TRUNK CIRCUITS
TESTS USING AUTOMATIC INCOMING TEST CIRCUIT SD-25161-01
CROSSBAR TANDEM OFFICES

1. GENERAL

1.01 This section describes a method of testing trunks that appear on the office multiple, using the automatic incoming test circuit SD-25161-01.

1.02 This section is reissued to change the title to omit No. 1 Crossbar and to add the following:

(a) Replacement of REP-2/REP-2-SXS key with REP-2 key.

(b) Reference to trunk holdover guard test.

(c) Restriction on tests of trunks employing E1E signaling units.

(d) Straightforward test class for home office transmission measuring and noise checking circuit (code 104).

(e) Reference to L key in monitor receiver circuit.

(f) Tables A and C, showing symbols printed by teletypewriter. Former Table A is changed to Table B.

1.03 The tests covered are:

A. Test Line Test: The following features are checked. (1) Signaling and supervision of the trunk being tested. (2) Ringing, rering, or ring forward for the trunks so equipped. (3) An operate test of the A relay is made on revertive pulse trunks except those working over carrier. (4) An operate and nonoperate test is made of the L relay on panel trunks except those working over carrier. (5) A check for momentary opens of the tip and ring during supervisory relay test is made by operating the MO key. (6) A check is made of the three types of start pulsing signals on multifrequency and dial pulse trunks. (7) A test of the ability of a two-way trunk to lock in the off-hook signal until an originating sender is attached is made by operating the CCT key. (8) A timing check is made for slow sequence switches and elevator rods on panel incoming selectors, and a release test of the A relay on revertive pulse trunks is made by operating the REP-2 key. (9) A timing check is made on step-by-step incoming selectors on dial pulse trunks by operating the REP-2-SXS key (or the REP-2 key where the REP-2-SXS key is not furnished). (10) On completion of regular test of 2-way trunks, a trunk holdover guard time test is applied automatically.

B. Busy Line Test: This test, made to a busy line in offices arranged to return flashes or tone and flashes, checks the following features. (1) A nonoperate test of the A relay is made on all revertive pulse trunks except 48V panel trunks and trunks working over carrier. (2) A timing check is made for slow sequence switches and elevator rods on panel incoming selectors, and a release test of the A relay on revertive pulse trunks is made by operating the REP-2 key. (3) A timing check is made on step-by-step incoming selectors on dial pulse trunks by operating the REP-2-SXS key (or the REP-2 key where the REP-2-SXS key is not furnished). (4) Multifrequency and dial pulse trunks requiring three-digit outpulsing are passed by on this test.

Note: This test should not be made over trunks employing E1E signaling units.

C. Brush Continuity Test: This test checks the continuity of the brushes of panel incoming selectors only, to any chosen group. When provided, the added operation of the BCR key will cause the test circuit to make a

single recycle in the event of trouble and so avoid blocking on panel incoming selectors seized in an off-normal position with no actual trouble. All other type trunks are passed by on this test.

D. Continuity and Polarity Test: This test checks the continuity and polarity of all trunks except those straightforward types that have battery on the ring and ground on the tip when normal.

E. Transmission Test: This test checks operational and transmission features of outgoing trunks from crossbar tandem having access to far-end transmission measuring and noise checking circuit. Access is also provided, by a straightforward test class, to trunks to the home office transmission measuring and noise checking circuit. The Automatic Transmission Test and Control Circuit (ATTC) is used in making these tests. The test results may be recorded on a teletypewriter, if desired. A chart of print-out symbols is shown in Part 4.

1.04 Audible ringing or other supervisory signals may be monitored by means of a 716E receiver (see 2.02) connected to the T jack. If the test frame is provided with an L key, this key must be held operated while monitoring. If the test frame is not provided with an L key, observe the caution below:

Caution: It is not intended that the test receiver be left connected to the T jack during normal progress of the tests as false rering test failures may result. In addition, the test receiver may attenuate multifrequency pulses sent from the test circuit resulting in possible failures when testing high loss trunks.

1.05 When a teletypewriter is used to record trouble, the printed record will indicate the trunk number and the type of trouble. The trunk is indicated by a five-digit number in the first, second, third, fourth, and fifth positions:

Ten Thousands digit — Test Conn. Frame

Thousands digit — Test Connector

Hundreds digit — Select Magnet

Tens digit, Units digit — Hold Magnet

The trouble will be indicated by a letter in the seventh, eighth, or ninth position. See Table A.

