TWO-WAY TRUNK CIRCUIT
(SD-2H112) TESTS
NO. 2 AND NO. 2B ELECTRONIC SWITCHING SYSTEMS

1. GENERAL

1.01 This section describes the method for testing the two-way trunk circuit (SD-2H112) used in the No. 2 and No. 2B Electronic Switching Systems (ESS).

1.02 This section is reissued to cover the No. 2B ESS. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

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

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

B. Transmission Loss Measurements: This test verifies the transmission loss of the trunk circuits in their various states.

1.04 Test A in this section is to be performed on a periodic basis as prescribed in the equipment test list. Tests A and B are to be performed whenever a malfunction of the circuits is suspected.

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

1.06 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.

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

1.08 *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 The following apparatus is required for the two-way trunk circuit with E&M lead supervision circuit 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 ± 0.1 dB from -15 dBm to $+10.0$ dBm at 1 kHz at normal room temperature.

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 One 262C-type (900 ohm) plug.

2.06 One (1) test telephone set, equipped with appropriate cord terminated to a 310 plug.

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) scan point number (SPN)

(d) 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 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

PBD cxzy b

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 Before proceeding with PREPARATION, instruct the distant office to make the trunk circuit under test maintenance busy at that location.

3.04 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.

3.05 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.

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—

STEP	ACTION	VERIFICATION
		SUPV lamp lighted. At TEL CKT— TRFR lamp lighted if TRFR key operated.
3	At TOUCH-TONE dial— Dial 1 + TGN + MEMN + ST key.	At ACCESS TRUNK 1 CONTROL— EQPT ST lamp lighted steadily or flashing at a rate of 120 interruptions per minute. At MISC TEST CONTROL— P & E lamp lighted steadily if connection was successful. ***Note:*** If the EQPT ST lamp is flashing and P & E lamp is not lighted steadily, the TTP is not connected to the trunk 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 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.

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
	A. Circuit State and Scan Point Operation	
7	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.	
8	At maintenance TTY— For No. 2 ESS offices type in: UBRL TS:RSN:ssrr! ss = Number of trunk scanner in decimal (0-11) from Step 7.	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.

STEP	ACTION	VERIFICATION
	rr = Number of scanner row in decimal (0-63) from Step 7. For No. 2B ESS offices type in: MON:TSSN ssrr;RDT LAMPS! ss = Number of trunk scanner in decimal (0-11) from Step 7. rr = Number of scanner row in decimal (0-63) 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. 100K lamp extinguished.
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. At VOLTMETER— Meter indicates 0.
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.

STEP	ACTION	VERIFICATION
18	Depress AT 1 key.	At circuit under test. Relays A and E operated. Relay B remains operated. At VOLTMETER— Meter indicates 48V.
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. At VOLTMETER— Meter indicates 0.
21	At PERIPHERAL DECODER POINTS— Release 1 and 4 keys.	At PERIPHERAL DECODER POINTS— All lamps extinguished.
22	Depress AT 1 key.	All relays in circuit released.
23	At PERIPHERAL DECODER POINTS— Operate 0 and 1 keys.	At PERIPHERAL DECODER POINTS— 0 and 1 lamps lighted.
24	Depress AT 1 key.	At circuit under test— Relay A operated.
25	At front of writing shelf— Insert 262C-type (900 ohm) plug into ACCESS TRK-1 jack.	DISPLAY BUFFER lamp associated with ferrod sensor 1 extinguished.
26	Remove 262C-type (900 ohm) plug from ACCESS TRK-1 jack.	DISPLAY BUFFER lamp associated with ferrod sensor 1 lighted.
27b	If the circuit is used as an outgoing trunk (OGT) to crossbar tandem traffic service position (TSP) or Traffic Service Position System (TSPS) No. 1 dial tone first operation— At PERIPHERAL DECODER POINTS— Operate 4 key.	At PERIPHERAL DECODER POINTS— 4 lamp lighted.
28b	Depress AT 1 key. At front of writing shelf— Connect test telephone set to ACCESS TRK-1 jack using appropriate cable and plug. Lift receiver off-hook.	At circuit under test— Relay E operated. Relays A and B remain operated. Dial tone received indicating TSP operator is attached. D relay operated.
29b	Inform operator that you are performing a test and ask for disconnection.	D relay released. Another signal is received.
30b	Place test telephone receiver on-hook.	

