

## TWO-WAY LONG HAUL TRUNK CIRCUITS (SD-2H157 AND SD-2H158)—TESTS

### NO. 2 AND NO. 2B ELECTRONIC SWITCHING SYSTEMS

#### 1. GENERAL

**1.01** This section describes the method for testing the two-way long haul trunk circuits (SD-2H157 and SD-2H158). The SD-2H157 circuit is a dial pulsing circuit and the SD-2H158 circuit is a multifrequency pulsing circuit. Both circuits are used in the No. 2 and No. 2B Electronic Switching Systems (ESS).

**1.02** This section is reissued to include changes since the last issue and additional information for No. 2B ESS.

**1.03** The following tests are described and may be performed in sequence or individually.

**A. Circuit State and Scan Point Operation:**

These tests verify the operation of the circuit relays and the ferrod sensors associated with the trunk circuits.

**B. Transmission Loss Measurements:**

These tests verify the transmission loss of the trunk circuits in their various states.

**1.04** The tests in this section are to be performed on a periodic basis as prescribed by local equipment test list procedures or whenever a malfunction of one of the circuits is suspected.

**1.05** The tests will be performed from the trunk test panel (TTP) in conjunction with the maintenance display buffer and teletypewriter (TTY). For more detailed information about the TTP and its operation, refer to Section 232-130-301, Trunk Test Panel—Method Of Operation.

**1.06** The keys on the TTP may be either a locking or 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.

**Note:** Nonlocking keys 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.

**1.08** Whenever the term TOUCH-TONE® telephone service is used, it refers to the equipment required to provide this service to the customer.

#### 2. APPARATUS

**2.01** The following apparatus is required for the two-way long haul trunk circuits test. The portable test equipment listed in 2.02 will not be required if this equipment is already mounted in the TTP. If the test equipment listed in 2.02 is not available, equivalent test equipment may be substituted.

**2.02** Transmission measuring set (TMS), 23D. Equivalent apparatus must be capable of measuring power in 600 and 900 ohm circuits at 1 kHz. The accuracy must be  $\pm 0.1$  dB from -15 dBm to +10.0 dBm at 1 kHz at normal room temperature.

#### NOTICE

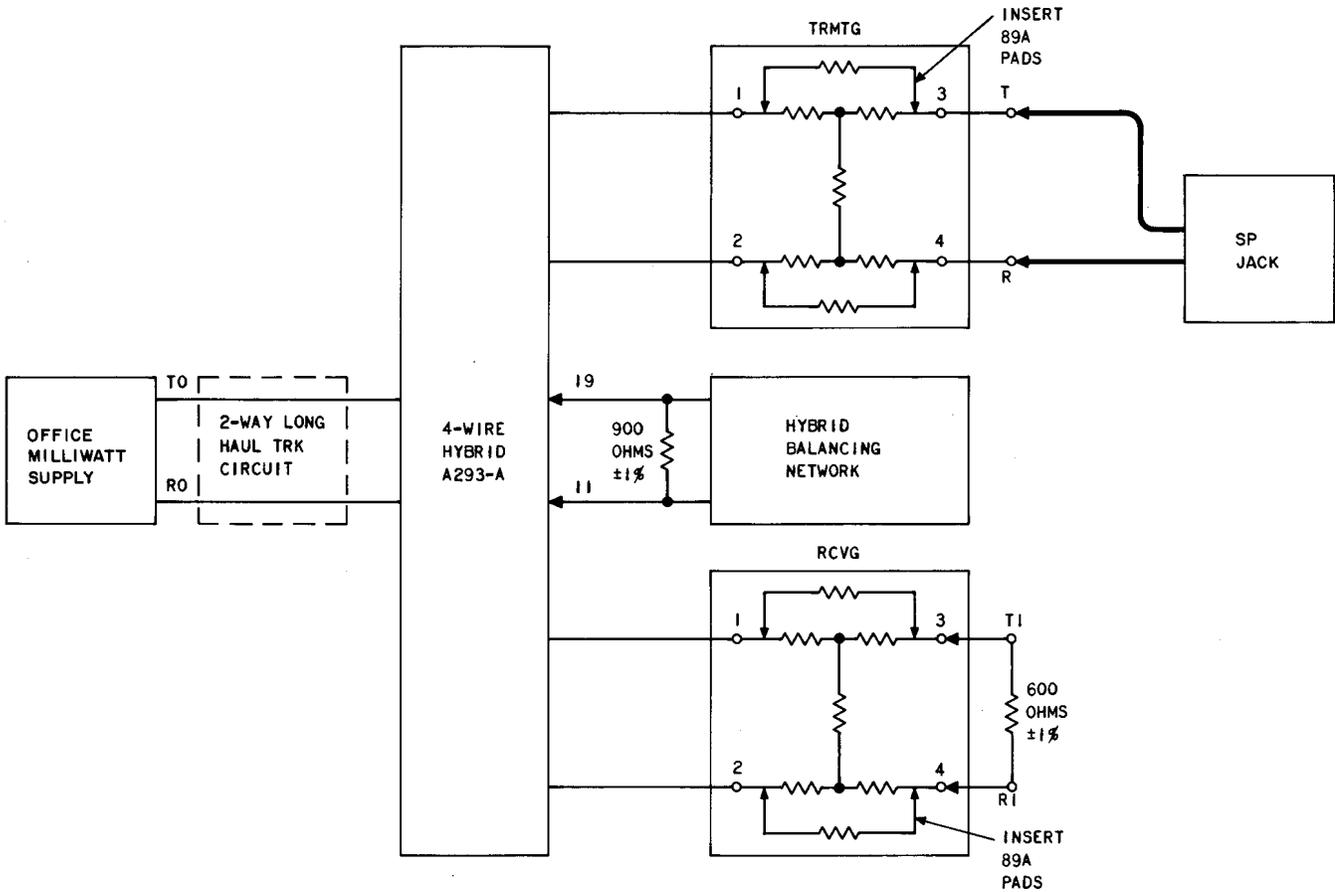
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**2.03** Two 2P4A cord assemblies consisting of a P2B cord at least 3 feet long and two 310 plugs.

