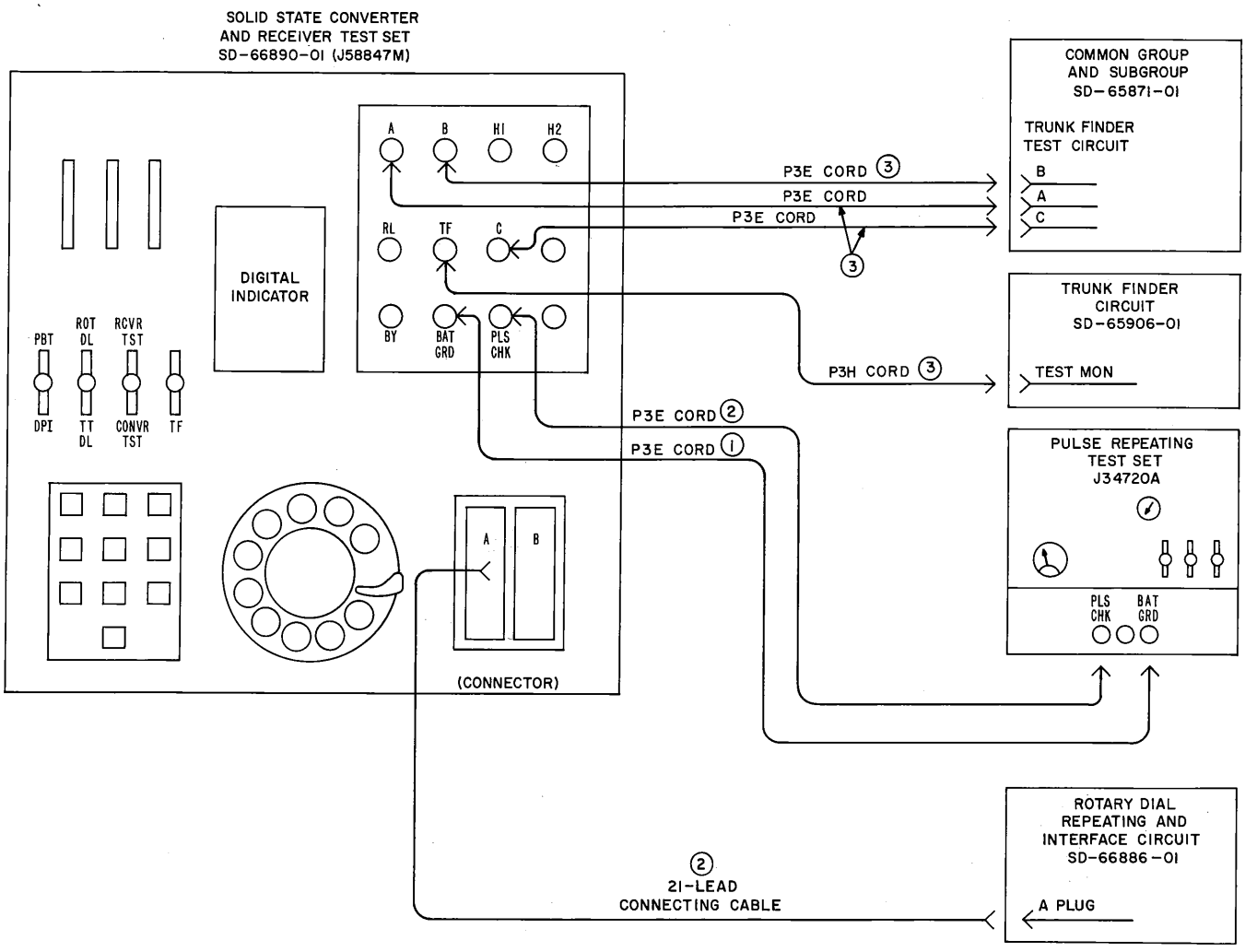
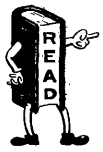