STEP	ACTION	VERIFICATION
31c	If circuit is used as an outgoing trunk to intercept systems— At PERIPHERAL DECODER POINTS— Operate 2 and 3 keys.	At PERIPHERAL DECODER POINTS— 2 and 3 lamps lighted.
32c	Depress AT 1 key. Lift test telephone receiver off-hook.	At circuit under test— Relays C and D operated. Relays A, B, and E remain operated. Audible ring tone returned.
33c	At PERIPHERAL DECODER POINTS— Release 3 key.	At PERIPHERAL DECODER POINTS— 3 lamp extinguished.
34c	Depress AT 1 key.	At circuit under test— Relay D released. Announcement is given and/or intercept operator connected. ***Note:*** If operator answers, inform operator that a test is being conducted.
35	At PERIPHERAL DECODER POINTS— Release all keys.	At PERIPHERAL DECODER POINTS— All lamps extinguished.
36	Depress AT 1 key.	At circuit under test— All relays released.
37	At front of writing shelf on TTP— Remove test telephone set from ACCESS TRK-1 jack.	
38	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.
39	At maintenance TTY— For No. 2 ESS offices type in: UB SY:CLB! For No. 2B ESS offices type in: STOP:UTIL!	Ferrod sensor display removed from DISPLAY BUFFER.
40	At telephone set on TTP— Operate green release key.	
41	Instruct the distant office to return the trunk to service.	

STEP	ACTION	VERIFICATION
B. Transmission Loss Measurements		
7	At the protector frame— Use 2W6A cord to connect the trunk side appearance of the tip and ring of the two-way trunk circuit under test to the SP jack nearest the protector frame (see 3.03 and Fig. 1). ***Note:*** Make sure no other connection is made to the SP jack.	
8	At front of writing shelf— Use 2P4A cord to connect 0 DBM jack to SP jack (See Fig. 1).	
9	At ACCESS TRUNK 1 CONTROL— Depress XMSN key.	At ACCESS TRUNK 1 CONTROL— XMSN lamp lighted.
10	At TRANSMISSION MEASURING CONTROL— Set TEST SET switch to TMS position. Set MEASURE switch to MEAS 1 position. Set SEND switch to OFF position.	
11b	If TTP is not equipped with TMS— At front of writing shelf— Use 2P4A cord to connect external TMS to TM1 jack.	
12	At TMS— Set ADD DBM switch to 0 position.	
13	At PERIPHERAL DECODER POINTS— Operate 0 and 2 keys.	At PERIPHERAL DECODER POINTS— 0 and 2 lamps lighted.
14	Depress AT 1 key.	At circuit under test— Relays A and C operated. At TRANSMISSION MEASURING CONTROL— Meter indicates between 0 and −0.5 dB. ***Record this level for reference use.***
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. Relays A and C remain operated. At TRANSMISSION MEASURING CONTROL— Meter indicates a maximum loss of 0.2 dB more than reference level in Step 14.
17	At PERIPHERAL DECODER POINTS— Release 2 key.	At PERIPHERAL DECODER POINTS— 2 lamp extinguished.

STEP	ACTION	VERIFICATION
18	Depress AT 1 key.	At circuit under test— Relay C released. Relays A and B remain operated. At TMS— Meter indicates a maximum loss of 0.3 dB more than reference level in Step 14.
19	At PERIPHERAL DECODER POINTS— Release 1 and 2 keys.	At PERIPHERAL DECODER POINTS— 1 and 2 lamps extinguished.
20	Depress AT 1 key.	At circuit under test— All relays released.
21c	Remove connections made in Steps 7, 8, and 11b.	
22	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.
23	At telephone set on TTP— Operate green release key.	
24	Instruct the distant office to return the trunk to service.	

