

**CENTREX LONG HAUL FOREIGN EXCHANGE
TRUNK CIRCUIT (SD-2H180) OPERATIONAL TESTS
NO. 2 AND NO. 2B ELECTRONIC SWITCHING SYSTEMS**

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1. GENERAL

1.01 This section describes the method of testing the long haul foreign exchange trunk circuit (SD-2H180) used in the No. 2 and No. 2B Electronic Switching Systems (ESS).

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 The long haul foreign exchange trunk circuit provides service to the centrex customer. It provides the necessary functions to handle both incoming and outgoing calls. The calls may originate or terminate locally or be switched tandem through the office.

1.04 The following tests will be performed:

A. Circuit State and Scan Point Operation:
This test verifies the operation of circuit relays and saturation of ferrod sensors associated with the long haul foreign exchange trunk circuit.

B. Transmission Loss Measurements:
This test verifies the transmission loss of

the long haul foreign exchange trunk circuit in the various states.

1.05 The tests in this section are to be performed on a periodic basis as prescribed by No. 2 and No. 2B ESS equipment test list or when a malfunction of one of the circuits is suspected.

1.06 The tests will be performed from the trunk test panel (TTP) in conjunction with the maintenance display buffer and teletypewriter (TTY). The keys on the TTP may be either a locking or a nonlocking type. In order to differentiate between the two types of keys, the use of a locking type key shall be identified by the words "operate" and "release" and the use of a nonlocking type key shall be identified by the word "depress" in the ACTION column. For more detailed information about the TTP and its operation, refer to Section 232-130-301, Trunk Test Panel—Method of Operation.

Note: Nonlocking relays require a depression of at least one-half second to ensure system recognition.

1.07 Lettered Steps: A letter a, b, c, etc, added to a step number in Part 3 or 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 Transmission measuring set (TMS), 23D, or equivalent with appropriate test leads. Equivalent apparatus must be capable of measuring

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power in 600- and 900-ohm circuits at 1 kHz. The accuracy must be ± 0.1 dBm at 1 kHz at normal room temperature and the range must be from -15 dBm to +10.0 dBm.

- 2.02 Two 900-ohm resistors $\pm 1\%$ tolerance.
- 2.03 One 600-ohm resistor $\pm 1\%$ tolerance.
- 2.04 Six test loads with an alligator clip on each end.
- 2.05 One 262B type plug.
- 2.06 One 2W6A cord assembly consisting of a W2C cord, 10 feet in length or longer, with a 310 plug on one end and two 59-type cord tips on the other.
- 2.07 One 2P4A cord assembly consisting of a P2B cord, 3 feet in length or longer, with a 310 plug on each end.

3. PREPARATION

- 3.01 Refer to office records to obtain the trunk group number (TGN), member number (MEMN), and scan point number (SPN) of the foreign exchange trunk circuit (SD-2H180).
- 3.02 Verify the SPN obtained from office records as follows:

At maintenance TTY type in:

A VY:TRK:aaa bbb!

aaa = TGN
bbb = MEMN

The system response is as follows:

AR VY TRK aaa bbb
TEN nn gcsl
PDB cxzy b
SPN ss rrbb

ss = scanner number
rr = row number
bb = bit in row

The bb field represents the first ferrod (0) in the scanner row; all other ferrods follow in consecutive order, i.e., (0, 1, 2 etc).

Refer to input message manual (IM-2H200) and output message manual (OM-2H200) for interpretation of input and output messages.

- 3.03 Prior to performing any tests on the foreign exchange trunk circuit, the attendant operator should be notified.

- 3.04 For all tests, use the following procedure for gaining access to the circuit under test.

STEP	ACTION	VERIFICATION
1	At telephone set on TTP— Operate access trunk 1 key.	
2	Lift handset off-hook or operate TRFR key at TEL CKT on TTP if using headset.	At telephone set— Access trunk 1 lamp lighted. At ACCESS TRUNK 1 CONTROL— SUPV lamp lighted At TEL CKT— TRFR lamp lighted if TRFR key is operated.
3	At TOUCH-TONE® dial— Dial 1 + TGN + MEMN + ST.	At ACCESS TRUNK 1 CONTROL— EQPT ST lamp lighted steadily or flashing at a rate of 120 interruptions per minute. P & E lamp lighted steadily if connection was successful.

