

TRUNK CIRCUITS FROM DISTRICT OR OFFICE MULTIPLE TESTS USING AUTOMATIC INCOMING TEST CIRCUITS PANEL OFFICES

1. GENERAL

1.01 This section describes a method of testing 3-wire local and 2-wire interoffice incoming trunk circuits in panel and crossbar offices when these circuits originate on the district or office multiple. This test involves the use of automatic incoming selector test circuits ES-239810. It may also include the use of automatic incoming selector test circuit or ~~ES-239817~~ except that these frames may not be arranged to include all the features of the tests covered in this section.

1.02 This section is reissued to include the use of the timing test set SD-21984-01 and the use of the recorder circuit SD-21978-01 in conjunction with the test circuit, and to bring the section up to date. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The tests covered are:

A. Test Line Test: The test circuit controls the incoming and final selections in tests to a panel office and directs the final selector to a group of final multiple test lines which are wired as a PBX group. In tests to a crossbar office, the test circuit pulses the incoming and final selections into a terminating sender, the terminating sender in conjunction with a terminating marker closes a path to an idle incoming trunk test line. The test line in a panel or crossbar office performs the following tests of the incoming trunk equipment: (1) A nonoperate or pretrip test of the ringing relay. (2) An operate or trip test of the ringing relay. (3) A test of immediate or machine ringing as the case may be. In addition, the following tests are made depending upon the type of termination and the type of test circuit:

TYPE OF TEST	Type of Testing Circuit			
	SD-20042-01		ES-239810	
	Type of Termination			
	PANEL	CROSSBAR	PANEL	CROSSBAR
Trunk Guard Test Before Testing	Yes	Yes	Yes	Yes
Nonoperate Test of L Relay	Yes	No*	No	No
Operate Test of L Relay	Yes	No*	Yes	No*
Release Test of L Relay	No	No	Yes	No*
Local Incoming Selectors				
Nonoperate Test of A Relay	Yes	No	No	No
24V Incoming Selectors				
Operate Test of A Relay	Yes	Yes	Yes	Yes
Momentary Open Test After Selection — 2-Wire Trunks	No	No	Yes	Yes
Operate Test of Supervisory Relay	Yes	Yes	Yes	Yes
Chattering Test of Supervisory Relay	Yes	Yes	No	No
Trunk Guard Test After Testing	Yes	Yes	Yes	Yes

Note 1: While the incoming and final selections are being completed and when a test line has been selected, the tests outlined are applied to the incoming selector or trunk circuit depending upon the testing circuit involved, except when testing reverting pulse trunks equipped with carrier. In this case the test frame is isolated from the incoming trunks by signaling units. The test frame looks into a relay in the signaling unit at the originating end of the trunk. Marginal tests of this relay are not required. However, to satisfy the test frame it is wired so that the least critical test is made of the following features:

L relay operate, L relay nonoperate
A relay operate

***Note 2:** During the test of a crossbar incoming trunk the L relay to which these tests are applied is in the terminating sender. With the feature provided, the highest value test resistance is automatically inserted in the L nonoperate test. Only a nominal amount of resistance is cross-connected in the test circuit, during the L operate test, to provide for the operation of the test circuit STP relay.

Note 3: In offices having 4-party selective ringing, the test line test covers only one ringing choice and if there is a capacitor instead of a resistor in series with the PW relay, a ringing polarity test is not made. To make a complete bell ringing test on these circuits use a wagon type test set and follow procedure outlined in Section 215-320-502 for ground cutoff relay offices or Section 215-522-501 for battery cutoff relay offices.

B. Busy Line Test: For this test, incoming and final selections are made as in Test A, except that the final selector circuit in a panel office or the terminating marker in a No. 1 crossbar office is directed to a busy line. This test provides the means of making a rapid test of the incoming trunk equipment. The following features are tested: (1) Trunk guard test. (2) Nonoperate test of the L relay. (3) Operate test of the L relay. (4) A second operate test of 3-wire incoming selector L relays. (5) Operate

test of the A relay in 24-volt incoming selector circuits. (6) A release test. The A relay may be incorporated in this test by the operation of the REPI key, the test circuit makes a single repeat test of each circuit, the nonoperate test of the L relay is not made on the second test to detect incoming selectors which are slow in returning to normal within a measured interval of time.