**2.04** One 2W6A cord assembly consisting of a W2C cord at least 10 feet long with a 310 plug on one end and two 59-type cord tips on the other.

**2.05** The following resistors will be needed, equipped with leads and alligator clips appropriate for connecting the resistor to circuit pack terminals (Fig. 1) or terminal boards or the protector frame.



**Fig. 1—Test Hookup for Transmitting (TRMTG) Test**

Two (2) 600 ohm ±1%

Two (2) 900 ohm ±1%

**2.06** One 262C-type (900 ohm) plug.

**2.07** One 322 type plug (ring and sleeve are connected together).

**3. PREPARATION**

**3.01** Refer to the office records to obtain the following information about the circuit to be tested:

- (a) trunk group number (TGN),
- (b) member number (MEMN),
- (c) supervisory scan point number (SPN),

- (d) digits to be outpulsed,
- (e) the protector block assignment for the two-way trunk circuit at the protector frame.

**3.02** Verify the scan point numbers obtained from the office records as follows:

At maintenance teletypewriter (TTY), type in

A VY:TRK:aaa bbb!

aaa = TGN

bbb = MEMN

The system will respond with the following TTY message:

AR VY TRK aaa bbb

TEN nn gcsl

PDB cxzy b

APD cxzy br

DSP ss rrbb

SPN ss rrbb

END

SPN = scan point number

ss = scanner number

rr = scanner row

bb = bit in row.

The bb bit represents the first ferrod sensor (0) in the scanner row that is associated with the specific circuit. All other ferrod sensors follow in consecutive order, i.e., (0, 1, 2, etc). Refer to the output message manual (OM-2H200) for an explanation of other data fields, if required.

**3.03** Use the protector block assignment from 3.01 to locate and remove the protector block assigned to the outgoing trunk circuit.

**Note:** In order to perform these tests, the tip and ring leads coming into the circuit must be open. If the trunk circuit does not appear at the protector frame, open the tip and ring leads into the trunk circuit in accordance with local procedures.

**3.04** Use the following procedure to make the trunk circuit traffic busy, connect it to the TTP, and display the ferrod sensors associated with the circuit on the display buffer.