STEP	ACTION	VERIFICATION
		Note: If the EQPT ST lamp is flashing and the P & E lamp is not lighted steadily, the TTP is not connected to the circuit to be tested.
4a	If the P & E lamp is not lighted steadily— At ACCESS TRUNK 1 CONTROL— Depress RLS key.	
5a	Repeat Steps 3 and 4a until connection is successful.	
6	Place handset on-hook or release TRFR key.	At telephone set— Access trunk 1 lamp extinguished. At TEL CKT— TRFR lamp extinguished.
4. METHOD		(2) Troubleshoot the circuit which failed.
4.01	If the verification procedure fails or if a malfunctioning circuit is indicated during any part of these tests, proceed as follows.	(3) Replace faulty circuit components using standard repair procedures.
	(1) Discontinue the test.	(4) Repeat the test that failed. If verification is successful, continue the test.

STEP	ACTION	VERIFICATION
A. Circuit State and Scan Point Operation		
7	From the TTY printout obtained in 3.02, determine the trunk scanner number and the number of the scanner row associated with the scan points assigned to the circuit under test.	
8	At maintenance TTY— For No. 2 ESS offices type in: UBRL TS:RSN:ssrr! ss = Number of trunk scanner in decimal (00-11). rr = Number of scanner row to be displayed. For No. 2B ESS offices type in: MON:TSSN ssrr;RDT LAMPS! ss = Number of trunk scanner in decimal (00-11). rr = Number of scanner row in decimal (0-63). RDT LAMPS = Direct the result to the DISPLAY BUFFER.	At DISPLAY BUFFER— Scanner row containing specific scan points is displayed on DISPLAY BUFFER lamps. Lamps associated with ferrod sensors connected to circuit under test are lighted.
9	At ACCESS TRUNK 1 CONTROL— Depress VM key.	At ACCESS TRUNK 1 CONTROL— VM lamp lighted.

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STEP	ACTION	VERIFICATION
		At VOLTMETER CONTROL— 100K lamp lighted.
10	At VOLTMETER CONTROL— Depress FEMF key.	At VOLTMETER CONTROL— FEMF lamp lighted. 100K lamp extinguished. At VOLTMETER— Meter indicates 0.
11	At VOLTMETER CONTROL— Operate TR REV key.	At VOLTMETER CONTROL— TR REV lamp lighted. At VOLTMETER— Meter indicates 0.
12	At VOLTMETER CONTROL— Operate GRD key.	At VOLTMETER CONTROL— GRD lamp lighted. At VOLTMETER— Meter indicates 0. A deflection on the voltmeter indicates a resistance between the tip and ring leads.
13	Release GRD key and release TR REV key.	At VOLTMETER CONTROL— GRD lamp extinguished. FEMF lamp remains lighted. TR REV lamp extinguished.
14	At STATE CHANGE CONTROL— Set PD GROUP switch to 0-5 position.	
15	At circuit under test— Ground A1 lead on terminal strip A terminal 25 and connect a 900-ohm resistor across pins 5 and 8 of the unity gain impedance isolator.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 1 extinguished.
16	At PERIPHERAL DECODER POINTS— Operate 0 key.	At PERIPHERAL DECODER POINTS— 0 lamp lighted.
17	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 1 lighted. At circuit under test— Relay A operated.
18	At PERIPHERAL DECODER POINTS— Release 0 key. Operate 3 key.	At PERIPHERAL DECODER POINTS— 0 lamp extinguished. 3 lamp lighted.
19	At front of writing shelf on TTP— Put 262B plug into ACCESS TRK-1 jack.	
20	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 extinguished. Lamp associated with ferrod sensor 1 lighted.