TABLE A

LETTER POSITION 7 8 9	TROUBLE CATEGORY	TROUBLE LAMP
A-X-X	Key Pulse-Trunk Test	KP-TG
B-X-X	Busy Trunk	BY
D-X-X	Digit-Selection	TU-IB
E-X-X	Digit-Selection	TH-IG
G-X-X	Digit-Selection	H-FB
I-X-X	Digit-Selection	T-FT
L-X-X	Digit-Selection	U-FU
O-X-X	Flashing	SFL
P-X-X	Extra Pulse	EP
Q-X-X	Disconnect Failure	FDC/SDC
R-X-X	Supervision	CHT
X-A-X	A Relay Test	A-OPR
X-D-X	A Relay Test	A-NO
X-E-X	L Relay Test	L-OPR
X-G-X	L Relay Test	L-FO
X-I-X	Supervision	HIT
X-L-X	Flashing	FS1
X-O-X	Flashing	FS2
X-P-X	Overflow	OF
X-Q-X	Ring No. 1	RF1
X-R-X	Ring No. 2	RF2
X-X-P	Momentary Open	MO
X-X-A	High and Dry	HAD
X - -	Other	—

1.06 ***Lettered Steps:*** A letter a, b, c, etc, added to a step number in Parts 3 and 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

All Tests

2.01 Automatic incoming test circuit, SD-25161-01.

2.02 Test Receiver—716E receiver (or equivalent) attached to an R2DB cord, 6 feet long, equipped with a 347A plug (2W32A cord). See 1.04.

2.03 Teletypewriter control circuit, SD-68456-01, arranged for either one or two teletypewriters. This apparatus is optional.

Test C

2.04 Two 322A (make-busy) plugs

Test E

2.05 Automatic transmission test and control circuit, SD-68446-01.

3. PREPARATION

STEP	ACTION	VERIFICATION
All Tests		
1	Restore all operated test circuit keys.	
2	Operate RN key.	Test circuit restores to normal. N lamp lights.
3a	If test circuit does not restore to normal — Operate CA key momentarily.	Test circuit restores to normal. N lamp lights.
4	Restore RN key.	N lamp extinguished.
5b	If it is desired to pass all busy trunks — Operate APB key.	
6c	If incoming trunk test frame is arranged for connecting to either one or two teletypewriters and a printed record of transmission test results, and/or circuit operation failures, and/or busy trunks is desired — Operate PTR key. *Note:* A printed record of busy trunks is made only when the APB key of Step 5b is operated.	
7d	If trunks are divided into groups A and B and both groups are to be tested — Operate TST GR key to position A & B.	

STEP	ACTION	VERIFICATION
8e	If trunks are divided into groups A and B and group A only is to be tested — Operate TST GR key to position A.	

TABLE B

RECORD ON TTY NO.	GRA KEY POSITION	GRB KEY POSITION	SEE NOTE
Group A on 1, Group B on 2	TDT1	TDT2	1
Group A and B on 1	TDT1	TDT1	1
Group A and B on 2	TDT2	TDT2	1
Group A on 1	TDT1	TDT1 & TDT2	2
Group A on 2	TDT2	TDT1 & TDT2	2
Group B on 1	TDT1 & TDT2	TDT1	3
Group B on 2	TDT1 & TDT2	TDT2	3

Note 1: TST GR key must be in position A & B.

Note 2: TST GR key must be in position A or position A & B.

Note 3: TST GR key must be in position B or position A & B.

9f If trunks are divided into groups A and B and group B only is to be tested — Operate TST GR key to position B.

10g If two teletypewriters are provided and PTR key is operated — Operate keys per Table B to obtain the results shown in Table B.

11h If automatic repeat test is desired on other than transmission measurement failure, with test frame advance on successful completion of second trial and test frame blocking with failure to complete second trial — Operate AR key.

Note: Transmission measurement failures block the test frame on first trial.

STEP	ACTION	VERIFICATION
12i	If PTR key of Step 6c is operated and an automatic repeat is desired on other than transmission measurement failure or "high and dry" troubles, with test frame advance on second trial after printing a trouble record — Operate AAR key. *Note:* Transmission measurement failures block the test frame on first trial and "high and dry" failures will block the frame on second trial.	
Tests A and B		
→ 13j	If testing revertive pulse trunks, except those working over carrier or employing E1E signaling units, and it is desired to make release test of A relay, or timing check for slow sequence switches and elevator rods on panel incoming selectors — Operate REP-2 key.	
→ 14k	If testing dial pulse trunks, and it is desired to make a timing check for release of step-by-step incoming selectors — Operate REP-2-SXS key (or REP-2 key where REP-2-SXS key is not provided).	
Test E		
15*l*	If transmission test only is to be made (without noise measurement) — Operate TRANS key.	
16m	If transmission test and noise measurement are to be made — Operate TRANS & NOISE key.	
17n	If transmission test results for only those trunks that exceed noise check or deviation limits are desired — On automatic transmission test and control circuit — Operate XTP key. *Note:* The PTR key of Step 6c must be operated if the XTP key is operated.	

STEP	ACTION	VERIFICATION
18p	If deviation register readings are to be used — At deviation register — Set all deviation registers to 0000.	

