

**CENTREX ATTENDANT LOOP CIRCUIT (SD-2H172)
AND TRUNK CIRCUIT (SD-2H173)**

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 centrex attendant loop and trunk circuits 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 loop and/or trunk circuits under test.

B. Transmission Loss Measurements:

This test verifies the transmission loss of the loop and trunk circuits in their various states.

1.04 The tests in this section are to be performed on a periodic basis as prescribed by the No. 2 and No. 2B ESS equipment test list or when 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 (DB) and teletypewriter (TTY). Refer to Fig. 1 for attendant loop and trunk circuit test set up. 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.

1.06 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.

NOTICE

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1.07 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 Transmission measuring set (TMS) 23D, or equivalent with appropriate test leads. Equivalent apparatus must be capable of measuring 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 dBm.

Note: This item will not be required if the TTP is equipped with a TMS.

2.02 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 end.

2.03 One 2P4A cord assembly consisting of a P2B cord, 3 feet in length or longer, with a 310 plug on each end.

2.04 Two (2) test telephone sets, equipped with an appropriate cord terminated to 310 plugs.

3. PREPARATION

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

- (a) centrex group number (CTX)
- (b) attendant number (AT No.)
- (c) loop number (LOOP)
- (d) port number (PORT)
- (e) scan point number (SPN-0-11).

Note: Each centrex attendant trunk circuit has six (6) attendant loop circuits associated with it. The loop circuits are tested one-at-a-time. Therefore, the same test procedure is repeated on each attendant loop circuit.

3.02 Prior to performing any tests on the centrex attendant loop or trunk circuits, the attendant console operator should be notified. Inhibit the audit program before removing the attendant console. Proceed as follows:

At maintenance TTY type in:

M AU:INH!

Caution: *The audit program should NOT be inhibited for more than 45 minutes.*

Note: If the test procedures have not been completed during this 45-minute time limit, stop the test by releasing the loop under test from the TTP and restoring the audit program with the following message:

At maintenance TTY type in:

M AU:RST!

After restoring the audit program, an all audits request should be made as follows:

At maintenance TTY type in:

M AU:ALL!

When the audits have been completed with an all test passed TTY printout message (M AU ALL ATP), inhibit the audit program as follows:

At maintenance TTY type in:

M AU:INH!

Reacquire the loop to be tested at the TTP and resume testing.

3.03 Make the circuit under test maintenance busy as follows:

At maintenance TTY type in:

M AC:RMV:f d c!

f = frame number

c = attendant console number.

d = data link number

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 5 + CTX + AT No. + LOOP + 0 + ST to gain access to port 0 of selected attendant loop circuit.	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 if connection was successful.
		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.
7	At telephone set— Operate access trunk 2 key.	At MISC TEST CONTROL— P & E lamp remains lighted.
8	Lift handset off-hook or operate TRFR key at TEL CKT on TTP if using headset.	At telephone set— Access trunk 2 lamp lighted. At ACCESS TRUNK 2 CONTROL— SUPV lamp lighted. At TEL CKT— TRFR lamp lighted if TRFR key is operated.
9	At TOUCH-TONE dial— Dial 5 + CTX + AT No. + LOOP + 1 + ST to gain access to port 1 of the selected attendant loop circuit.	At ACCESS TRUNK 2 CONTROL— EQPT ST lamp lighted steadily or flashing at a rate of 120 interruptions per minute.

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STEP	ACTION	VERIFICATION
		Note: If the EQPT ST lamp and the P & E lamp are flashing, the TTP is not connected to the circuit to be tested.
10b	If the P & E lamp is flashing— At ACCESS TRUNK 2 CONTROL— Depress RLS key.	
11b	Repeat Steps 9 and 10b until connection is successful.	
12	Place handset on-hook or release TRFR key.	At telephone set— Access trunk 2 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.

ATTENDANT LOOP (SD-2H172) AND TRUNK CIRCUIT (SD-2H173) TESTS

A. Circuit State and Scan Point Operation

STEP	ACTION	VERIFICATION
13	At ACCESS TRUNK 1 CONTROL— Depress VM key.	At ACCESS TRUNK 1 CONTROL— VM lamp lighted. At VOLTMETER CONTROL— 100K lamp lighted.
14	At VOLTMETER CONTROL— Depress FEMF key.	At VOLTMETER CONTROL— FEMF lamp lighted. 100K lamp extinguished.
15	Operate TR REV key.	At VOLTMETER CONTROL— TR REV lamp lighted. At VOLTMETER— Meter indicates 0.
16	Operate GRD key.	At VOLTMETER CONTROL— GRD lamp lighted. At VOLTMETER— Meter indicates 0. A deflection on voltmeter indicates a resistance between tip and ring leads.