STEP	ACTION	VERIFICATION
		At circuit under test— Relay A released. Relay D operated.
21	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted. 3 lamp remains lighted.
22	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 lighted. Lamp associated with ferrod sensor 1 remains lighted. At circuit under test— Relay B operated. Relay D remains operated.
23	At PERIPHERAL DECODER POINTS— Release 1 and 3 keys.	At PERIPHERAL DECODER POINTS— 1 and 3 lamps extinguished.
24	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 1 extinguished. Lamp associated with ferrod sensor 0 lighted. At circuit under test— Relays B and D released.
25	At circuit under test— Remove 900-ohm resistor from pins 5 and 8 of the isolator unit.	
26	At PERIPHERAL DECODER POINTS— Operate 2 key.	At PERIPHERAL DECODER POINTS— 2 lamp lighted.
27	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 extinguished. Lamp associated with ferrod sensor 1 remains extinguished. At circuit under test— Relay C operated.
28	At PERIPHERAL DECODER POINTS— Release 2 key.	At PERIPHERAL DECODER POINTS— 2 lamp extinguished.
29	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 lighted. Lamp associated with ferrod sensor 1 remains extinguished. At circuit under test— Relay C released.
30	At front of writing shelf on TTP— Remove 262B plug from ACCESS TRK-1 jack.	

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STEP	ACTION	VERIFICATION
31	At circuit under test— Remove ground from A1 lead on terminal strip A terminal 25.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 1 lighted.
32	To clear the DISPLAY BUFFER— At maintenance TTY— For No. 2 ESS offices type in: UB SY:CLB!	At DISPLAY BUFFER— Ferrod sensor display cleared from DISPLAY BUFFER lamps.
32	For No. 2B ESS offices type in: STOP:UTIL!	
33b	If circuit under test is equipped with option 2— At PERIPHERAL DECODER POINTS— Operate 0 and 1 keys.	At PERIPHERAL DECODER POINTS— 0 and 1 lamps lighted.
34b	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At circuit under test— Ensure that the P and SR relays are operated.
35b	At PERIPHERAL DECODER POINTS— Release 0 and 1 keys.	At PERIPHERAL DECODER POINTS— 0 and 1 lamps extinguished.
36b	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At circuit under test— Relays P and SR released.

B. Transmission Loss Measurements

- 7 At front of writing shelf on TTP—
Connect portable TMS to TRANS MEAS—
DBM-0 jack with 2P4A cord assembly.
- 8 At TMS—
Set INPUT switch to 600-ohm position and
adjust meter for 0.
- 9 At front of writing shelf on TTP—
Remove cord from TRANS MEAS—DBM-0
jack and connect to SP jack.

Note: Make sure no other connection is
made to the SP jack in the office.
- 10 At TRANSMISSION MEASURING CONTROL—
Set SEND switch to DBM-0 1 kHz position.
- 11 At STATE CHANGE CONTROL—
Set PD GROUP switch to 0-5 position.
- 12 At circuit under test—
Open all screw switches on the hybrid balancing
network.

STEP	ACTION	VERIFICATION
13	At circuit under test— Remove 89-type pads from transmitter (TRMTG) and receiver (RCVG) circuits and replace with 89A-type pads to provide zero loss during transmission test (see Fig. 1).	
14	At circuit under test— Connect 900 ohm ± 1 percent resistor to pins 11 and 19 of the 4-wire hybrid circuit pack 293-A (see Fig. 1).	
15	At circuit under test— Connect 600 ohm ± 1 percent resistor to tip and ring (T and R) leads of the RCVG circuit (terminals 24 and 14 on terminal strip A).	
16	At circuit under test— Connect tip and ring (T and R) leads of TRMTG (terminals 44 and 34 on terminal strip A) to the SP jack with 2W6A cord assembly (see Fig. 1).	
17	At ACCESS TRUNK 1 CONTROL— Depress XMSN key.	At ACCESS TRUNK 1 CONTROL— XMSN lamp lighted.
18	At PERIPHERAL DECODER POINTS— Operate 2 and 3 keys.	At PERIPHERAL DECODER POINTS— 2 and 3 lamps lighted.
19	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At TMS— Meter indicates between 5.9 and 6.8 dBm. At circuit under test— Relays C and D operated.
20	At PERIPHERAL DECODER POINTS— Operate 0 key.	At PERIPHERAL DECODER POINTS— 0 lamp lighted. 2 and 3 lamps remain lighted.
21	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At TMS— Meter indicates between 5.6 and 6.5 dBm. At circuit under test— Relay A operated. Relays C and D remain operated.
22	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted. 0, 2, and 3 lamps remain lighted.
23	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At TMS— Meter indicates between 3.5 and 4.5 dBm. At circuit under test— Relay B operated. Relays A, C and D remain operated.