C. Continuity and Polarity Test: This test checks the continuity and polarity of the idle incoming selectors and for trunk circuits (including tandem trunk circuits where the feature is provided) stuck off-normal in the reverse battery position. Operation of the BCR key in conjunction with the BC key will cause the test circuit to make a single repeat test of an incoming selector seized by the test circuit in the off-normal position, restoring the off-normal incoming selector circuit to normal automatically.

D. Brush Continuity Test: This test provides a means of checking the continuity and closure of multiple brushes on the incoming selector circuit. With this test the No. 1 final selector multiple brush will be tripped and the final selector is directed to telltale during tens selection. Where the test circuit is wired to make a theoretical No. 5 final brush selection on this test, a final brush will not be tripped.

Note: Where the test frame cross connections are so arranged, this test will not be made on trunks to crossbar offices.

1.04 CAP or NO CAP Key: In cases where repeating incoming selectors are tested, or where access to repeating or nonrepeating incoming selectors is gained through test selectors on a distant office multiple so that the test is made only over the trunk conductors from the distant office multiple and not over the total loop over which the circuit may be required to function, cross connections of the director switches, on test frames wired per ES-239810, are arranged to provide for introducing into the fundamental testing circuit one or more steps of an artificial cable network. This network consists of two steps of 150 ohms each and five steps of 300 ohms each. When failures occur during tests in which the

artificial cable network is normally used, cutting out some or all of the added resistance and capacity may aid in determining the nature of the troubles. Accomplish this by operating the CAP (or NO CAP) key, if this feature is provided. Operation of this key on test frames wired per ES-239810, when testing repeating incoming selectors, eliminates the capacity of the network and cuts out of the fundamental circuit 200 ohms as well as the first two 150-ohm steps and the first 300-ohm step of the network. When testing non-repeating incoming selectors, operation of the key cuts out all of the capacity of the network and reduces the resistance by 200 ohms.

Note: In the case of test frames having the circuit SD-20042-01, means for introducing additional capacity and a NO CAP key to eliminate it, when desired, were provided only in the earlier installations, since it has been found impracticable, in general, to employ a lumped capacity for building out the trunk capacity to a maximum. For this reason the director switch cross connections on frames wired per SD-20042-01 should not be arranged for the introduction of additional capacity.

1.05 The timing test set SD-21984-01 may be used in conjunction with incoming test circuits SD-20042-01 and ES-239810 to detect incoming selector circuits which are slow in completing incoming brush and incoming group selections. If the incoming circuit fails to complete incoming brush and group selections within 2.75 to 3.25 seconds, the timing test circuit will cause the test frame to block and bring in an alarm. The TBL lamp will light on the timing test set.

1.06 The recorder circuit SD-21978-01 is designed to start and control the test frame on an automatic basis or to control it when started on a manual basis. Detailed information on the operation and functions of the recorder circuit is covered in Section 215-181-501. This circuit is designed to function with test circuits equipped with locating lamps, such as SD-20042-01.

1.07 Local instructions should be followed with reference to recording and reporting any register operations caused by performing these tests.

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 Incoming selector test circuits SD-20042-01, ES-239810, ES-239387 and ES-239547.

2.02 184B (make busy) plugs, as required.

2.03 32A test set.

2.04 Timing test set SD-21984-01 and patching cords: two P2J cords, 6 feet long, equipped with two 310 plugs (two 2P9C cords), one P3K cord, 6 feet long, equipped with two 310 plugs (3P15A cord).

2.05 Recorder circuit SD-21978-01.

3. PREPARATION

STEP	ACTION	VERIFICATION
All Tests		
1	Restore to normal any keys of the test circuit which may be in the operated position.	
2a	If sequence switches or 200-type selectors are off-normal — Operate RN key.	All sequence switches and 200-type selectors restored.