### 3. PREPARATION

#### All Tests

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 if using headset.	At telephone set— Access trunk 1 key lamp lighted. Dial tone received. At ACCESS TRUNK 1 CONTROL— SUPV lamp lighted. At TEL CKT— TRFR lamp lighted if TRFR key operated.
3	At TOUCH-TONE dial— Dial 1 + TGN + MEMN + OP + DIGITS to be outpulsed + ST.	At ACCESS TRUNK 1 CONTROL— EQPT ST lamp lighted steadily or flashing at a rate of 120 interruptions per minute.

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STEP	ACTION	VERIFICATION
		<p>At MISC TEST CONTROL— P &amp; E lamp lighted if connection was successful.</p> <p><i>Note:</i> If the EQPT ST lamp is flashing and P &amp; E lamp is not lighted steadily, the TTP is not connected to the trunk to be tested. Perform Steps 4a and 5a.</p>
4a	<p>If the P &amp; E lamp is not lighted steadily— At ACCESS TRUNK 1 CONTROL— Depress RLS key.</p>	
5a	<p>Repeat Step 3 until connection is successful.</p>	
6	<p>Place handset on-hook, or release TRFR key.</p>	<p>At TRANSMISSION MEASURING CONTROL— CS lamp indicates state of trunk side ferrod sensor of trunk circuit under test. At telephone set— Access trunk 1 lamp extinguished. At TEL CKT— TRFR lamp extinguished.</p>

**4. METHOD**

**4.01** If the verification procedure fails or if a malfunctioning circuit is indicated during any part of these tests, proceed as follows:

- (1) Discontinue the test.

- (2) Troubleshoot the circuit which failed.
- (3) Replace faulty circuit components using standard repair procedures.
- (4) Repeat the test that failed. If verification is successful, continue the test.

STEP	ACTION	VERIFICATION
<b>A. Circuit State and Scan Point Operation</b>		
7	<p>From the TTY printout obtained in 3.02, determine the trunk scanner and the number of the scanner row associated with the scan points assigned to the circuit under test.</p>	
8	<p>At maintenance TTY— ◆For No. 2 ESS offices type in:◆ UBRL TS:RSN:ssrr! ss = Number of trunk scanner in decimal (00-11) from Step 7. rr = Number of scanner row in decimal (00-63) from Step 7.</p> <p>◆For No. 2B ESS offices type in: MON:TSSN ssrr;RDT LAMPS! ss = Number of trunk scanner in decimal (00-11) from Step 7. rr = Number of scanner row in decimal (00-63)</p>	<p>At DISPLAY BUFFER— Scanner row containing specific scan points displayed on DISPLAY BUFFER lamps. Lamps associated with ferrod sensors connected to circuit under test lighted.</p>

STEP	ACTION	VERIFICATION
	from Step 7. RDT LAMPS = Direct the result to the DISPLAY BUFFER.⚡	
9	At ACCESS TRUNK 1 CONTROL— Depress VM key.	At ACCESS TRUNK 1 CONTROL— VM lamp lighted. At VOLTMETER CONTROL— 100K lamp lighted. At VOLTMETER— Meter indicates 0.
10	At VOLTMETER CONTROL on TTP— Operate TR REV key.	At VOLTMETER CONTROL— TR REV lamp lighted. At VOLTMETER— Meter indicates 0.
11	Depress FEMF key.	At VOLTMETER CONTROL— FEMF lamp lighted. At VOLTMETER— Meter indicates 0.
12	Release TR REV key.	At VOLTMETER CONTROL— TR REV lamp extinguished. At VOLTMETER— Meter indicates 0.
13	Depress MET VM key.	At VOLTMETER CONTROL— FEMF lamp extinguished. MET VM lamp lighted.
14	At STATE CHANGE CONTROL— Set PD GROUP switch to 0-5 position.	
15	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted.
16	Depress AT 1 key.	At circuit under test— Relay B operated.
17	At PERIPHERAL DECODER POINTS— Operate 0 and 4 keys.	At PERIPHERAL DECODER POINTS— 0 and 4 lamps lighted.
18	Depress AT 1 key.	At circuit under test— Relays A and E operated. Relay B remains operated.
19	At PERIPHERAL DECODER POINTS— Release 0 key.	At PERIPHERAL DECODER POINTS— 0 lamp extinguished.
20	Depress AT 1 key.	At circuit under test— Relay A released.