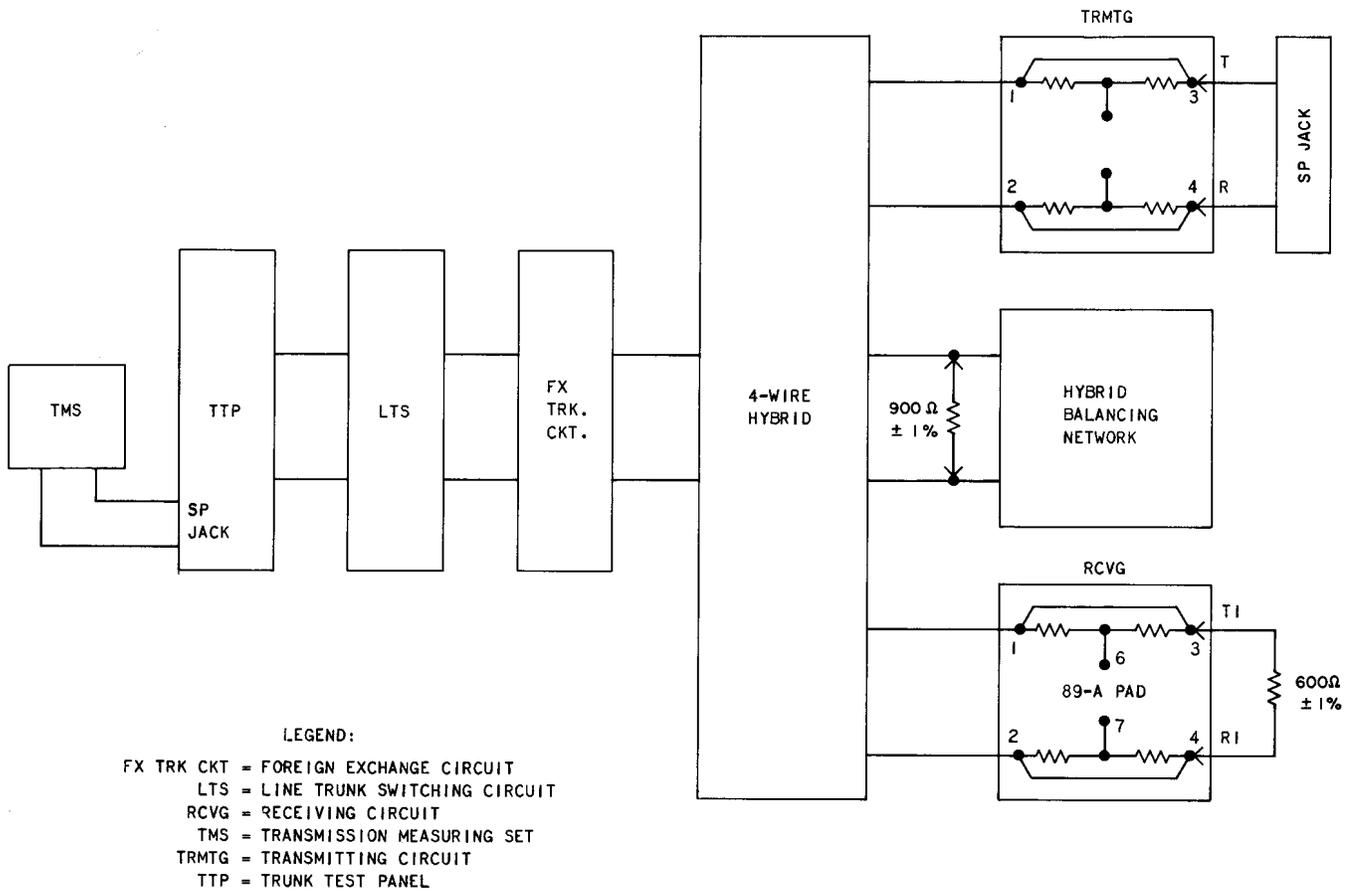


Fig. 1—Test Hookup for Transmitting Test

STEP	ACTION	VERIFICATION
24	At PERIPHERAL DECODER POINTS— Release 0, 1, 2 and 3 keys.	At PERIPHERAL DECODER POINTS— 0, 1, 2 and 3 lamps extinguished.
25	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At TMS— Meter indicates 0. At circuit under test— Relays A, B, C and D released.
26	At TRANSMISSION MEASURING CONTROL— Set SEND switch to OFF.	
27	At front of writing shelf on TTP— Remove TMS cord from SP jack and connect cord to ACCESS TRK-1 jack (See Fig. 2).	
28	At front of writing shelf on TTP— Connect TRANS MEAS— DBM-0 jack to SP jack with 2P4A cord assembly. <i>Note:</i> The DBM-0 jack is supplied with a 1 kHz signal from the system equipment. This patch cord allows the signal to be transmitted through the system for convenience.	
29	At circuit under test— Remove connection from T and R of TRMTG (terminals 44 and 34 on terminal strip A).	
30	At circuit under test— Remove 600-ohm resistor from T1 and R1 of RCVG (terminals 24 and 14 on terminal strip A).	
31	At circuit under test— Connect T1 and R1 of RCVG to SP jack with 2W6A cord assembly (terminals 24 and 14 on terminal strip A).	
32	At circuit under test— Connect 600 ohm ± 1 percent resistor to T and R leads of TRMTG (terminals 44 and 34 on terminal strip A).	
33	At PERIPHERAL DECODER POINTS— Operate 2 and 3 keys.	At PERIPHERAL DECODER POINTS— 2 and 3 lamps lighted.
34	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At TMS— Meter indicates between 5.9 and 6.8 dBm. At circuit under test— Relays C and D operated.