STEP	ACTION	VERIFICATION
17	Release TR REV key.	At VOLTMETER CONTROL— TR REV lamp extinguished. At VOLTMETER— Meter indicates 0.
18	Release GRD key.	At VOLTMETER CONTROL— GRD lamp extinguished.
19	Depress MET VM key.	At VOLTMETER CONTROL— MET VM lamp lighted. FEMF lamp extinguished.
20	From the SPN obtained in 3.01 determine the scanner number and the row number of the scan points assigned to port 0 of the appropriate attendant loop circuit (0-5).	
21	At maintenance TTY— For No. 2 ESS offices type in: UBRL TS:RSN:ssrr! ss = Number of the trunk scanner in decimal (00-11). rr = Number of the scanner row in decimal 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 (00-63) RDT LAMPS = Direct the result to the DISPLAY BUFFER.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 for port 0 displayed on display buffer and is lighted.
22	At test and control unit— Set PD GROUP switch to 0-5 position.	
23	At PERIPHERAL DECODER POINTS— Operate 0 key.	At PERIPHERAL DECODER POINTS— 0 lamp lighted.
24	Depress AT 1 key.	At VOLTMETER— Meter indicates between 42.75 and 52.5 volts on the 120-volt scale. At circuit under test— Relay A0 operated.
25	A front of writing shelf on TTP— Plug in test telephone "A" into ACCESS TRK-1 jack and lift receiver off-hook. Note: Voltmeter is disconnected from circuit when ACCESS TRK-1 jack is used.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 extinguished. At VOLTMETER— Meter indicates 0 because it has been disconnected from circuit.

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STEP	ACTION	VERIFICATION
26	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted. 0 lamp remains lighted.
27	Depress AT 1 key.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 lighted. At circuit under test— Relay B0 operated. Relay A0 remains operated.
28	At PERIPHERAL DECODER POINTS— Operate 2 key.	At PERIPHERAL DECODER POINTS— 2 lamp lighted. 0 and 1 lamps remain lighted.
29	Depress AT 1 key.	At test telephone set A— Listen for audible ringing on receiver. At circuit under test— Relay C0 operated. Relays A0 and B0 remain operated.
30	At PERIPHERAL DECODER POINTS— Release 1 and 2 keys.	At PERIPHERAL DECODER POINTS— 1 and 2 lamps extinguished. 0 lamp remains lighted.
31	Depress AT 1 key.	At test telephone set A— Audible ring no longer present. At circuit under test— Relays B0 and C0 released. Relay A0 remains operated.
32	At ACCESS TRUNK 1 CONTROL— Operate HOLD key.	At ACCESS TRUNK 1 CONTROL— HOLD lamp lighted. VM lamp extinguished.
33	At ACCESS TRUNK 2 CONTROL— Operate VM key.	At ACCESS TRUNK 2 CONTROL— VM lamp lighted. At VOLTMETER CONTROL— 100K lamp lighted.
34	At VOLTMETER CONTROL Depress MET VM key.	At VOLTMETER CONTROL— MET VM lamp lighted. 100K lamp extinguished.
35	At PERIPHERAL DECODER POINTS— Depress AT 2 key.	At VOLTMETER— Meter indicates between 42.75 and 52.5 volts on the 120-volt scale. At circuit under test— Relay A1 operated.
36	At front of writing shelf on TTP— Plug in test telephone "B" into ACCESS TRK-2 jack and lift receiver off-hook.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 1 extinguished. At VOLTMETER—

STEP	ACTION	VERIFICATION
	Note: Voltmeter is disconnected from circuit when ACCESS TRK-2 jack is used.	Meter indicates 0 because it has been disconnected from circuit.
37	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted. 0 lamp remains lighted.
38	Depress AT 2 key.	At DISPLAY BUFFER— Lamp associated with ferrod sensor 1 lighted. At circuit under test— Relay B1 operated. Relay A1 remains operated.
39	At PERIPHERAL DECODER POINTS— Operate 2 key.	At PERIPHERAL DECODER POINTS— 2 lamp lighted. 0 and 1 lamps remain lighted.
40	Depress AT 2 key.	At test telephone set B— Listen for audible ringing on receiver. At circuit under test— Relay C1 operated. Relays A1 and B1 remain operated.
41	At PERIPHERAL DECODER POINTS— Release 1 and 2 keys.	At PERIPHERAL DECODER POINTS— 1 and 2 lamps extinguished. 0 lamp remains lighted.
42	Depress AT 2 key.	At test telephone set B— Audible ringing no longer present. At circuit under test— Relays B1 and C1 released. Relay A1 remains operated.
43	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.
	For No. 2B ESS offices— Type in: STOP:UTIL!	
44	At test and control unit— Set PD GROUP switch to the 12-17 position.	
45	At PERIPHERAL DECODER POINTS— Release 12 key.	At PERIPHERAL DECODER POINTS— 12 lamp extinguished.
46	At PERIPHERAL DECODER POINTS— circuit under test as follows:	At PERIPHERAL DECODER POINTS— Lamp for selected attendant loop circuit lighted.