Fig. 2 — Test E Connections

STEP	ACTION	VERIFICATION
7	At pulse repeating test set — Operate SL key.	
8	Adjust R1 potentiometer to give full scale deflection of the meter to the left or zero end.	At pulse repeating test set — Percent break meter reads zero.
9	Restore SL key to normal.	
10	Remove 310 plug on P3E cord from B jack on pulse repeating test set and remove shunt from tip to ring on 310 plug on other end of cord.	
11	Establish connections designated (3) as shown in Figure 2.	
12a	At solid state converter and receiver test set — If BY lamp is lighted — Wait until BY lamp is extinguished before continuing.	
13	Operate TT DL key.	
14	Operate CONVER TST key.	
15	At solid state converter and receiver test set — Operate PBT key.	
16	Operate and hold nonlocking TF key.	At trunk finder — Vertical and rotary stepping initiated.
17	When rotary stepping is completed — Release TF key.	
18b	If trunk finder released and solid state converter and receiver test set RL lamp momentarily lighted in Step 16 — Repeat Steps 16 and 17.	
19	TOUCH-TONE dial a series of high numbered digits rapidly approximately 10 times. *Note:* TOUCH-TONE digits selected should not be associated with pretranslation.	At pulse repeating test set — Meter reads 57 to 62 percent.
	 ***This test is a check of the percent break ratio of the PLS relay and should not be used for adjustment purposes.***	
20	Restore all keys to normal.	

STEP	ACTION	VERIFICATION
21	***Caution: To avoid possible grounding of —48 volt battery, remove P3E battery cord from solid state converter and receiver test set circuit first.*** Remove connections made in Steps 5, 6, and 11.	
22c	If no other tests are to be performed — At common group and subgroup circuit — Remove blocking tool from OB relay. At associated trunk finder — Restore MB key.	

F. Receiving Circuit SD-67027-01

4	***Use caution when removing connector from plug. The 15-watt R28 resistor adjacent to the plug may be hot.*** At receiver circuit — Remove N connector.	
5	Establish connections designated (1) as shown in Figure 3.	