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STEP	ACTION	VERIFICATION
21	At PERIPHERAL DECODER POINTS— Release 1 and 4 keys.	At PERIPHERAL DECODER POINTS— All key lamps extinguished.
22	Depress AT 1 key.	All relays in circuit released.
23	At PERIPHERAL DECODER POINTS— Operate 3 key.	At PERIPHERAL DECODER POINTS— 3 lamp lighted.
24	Depress AT 1 key.	Relay D operated.
25	At front of TTP writing shelf— Insert 322 type plug into E&M ACCESS D jack.	
26	At MISC TEST CONTROL— Operate E&M MON key.	DISPLAY BUFFER lamp associated with ferrod sensor 1 extinguished.
27	Release E&M MON key.	DISPLAY BUFFER lamp associated with ferrod sensor 1 lighted.
28	Remove plug from E&M ACCESS D jack.	
29	At PERIPHERAL DECODER POINTS— Release 3 key.	At PERIPHERAL DECODER POINTS— 3 lamp extinguished.
30	Depress AT 1 key.	Relay D released.
31	At PERIPHERAL DECODER POINTS— Operate 0, 1, and 4 keys.	At PERIPHERAL DECODER POINTS— 0, 1, and 4 lamps lighted.
32	At front of TTP writing shelf— Insert 262C-type (900-ohm) plug into ACCESS TRK-1 jack.	
33	Depress AT 1 key.	Relays A, B, and E operated. DISPLAY BUFFER lamp associated with ferrod sensor 0 extinguished.
34	At PERIPHERAL DECODER POINTS— Release 0, 1, and 4 keys.	At PERIPHERAL DECODER POINTS— 0, 1, and 4 lamps extinguished.
35	At front of TTP writing shelf— Remove 262C-type (900 ohm) plug from ACCESS TRK-1 jack.	
36	Depress AT 1 key.	Relays A, B, and E released. DISPLAY BUFFER lamp associated with ferrod sensor 0 lighted.
37	At ACCESS TRUNK 1 CONTROL— Depress RLS key.	At ACCESS TRUNK 1 CONTROL— VM lamp extinguished. SUPV lamp extinguished.

STEP	ACTION	VERIFICATION
38	At maintenance TTY— ♦For No. 2 ESS offices type in:♦ UB SY:CLB!  ♦For No. 2B ESS offices type in: STOP:UTIL!♦	EQPT ST lamp extinguished. At MISC TEST CONTROL— P & E lamp extinguished.  Ferrod sensor display removed from DISPLAY BUFFER.
39	At telephone set on TTP— Operate green release key.	
40	Replace the protector block or connection opened in 3.03.	

#### B. Transmission Loss Measurements

**Note 1:** At the circuit under test the 89-type pads in the TRMTG (transmitting) and RCVG (receiving) circuits must be arranged to provide zero loss during the transmission test. This is accomplished by plugging an 89A pad in the TRMTG (transmitting) and pins 2 and 4 for RCVG (receiving) sockets at the circuit under test. (Refer to Fig. 1).

**Note 2:** The hybrid balancing network, at the circuit under test, shall be disconnected while making the transmission loss test. This is accomplished by opening all screw switches on the hybrid balancing network.

#### TRMTG TEST

- 7 At the protector block or the circuit under test—  
Connect a 600 ohm resistor to the tip and ring (T1 and R1) leads of the RCVG (receiving) section of the circuit under test. (Refer to Fig. 1.)
- 8 At the circuit under test—  
Connect a 900 ohm  $\pm 1$  percent resistor to pins 11 and 19 of the 4-wire hybrid CP A293-A. (Refer to Fig. 1.)
- 9 At the protector frame—  
Using a 2W6A cord connect the trunk side appearance of the tip and ring of the TRMTG