STEP	ACTION	VERIFICATION
54	At PERIPHERAL DECODER POINTS— Operate 7 key.	At PERIPHERAL DECODER POINTS— 7 lamp lighted.
55	Depress AT 1 key. <i>Note:</i> Both telephones have talking battery but are not connected together.	At circuit under test— Relay B in attendant trunk circuit operated (split 1 state). At test telephone sets A and B— Talking path is no longer established between two telephone sets.
56	At PERIPHERAL DECODER POINTS— Release 7 key.	At PERIPHERAL DECODER POINTS— 7 lamp extinguished.
57	Depress AT 1 key.	At circuit under test— Relay B in trunk circuit released. At test telephone sets A and B— Talking path is established between telephone sets.
58	At PERIPHERAL DECODER POINTS— Operate 9 key.	At PERIPHERAL DECODER POINTS— 9 lamp lighted.
59	Depress AT 1 key. <i>Note:</i> Both telephones have talking battery but are not connected together.	At circuit under test— Relay D in attendant trunk circuit operated. At test telephone sets A and B— Talking path is no longer established between telephone sets.
60	At PERIPHERAL DECODER POINTS— Release 9 key.	At PERIPHERAL DECODER POINTS— 9 lamp extinguished.
61	At front of writing shelf on TTP— Remove test telephone sets A and B from ACCESS TRK-1 and ACCESS TRK-2 jacks, respectively.	
62	At test and control unit— Set PD GROUP switch to the 12-17 position.	
63	Depress AT 1 key.	At circuit under test— Relay E for the selected attendant loop circuit released.
64	At test and control unit— Set PD GROUP switch to the 0-5 position.	
65	Depress AT 1 and AT 2 keys.	At circuit under test— Relay A0 of attendant loop circuit for port 0 released. Relay A1 of attendant loop circuit for port 1 released.

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STEP	ACTION	VERIFICATION
66	At ACCESS TRUNK 1 CONTROL— Depress RLS key.	At ACCESS TRUNK 1 CONTROL— All lamps extinguished.
67	At ACCESS TRUNK 2 CONTROL— Depress RLS key.	At ACCESS TRUNK 2 CONTROL— All lamps extinguished. At MISC TEST CONTROL— P & E lamp extinguished.
68	At telephone set on TTP— Operate green release key.	Access trunks 1 and 2 released.

B. Transmission Loss Measurements

- 13 At front of writing shelf on TTP—
Connect TRANS MEAS—DBM-0 jack to SP
jack with appropriate cord.
- Note:* 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.
- 14 At ACCESS TRUNK 1 CONTROL—
Depress XMSN key.
- 15c If the TTP is equipped with a TMS—
At TRANSMISSION MEASURING CONTROL—
Set TEST SET switch to TMS position.
Set MEASURE switch to MEAS 1 position.
Set SEND switch to OFF position.
- 16d If TTP is not equipped with a TMS—
At front of writing shelf on TTP—
Connect portable TMS to TRANS MEAS-TM-1
jack using appropriate cord.
- 17 At TMS—
Set ADD DBM switch to 0 position.
- 18 At protector frame—
Locate the test points (TP) for the tip and
ring (T and R) leads for the attendant trunk
circuit. Remove the heat coil.
Connect T and R leads to the SP jack nearest
the protector frame using a 2W6A cord.
- Note:* Make sure no other connection is
made to the SP jack in the office during this
test procedure.
- 19 At test and control unit—
Set PD GROUP switch to the 0-5 position.