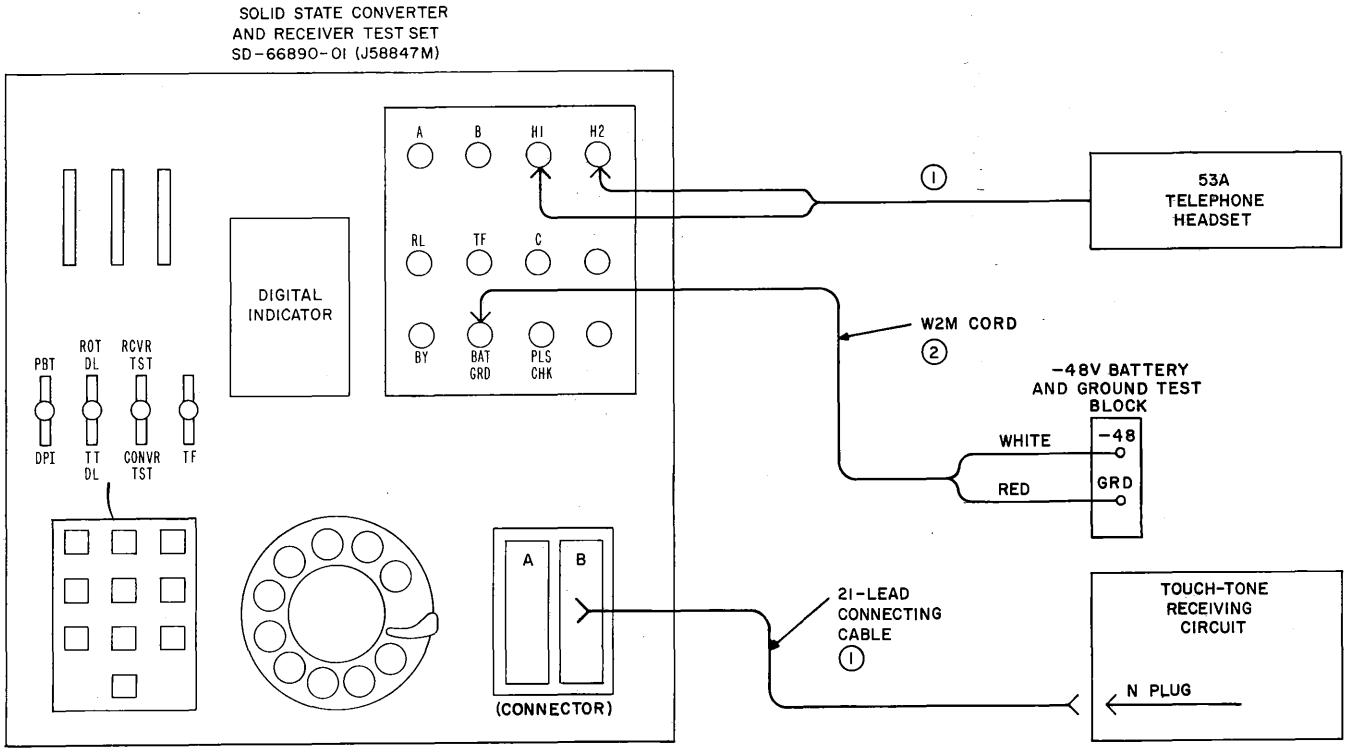


Fig. 3 — Test F Connections

STEP	ACTION	VERIFICATION
6	***Caution: To avoid possible grounding of —48 volt battery, connect W2M cord to test set first.*** Establish connection designated (2) as shown in Figure 3.	
7	At test set — Operate RCVR TST key.	
8	Operate TT DL key.	
9	TOUCH-TONE dial all digits (0-9).	At test set — TOUCH-TONE signals heard. TOUCH-TONE dialed digits displayed on digital indicator.
10	Restore all keys to normal.	
11	***Caution: To avoid possible grounding of —48 volt battery, remove W2M cord from battery and ground source first.*** Remove connection designated (2) in Figure 3.	
12	***Use caution when removing connector from plug. The 15-watt R28 resistor adjacent to the plug may be hot.*** Remove connections designated (1) in Figure 3.	
13	At common group and subgroup circuit — Remove blocking tool from OB relay. At associated trunk finder — Restore MB key.	

G. Receiving Circuit SD-98148-01

4	Establish connections as shown in Figure 1.	
5a	If BY lamp is lighted at test set — Wait until BY lamp is extinguished before continuing.	
6	At solid state converter circuit — Block nonoperated DO relay.	
7	At test set — Operate TT DL key.	
8	Operate CONVER TST key.	
9	Operate and hold nonlocking TF key.	At trunk finder — Vertical and rotary stepping initiated.
10	When rotary stepping is completed — Release TF key.	

STEP	ACTION	VERIFICATION
11b	If trunk finder released and test set RL lamp momentarily lighted in Step 9 — Repeat Steps 9 and 10.	
12	TOUCH-TONE dial all digits (0-9).	At test set — TOUCH-TONE signals heard. At applique circuit SD-66888-01 — L and H relays operated in accordance with Table B.
13c	If L and H relays did not operate in Step 12 in accordance with Table B — At receiving circuit — Connect positive lead of volt-ohmmeter to GND test point.	
14c	Connect negative meter lead to test points indicated in Table C.	At volt-ohmmeter — Voltages shall read in accordance with Table C.

TABLE B

DIGIT DIALED	RELAYS OPERATED	POSSIBLE CIRCUIT PACK IN TROUBLE
1	L1, H1	B3 or B5
2	L1, H2	B3 or B5
3	L1, H3	B3, B6, or B7
4	L2, H1	B5
5	L2, H2	B3 or B5
6	L2, H3	B6 or B7
7	L3, H1	
8	L3, H2	B4 or B5
9	L3, H3	B4, B6, or B7
0	L4, H2	B4 or B5

TABLE C

TEST POINT	VOLTAGES		POSSIBLE CIRCUIT PACK IN TROUBLE
	MAX	MIN	
—48	50	45	—
STR	50	45	B8
—22	24.5	19.5	B8 or CR1
—30	33	27	B8
H3	50	45	B7 or B9
H2	50	45	B6, B7, or B9
H1	50	45	B5 or B9
L4	50	45	B4 or B9
L3	50	45	B4 or B9
L2	50	45	B3 or B9
L1	50	45	B3 or B9
—24	27	21	B1
D	—	—	B9

STEP	ACTION	VERIFICATION
15c	Remove meter leads.	
16c	Connect positive meter lead to D test point.	
17c	Connect negative meter lead to —48 volt test point.	7.5 to 9.5 volts indicated.
18c	Remove meter leads.	
19	At solid state converter circuit — Remove blocking tool from DO relay.	
20	At test set — Restore all keys to normal.	
21	Remove connections established in Step 4.	
22	At common group and subgroup circuit — Remove blocking tool from OB relay. At associated trunk finder — Restore MB key.	