SECTION 215-120-501

STEP	ACTION	VERIFICATION
3a	Restore RN key.	
4b	If provided, operate CAP or NO CAP key as required. See 1.04.	
5c	If Test B, busy line test, is required — Operate BL or BY key and REP1 key, if desired.	
6d	If Test C, continuity and polarity test, is required — Operate CP and APB keys.	
7e	If timing test set is used in conjunction with test circuit — Patch timing test set BAT-G jack to incoming test circuit A jack, using P2J cord.	
8e	Momentarily operate PREL key of timing test set several times.	TBL lamp lights for each operation of PREL key.
9e	Patch timing test set TM1 jack to incoming test circuit TM1 jack, using P3K cord.	
10e	Patch timing test set TM2 jack to incoming test circuit TM2 jack, using P2J cord.	
11e	Operate TMG key of timing test set to TST position.	
12f	If recorder circuit is to be used in conjunction with test circuit — If test circuit is to be started manually — At recorder circuit — Operate associated MST- key.	At recorder circuit — Associated TF- lamp lights when ST key of test circuit is operated.
13g	If test circuit is to be started automatically by recorder circuit — At recorder circuit — Set CL timer for time test circuit is required to start testing.	
14g	Operate associated AST- key.	Associated TF- lamp lights when CL timer contacts close.

4. METHOD

STEP	ACTION	VERIFICATION
Tests A, B and C		
15h	If testing a particular circuit — Operate PC key.	

STEP	ACTION	VERIFICATION
16h	Operate U, T, GN, one or more TWA, TWB, etc, keys and OC key if provided, to direct test selector to location of circuits to be tested.	
17h	Operate ST key.	Test circuit proceeds to location determined by keys operated in previous step. BD or BO lamp lighted indicates a busy district or office test selector. BY or TA lamp lights and minor alarm sounds when district or office test selector is busy for a predetermined time.
18h	When BD or BO lamp is extinguished — Operate CA or MPB key as required until test selector is located on terminal associated with particular circuit to be tested. If test circuit is not equipped with locating lamps, it will be necessary to raise test selector manually to the desired terminal. <i>Note:</i> If recorder circuit is used in conjunction with test circuit, recorder circuit will cause test circuit to pass by busy circuits on a test circuit time-out basis.	
19i	If repeat tests are required on a particular circuit — Operate REP key.	
20h	If testing a particular circuit — Restore PC key.	Test circuit proceeds to test trunk circuits to which it is directed. BI lamp lighted indicates that trunk circuit selected for test is busy. BY or TA lamp lights and minor alarm sounds if trunk circuit is busy for a predetermined time.
21g	If recorder circuit is used in conjunction with test circuit on an automatic start basis — Restore ST key.	When CL timer contacts close at recorder circuit — Test circuit proceeds to test trunk circuits to which it is directed. BD or BO lamp lighted indicates a busy district or office test selector. BY or TA lamp lights and minor alarm sounds when district or office test selector is busy for a predetermined time. If end of cycle is reached — Test circuit restored to normal under control of recorder circuit. At recorder circuit — TF- lamp extinguished.

SECTION 215-120-501

STEP	ACTION	VERIFICATION
22j	<p>If not testing a particular circuit — Operate APB key if busy circuits are to be passed by automatically.</p> <p><i>Note:</i> When recorder circuit is used in conjunction with test circuit, recorder circuit will cause test circuit to pass by busy on a test circuit time-out basis.</p>	
23j	Operate ST key.	<p>Test circuit proceeds to test trunk circuits to which it has access. BD or BO lamp lighted indicates a busy district or office test selector. BI lamp lighted indicates a busy trunk circuit. BY or TA lamp lights and minor alarm sounds when test selector or trunk circuit is busy for a predetermined time. When all trunk circuits are tested — EC lamp lights. Minor alarm sounds.</p>
24g	<p>If recorder circuit is used in conjunction with test circuit on an automatic start basis — Restore ST key.</p>	<p>When CL timer contacts close at recorder circuit — Test circuit proceeds to test trunk circuits to which it has access. BD or BO lamp lighted indicates a busy district or office test selector. BY or TA lamp lights and minor alarm sounds if test selector is busy for a predetermined time. When all trunk circuits are tested — Test circuit restored to normal under control of recorder circuit. All lamps extinguished. At recorder circuit — Associated TF- lamp extinguished.</p>
25	<p>When testing is finished — Restore ST key.</p>	<p>If recorder circuit is used in conjunction with test circuit on a manual start basis — Associated TF- lamp extinguished.</p>
26	Operate RN key.	<p>Test circuit restored to normal. At test circuit — All sequence switches and 200-type selectors restored to normal. All lamps extinguished. If not testing a particular circuit — EC lamp extinguished. Minor alarm silenced.</p>
27	Restore RN key.	