STEP	ACTION	VERIFICATION
20	At PERIPHERAL DECODER POINTS— Operate 0 and 1 keys.	At PERIPHERAL DECODER POINTS— 0 and 1 lamps lighted.
21	Depress AT 1 key.	At circuit under test— Relays A0 and B0 operated.
22	At test and control unit— Set PD GROUP switch to the 12-17 position.	
23	At PERIPHERAL DECODER POINTS— Release 12 and 13 keys.	At PERIPHERAL DECODER POINTS— 12 and 13 lamps extinguished.
24	At PERIPHERAL DECODER POINTS— Operate appropriate key for attendant loop circuit under test as follows:	At PERIPHERAL DECODER POINTS— Lamp for selected attendant loop circuit lighted.

PERIPHERAL DECODER POINTS KEY	OPERATED RELAY	ATTENDANT LOOP CIRCUIT
12	E0	0
13	E1	1
14	E2	2
15	E3	3
16	E4	4
17	E5	5

25	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At circuit under test— Relay E operated.
26	At test and control unit— Set PD GROUP switch to the 6-11 position.	
27	At PERIPHERAL DECODER POINTS— Release key operated in Step 24.	At PERIPHERAL DECODER POINTS— Lamp associated with key operated in Step 24 extinguished.
28	At PERIPHERAL DECODER POINTS— Operate 9 key.	At PERIPHERAL DECODER POINTS— 9 lamp lighted.
29	Depress AT 1 key.	At TMS— Meter indicates between 0 and -0.5 dBm (note level for reference use). At circuit under test— Relay D for the attendant trunk circuit operated.

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STEP	ACTION	VERIFICATION
30	At PERIPHERAL DECODER POINTS— Release 9 key.	At PERIPHERAL DECODER POINTS— 9 lamp extinguished.
31	Depress AT 1 key.	At TMS— Meter indicates 0 to -2.0 dBm less than the reference level established in Step 29.
32	At test and control unit— Set PD GROUP switch to the 0-5 position.	
33	At PERIPHERAL DECODER POINTS— Operate 0 key.	At PERIPHERAL DECODER POINTS— 0 lamp lighted.
34	Depress AT 2 key.	At TMS— Meter indicates 0 to -2.7 dBm less than the reference level established in Step 29. At circuit under test— Relay A0 in attendant loop circuit for port 0 remains operated.
<p>Note: If dBm loss exceeds 3 dBm, the negative impedance converter and converter balancing network needs to be checked.</p>		
35	At TRANSMISSION MEASURING CONTROL— Set MEASURE switch to the MEAS 2 position.	
36	At ACCESS TRUNK 2 CONTROL— Depress XMSN key.	At ACCESS TRUNK 2 CONTROL— XMSN lamp lighted. At TMS— Meter indicates 0 to -2.7 dBm less than the reference level established in Step 29.
37	At PERIPHERAL DECODER POINTS— Operate 1 key.	At PERIPHERAL DECODER POINTS— 1 lamp lighted. 0 lamp remains lighted.
38	Depress AT 2 key.	At TMS— Meter indicates 0 to -2.7 dBm less than the reference level established in Step 29.
39	At PERIPHERAL DECODER POINTS— Release 0 and 1 keys.	At PERIPHERAL DECODER POINTS— 0 lamp extinguished. 1 lamp extinguished.
40	Depress AT 1 key.	At TMS— Meter indicates 0 to -2.7 dBm less than the reference level established in Step 29. At circuit under test— Relay A0 in port 0 of attendant loop circuit released.

STEP	ACTION	VERIFICATION
41	Depress AT 2 key.	At TMS— Meter is disconnected. At circuit under test— Relay A1 in port 1 of attendant loop circuit released.
42	At test and control unit— Set PD GROUP switch to the 12-17 position.	
43	At PERIPHERAL DECODER POINTS— Depress AT 1 key.	At circuit under test— Relay E for attendant loop circuit selected in Step 24 released.
44	At protector frame— Remove cord connection from test points (TP) and SP jack.	
45	At front of writing shelf on TTP— Remove cord from SP jack and TRANS MEAS—DBM-0 jack.	
46e	If TTP is not equipped with TMS— At front of writing shelf on TTP— Remove cord from TRANS MEAS— TM-1 jack.	
47	At ACCESS TRUNK 1 CONTROL— Depress RLS key.	At ACCESS TRUNK 1 CONTROL— All lamps extinguished.
48	At ACCESS TRUNK 2 CONTROL— Depress RLS key.	At ACCESS TRUNK 2 CONTROL All lamps extinguished. At MISC TEST CONTROL— P & E lamp extinguished.
49	At telephone set— Operate green release key.	
50	Repeat all steps outlined in this section to test the remaining attendant loop circuits assigned to the attendant trunk circuit being tested.	
51	At maintenance TTY— Type in: M AC:RST:f d c! f = frame number d = data link number c = attendant console number.	At maintenance TTY— OK received if message was accepted and attendant console is restored to service.