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STEP	ACTION	VERIFICATION
	(transmitting) circuit to the SP jack nearest the protector frame.	
	<b>Note:</b> Make sure no other connection is made to the SP jack in the office.	
10	At the front of the writing shelf— Use 2P4A cord to connect TRANS MEAS-TMS jack to SP jack.	
11	At test and control panel— Set SEND switch to 0 DBM 1 KHz, Set TEST SET switch to TMS. Set MEASURE switch to MEAS 1.	
12	At TMS— Set ADD DBM switch to -5 position.	
13	At PERIPHERAL DECODER POINTS— Operate 0 and 1 keys.	At PERIPHERAL DECODER POINTS— Lamps 0 and 1 lighted.
14	Depress AT 1 key.	At circuit under test— Relays A and B operated. At TMS— Meter indicates between 0.9 and 1.8 dBm (actual loss is between 5.9 and 6.8 dBm).
15	At PERIPHERAL DECODER POINTS— Operate 2 key.	
16	Depress AT 1 key.	At PERIPHERAL DECODER POINTS— 2 lamp lighted. Relay C in circuit under test operated. Relays A and B in circuit under test remain operated. At TMS— Meter indicates between 0.6 and 1.5 dBm (actual loss is between 5.6 and 6.5 dBm).
17	At PERIPHERAL DECODER POINTS— Release 0 key.	At PERIPHERAL DECODER POINTS— 0 lamp extinguished.
18	Depress AT 1 key.	At circuit under test— Relay A released. Relays B and C remain operated.
19	At TMS— Set the ADD DBM switch to the 0 position.	At TMS— Meter indicates between 3.5 and 4.5 dBm (actual loss).
20	At PERIPHERAL DECODER POINTS— Release 1 and 2 keys.	At PERIPHERAL DECODER POINTS— 1 and 2 lamps extinguished.

STEP	ACTION	VERIFICATION
21	Depress AT 1 key.	At circuit under test— Relays B and C released.
22	Remove the connections made in Steps 7, 9 and 10.	

**RCVG TEST**

- 23 At the protector block or the circuit under test—  
Connect a 600 ohm  $\pm 1$  percent resistor to the tip and ring of the TRMTG (transmitting) section of the circuit under test.  
(Refer to Fig. 2.)
- 24 At the protector frame—  
Using a 2W6A cord connect the trunk side appearance of the tip and ring of the RCVG