4. METHOD

STEP	ACTION	VERIFICATION
	A. Test Line Test	
15*l*	If provided, and momentary open check is desired — Operate MO key.	
16m	If it is desired to test ability of a two-way trunk to lock in original off-hook signal until an originating sender is attached — Operate CCT key.	
17	Operate ST key.	Progress lamps light momentarily to show progress of test. If REP-2 or REP-2-SXS key is not operated — Test circuit proceeds to test each trunk automatically. If REP-2 or REP-2-SXS key is operated — Test circuit proceeds to test and make a single repeat test on each trunk automatically. When all trunks have been tested — EC lamp lights. Minor alarm sounds.
18	Restore ST key.	
19	Restore all operated keys to normal.	
20	Operate RN key.	Test circuit restores to normal. EC lamp extinguished. N lamp lights. Minor alarm silenced.
21	Restore RN key.	N lamp extinguished.
	B. Busy Line Test	
15	Operate BL key.	

STEP	ACTION	VERIFICATION
16	Operate ST key.	Progress lamps light momentarily to show progress of test. If REP-2 or REP-2-SXS key is not operated — Test circuit proceeds to test each trunk automatically. If REP-2 or REP-2-SXS key is operated — Test circuit proceeds to test and make a single repeat test on each trunk automatically. When all trunks have been tested — EC lamp lights. Minor alarm sounds.
17	Restore ST key.	
18	Restore all operated keys to normal.	
19	Operate RN key.	Test circuit restores to normal. EC lamp extinguished. N lamp lights. Minor alarm silenced.
20	Restore RN key.	N lamp extinguished.

C. Brush Continuity Test

13	Insert 322A plugs into IB and IG jacks of brush and group to be tested.	
14	Operate BC key.	
15j	If provided, and a recycle on first test trouble is desired — Operate BCR key.	
16	Operate ST key.	Progress lamps light momentarily to show progress of test. Test circuit proceeds to test each trunk automatically. When all trunks have been tested — EC lamp lights. Minor alarm sounds.
17	Restore ST key.	
18	Restore all operated keys to normal.	

STEP	ACTION	VERIFICATION
19	Operate RN key.	Test circuit restores to normal. EC lamp extinguished. N lamp lights. Minor alarm silenced.
20	Restore RN key.	N lamp extinguished.
21	Remove 322A plugs.	

D. Continuity and Polarity Test

13	Operate CP key.	
14	Operate ST key.	Progress lamps light momentarily to show progress of test. Test circuit proceeds to test each trunk automatically. When all trunks have been tested — EC lamp lights. Minor alarm sounds.
15	Restore ST key.	
16	Restore all operated keys to normal.	
17	Operate RN key.	Test circuit restores to normal. EC lamp extinguished. N lamp lights. Minor alarm silenced.
18	Restore RN key.	N lamp extinguished.

E. Transmission Test

Note: If PTR key is operated, teletypewriter prints test results as shown in Table C. However, if XTP key is also operated, test results will be printed for only those trunks that exceed noise check or deviation limit.

→ 19	Operate ST key.	Progress lamps light momentarily to show progress of test. Test circuit proceeds to test each trunk automatically. When all trunks have been tested — EC lamp lights. Minor alarm sounds. *Note:* Transmission test class assigned to trunks to code 104 test circuit is 3.9. Since both ITT and code 104 test circuit insert a 2 db pad in test path, calculated deviation will be +0.1.

STEP	ACTION	VERIFICATION
20	Restore ST key.	
21	Restore all operated keys to normal.	
22	Operate RN keys.	Test circuit restores to normal. EC lamp extinguished. N lamp lights. Minor alarm silenced.
23	Restore RN key.	N lamp extinguished.
24	If deviation register readings are required — Read registers and enter readings on proper form.	

TABLE C

	TRUNK IDENTITY					SPECIFIED LOSS				FAR-NEAR DEVIATION				NEAR-FAR DEVIATION						F-N		N-F
POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21 **	22	23 **
	Test Conn. Fr.	Test Connector	Select Magnet	Hold Magnet	Space	Tens or Letter*	Units	Tenths	Space	Plus or Minus	Tens	Units	Tenths	Space	Plus or Minus	Tens	Units	Tenths	Space		Space		

* If trunk trouble, see 1.05.

If transmission test failure,

And the letter is:	Then the trouble is:	With lamp indication:	**Letter or Space:	Indicates:	With Lamp
N	ATTC 3rd trial failure	HNCK	N	Noise limit exceeded —	
N	Far-Near loss over 20 db	FNO		at Far-end (Pos. 21)	FEN
				at Near-end (Pos. 23)	HEN
N	ATTC time out	MVT	U	Deviation limit —	
Y	Far-end 3rd trial failure	FNCK		Far-Near (Pos. 21)	FNU
				Near-Far (Pos. 23)	NFU
Y	Near-Far loss over 20 db	NFO	X	Trouble prevented noise	
T	Late tone arrival	LTA		check (Pos. 23 only)	
T	Late tone removal	LTR	Space	Satisfactory test	