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STEP	ACTION	VERIFICATION
52	After restoring the attendant console to service, restore the audit program as follows: At maintenance TTY type in: M AU RST!	At maintenance TTY— M AU ALL ATP message received when audits have been tested and all tests passed.
53	Notify attendant operator that test procedures have been completed and the attendant console has been restored to service.	

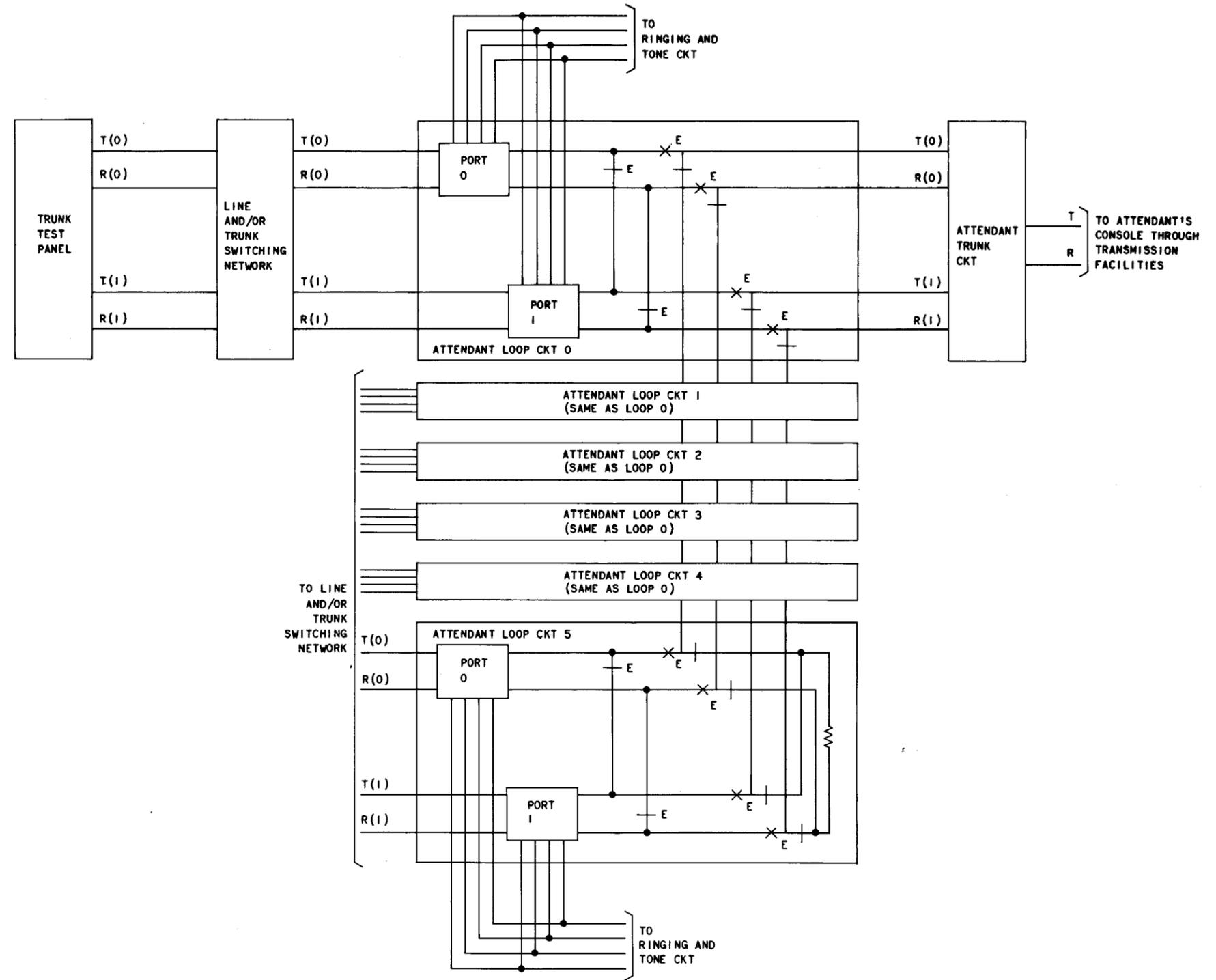


Fig. 1—Attendant Loop and Trunk Circuit Test Set Up