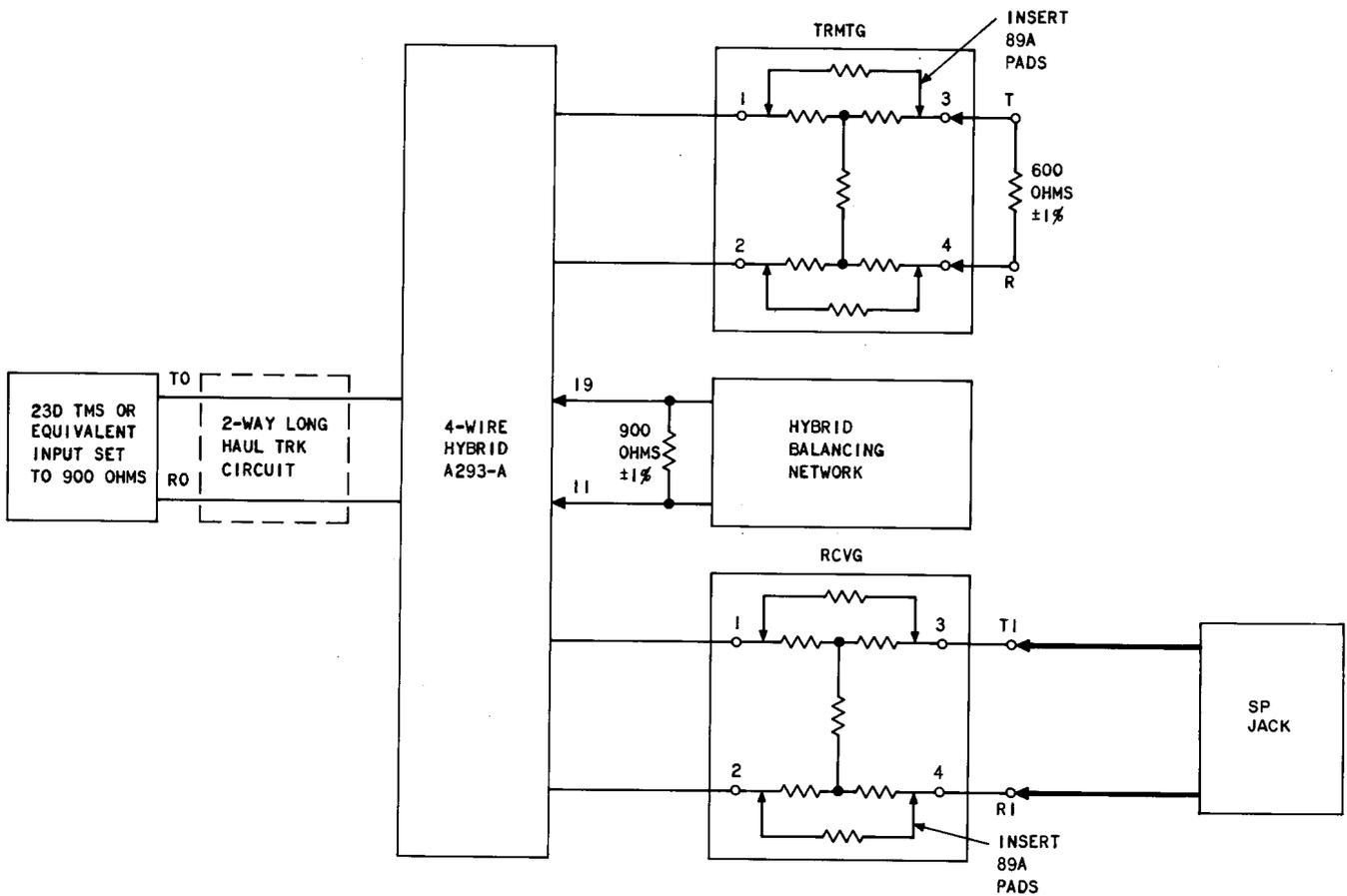


Fig. 2—Test Hookup for Receiving (RCVG) Test

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STEP	ACTION	VERIFICATION
	(receiving) circuit to the SP jack nearest the protector frame.	
	<b>Note:</b> Make sure no other connection is made to the SP jack in the office.	
25	At the front of the writing shelf on TTP— Connect TRANS MEAS—DBM-0 jack to SP jack with 2P4A cord assembly.	
26	At ACCESS TRUNK 1 CONTROL— Depress XMSN key.	At ACCESS TRUNK 1 CONTROL— XMSN lamp lighted.
27	At test and control panel Set TEST switch to TMS position. Set MEASURE switch to MEAS 1 position. Set SEND switch to OFF position.	
28b	If TTP is not equipped with TMS— At front of writing shelf— Use 2P4A cord to connect external TMS to TRANS MEAS—TM-1 jack.	
29	At TMS— Set ADD DBM switch to -5 position.	
30	At PERIPHERAL DECODER POINTS— Operate 0 and 1 keys.	At PERIPHERAL DECODER POINTS— 0 and 1 lamps lighted.
31	Depress AT 1 key.	At circuit under test— Relays A and B operated. At TMS— Meter indicates between 0.9 and 1.8 dBm (actual loss is between 5.9 and 6.8 dBm).
32	At PERIPHERAL DECODER POINTS— Operate 2 key.	At PERIPHERAL DECODER POINTS— 2 lamp lighted.
33	Depress AT 1 key.	At circuit under test— Relay C operated. Relay A and B remain operated. At TMS— Meter indicates between 0.6 and 1.5 dBm (actual loss is between 5.6 and 6.5 dBm).
34	At PERIPHERAL DECODER POINTS— Release 0 key.	At PERIPHERAL DECODER POINTS— 0 lamp extinguished.
35	Depress AT 1 key.	At circuit under test— Relay A released. Relays B and C remain operated.

STEP	ACTION	VERIFICATION
36	At TMS— Set the ADD DBM switch to the 0 position.	At TMS— Meter indicates between 3.5 and 4.5 dBm (actual loss).
37	At PERIPHERAL DECODER POINTS— Release 1 and 2 keys.	At PERIPHERAL DECODER POINTS— 2 and 3 lamps extinguished.
38	Depress AT 1 key.	At circuit under test— Relays B and C released.
39	Remove the connections made in Steps 8, 25, 26, 27, and 28b.	
40	Close all screw switches in the hybrid balancing network.	
41	Remove the 89A pads from the TRMTG (transmitting) and RCVG (receiving) sections of the circuit under test.	
42	At ACCESS TRUNK 1 CONTROL— Depress RLS key.	At ACCESS TRUNK 1 CONTROL— VM lamp extinguished. SUPV lamp extinguished. EQPT ST lamp extinguished. AT MISC TEST CONTROL— P & E lamp extinguished.
43	◆At telephone set on TTP— Operate green release key.◆	