STEP	ACTION	VERIFICATION
28e	If timing test set is used in conjunction with test circuit — Remove patching cords from TM1, TM2 and A jacks.	
29e	At timing test set — Restore TMG key.	
30f	If recorder circuit is used in conjunction with test circuit on a manual start basis — At recorder circuit — Restore associated MST- key.	
31g	If recorder circuit is used on an automatic start basis — At recorder circuit — Restore associated AST- key.	

D. Brush Continuity Test

15	Operate BC key.	
16h	If brush continuity recycle is required — Operate BCR key.	
17i	If particular circuit test is required — Operate PC key.	
18i	Operate U, T, GN, one or more TWA, TWB, etc, keys and OC key if provided, to direct test selector to location of circuits to be tested.	
19i	Operate ST key.	Test circuit proceeds to location determined by keys operated in previous step. BD or BO lamp lighted indicates a busy district or office test selector. BY or TA lamp lights and minor alarm sounds when district or office test selector is busy for a predetermined time.
20i	When BD or BO lamp is extinguished — Operate CA or MPB key as required until test selector is located on terminal associated with particular circuit to be tested. If test circuit is not equipped with locating lamps, it will be necessary to raise test selector manually to desired terminal.	
	<i>Note:</i> If recorder circuit is used in conjunction with test circuit, recorder circuit will cause test circuit to pass by busy circuits on a test circuit time-out basis.	

SECTION 215-120-501

STEP	ACTION	VERIFICATION
21j	If repeat tests are required on a particular circuit — Operate REP key.	
22	Operate GN-IB and OC-IG or B and G keys for incoming brush and incoming group selections required, depending upon the type of test circuit in use.	
23i	If particular circuit test is required — Restore PC key.	Test circuit proceeds to test trunk circuits to which it is directed. BI lamp lighted indicates trunk circuit selected for test is busy. BY or TA lamp lights and minor alarm sounds if trunk circuit is busy for a predetermined time.
24g	If recorder circuit is used in conjunction with test circuit on an automatic start basis — Restore ST key.	When CL timer contacts close at recorder circuit — Test circuit proceeds to test trunk circuits to which it is directed. BD or BO lamp lighted indicates a busy district or office test selector. BY or TA lamp lights and minor alarm sounds when district or office test selector is busy for a predetermined time. If end of cycle is reached — Test circuit restored to normal under control of recorder circuit. At recorder circuit — TF- lamp extinguished.
25k	If not testing a particular circuit — Operate APB key if busy circuits are to be passed by automatically. <i>Note:</i> When recorder circuit is used in conjunction with test circuit, recorder circuit automatically passes by busy circuits on a test circuit time-out basis.	
26k	Operate ST key.	Test circuit proceeds to test trunk circuits to which it has access. BD or BO lamp lighted indicates a busy district or office test selector. BI lamp lighted indicates a busy trunk circuit. BY or TA lamp lights and minor alarm sounds if district or office test selector or trunk circuit is busy (recorder circuit not used) for a predetermined time. When all trunk circuits are tested — EC lamp lights. Minor alarm sounds.

STEP	ACTION	VERIFICATION
27g	If recorder circuit is used in conjunction with test circuit on an automatic start basis — Restore ST key.	When CL timer contacts close at recorder circuit — Test circuit proceeds to test trunk circuits to which it is directed. BD or BO lamp lighted indicates a busy district or office test selector. BY or TA lamp lights and minor alarm sounds when district or office test selector is busy for a predetermined time. When all trunk circuits are tested — Test circuit restored to normal under control of recorder circuit. All lamps extinguished. At recorder circuit — Associated TF- lamp extinguished.
28	When testing is finished and recorder circuit is not used in conjunction with test circuit on an automatic start basis — Restore ST key.	If recorder circuit is used in conjunction with test circuit on a manual start basis — At recorder circuit — Associated TF- lamp extinguished.
29	Operate RN key.	Test circuit restored to normal. At test circuit — All lamps extinguished. If not testing a particular circuit — EC lamp extinguished. Minor alarm silenced.
30	Restore RN key.	
31f	If recorder circuit is used in conjunction with test circuit on a manual start basis — At recorder circuit — Restore MST- key.	
32g	If recorder circuit is used in conjunction with test circuit on an automatic start basis — At recorder circuit — Restore associated AST- key.	
33e	If timing test set is used in conjunction with test circuit — At test circuit — Remove patching cords from TM1, TM2 and A jacks.	
34e	At timing test set — Restore TMG key.	