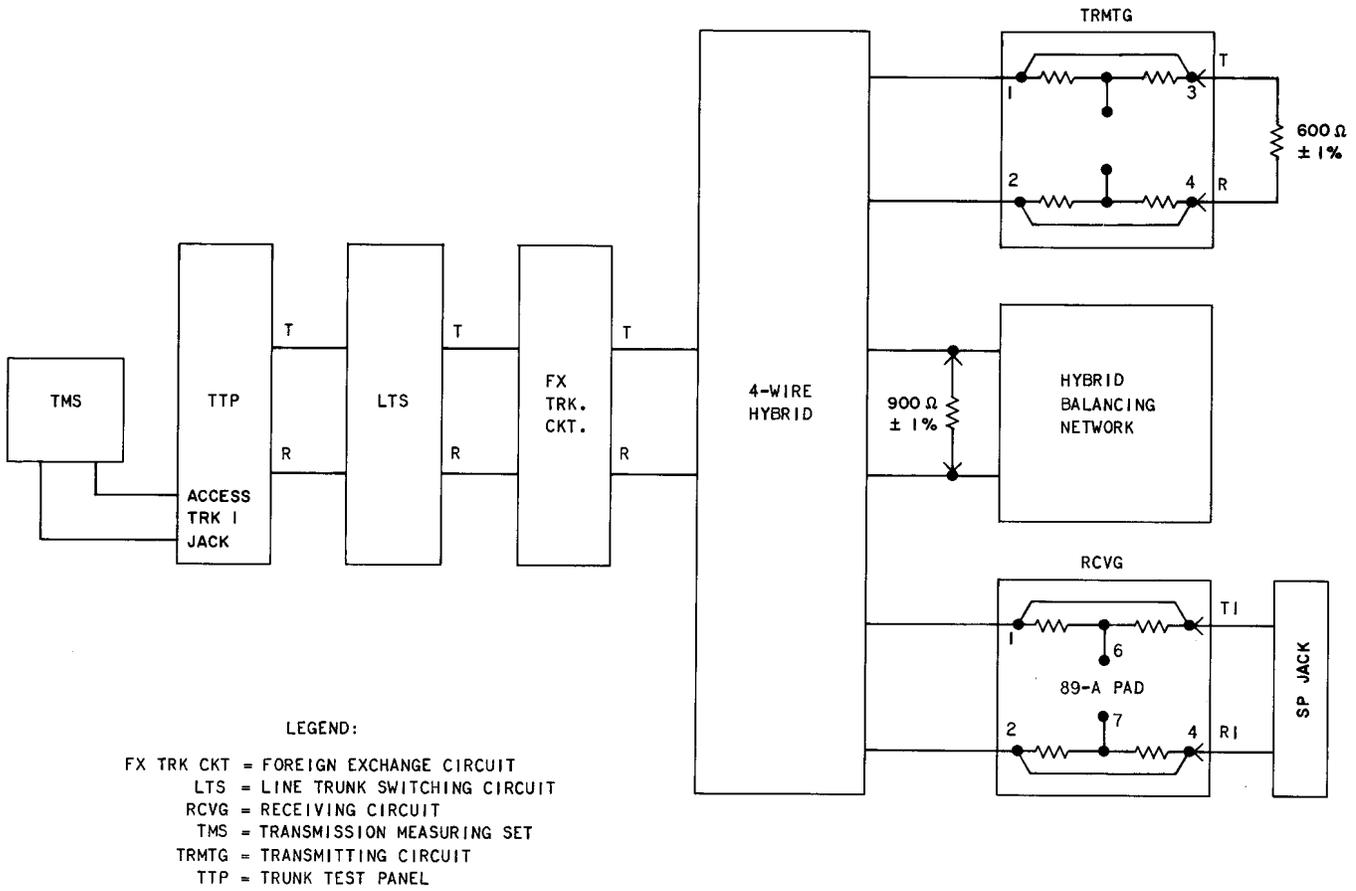


Fig. 2—Test Hookup for Receiver Test

STEP	ACTION	VERIFICATION
35	At PERIPHERAL DECODER POINTS— Operate 0 key.	At PERIPHERAL DECODER POINTS— 0 lamp lighted. 2 and 3 lamps remain lighted.
36	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At TMS— Meter indicates between 5.6 and 6.5 dBm. At circuit under test— Relay A operated. Relays C and D remain operated.
37	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted. 0, 2 and 3 lamps remain lighted.
38	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At TMS— Meter indicates between 3.5 and 4.5 dBm. At circuit under test— Relay B operated. Relays A, C and D remain operated.
39	At PERIPHERAL DECODER POINTS— Release 0, 1, 2 and 3 keys.	At PERIPHERAL DECODER POINTS— 0, 1, 2 and 3 lamps extinguished.
40	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At TMS— Meter indicates 0. At circuit under test— Relays A, B, C and D released.
41	At circuit under test— Remove cord from RCVG and SP jack.	
42	At circuit under test— Remove 600-ohm resistor from TRMTG circuit and remove 900-ohm resistor from hybrid balancing network.	
43	At circuit under test— Remove 89A pads from TRMTG and RCVG and replace the 89-type pads.	
44	At circuit under test— Restore all screw switches to original position on hybrid balancing network.	
45	At front of writing shelf on TTP— Remove cord from SP jack and TRANS MEAS—DBM-0 jack. Also remove TMS connection from ACCESS TRK-1 jack.	
46	At ACCESS TRUNK 1 CONTROL— Depress RLS key.	At ACCESS TRUNK 1 CONTROL— SUPV lamp extinguished.

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STEP	ACTION	VERIFICATION
47	At telephone set— Operate green release key.	EQPT ST lamp extinguished. XMSN lamp extinguished. At MISC TEST CONTROL— P & E lamp extinguished.
48	Repeat all step procedures outlined in this section to test the remaining long haul foreign exchange trunk circuits.	