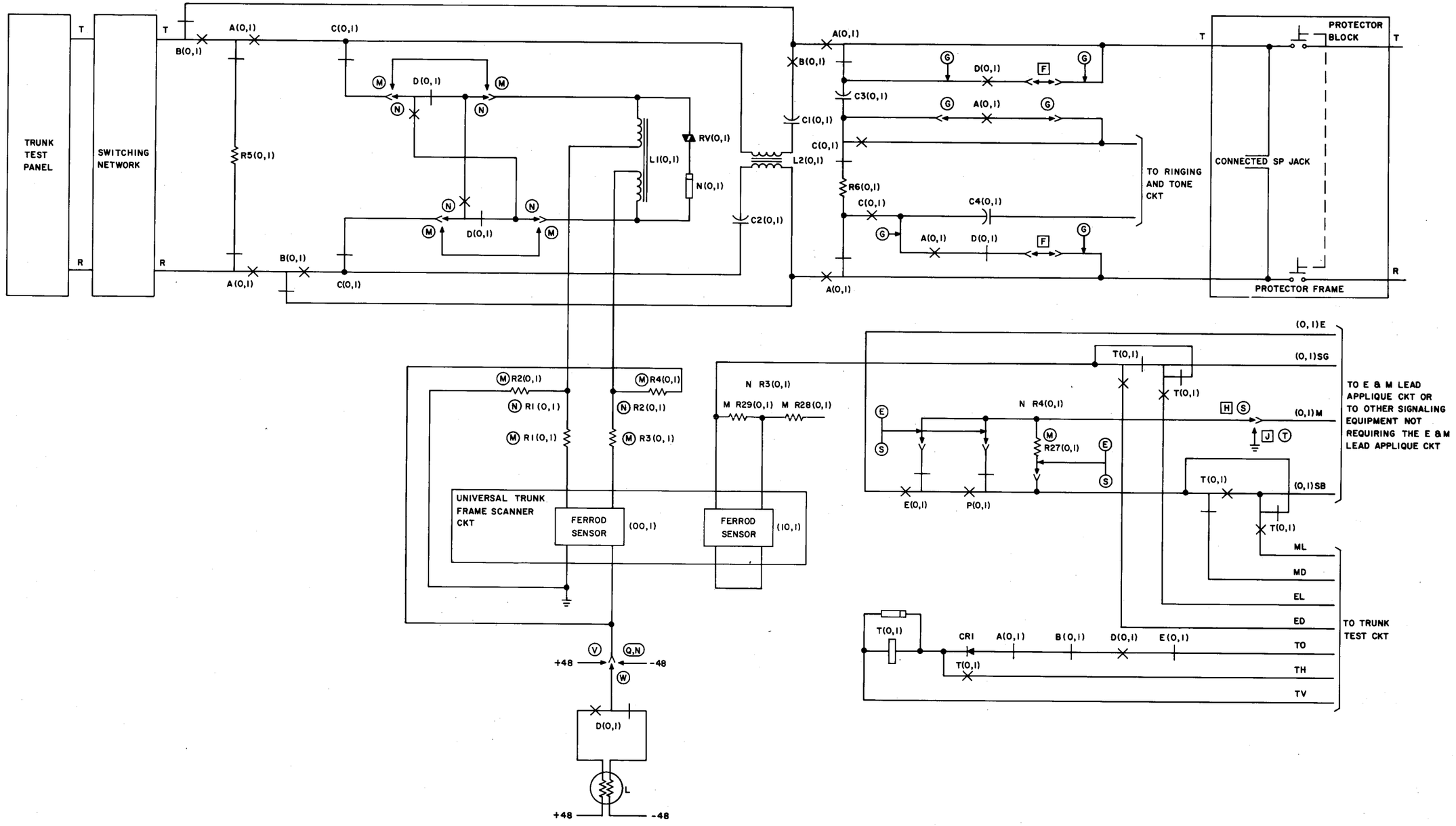

Fig. 1—Test Hookup for Transmission Loss Measurements