

TOLL SWITCHING TRUNKS TO STEP-BY-STEP OFFICES

MISCELLANEOUS TESTS

NO. 1 TOLL SWITCHBOARD

1. GENERAL

1.01 This section describes methods of making miscellaneous tests of toll switching trunks to step-by-step offices from the No. 1 toll switchboard.

1.02 This section has been reissued to cover trunks arranged for 2000 ohm loops, to cover Busy Indication Test when Intertoll Dialing or SXS Tandem Train Multiple is provided, to remove group busy tone test, and to add busy and idle indicating lamp tests.

1.03 The tests are divided as follows:

- (A) Paths Busy Test
- (B) Continuity, Polarity and Current Flow Test - Repeated Dialing Trunks
- (C) Continuity, Polarity and Current Flow Test - Loop Dialing Trunks - Loop Dialing Position
- (D) Continuity, Polarity and Current Flow Test - Loop Dialing Trunks - Repeated Dialing Position
- (E) Group Busy Test
- (F) All-Trunks-Busy Register Test
- (G) Test of Busy Lamps
- (H) Test of Idle Indicating Lamps
- (J) Toll Identification Tone Test
- (K) Busy Indication Test - When Intertoll Dialing or SXS Tandem Train Multiple is Provided

1.04 Tests (B), (C) and (D) apply to all trunks except those having the toll switching trunk jack wired through a repeating coil in the toll office. Test (C) applies to loop dialing trunks appearing at a toll position arranged for loop dialing. Test (D) applies to loop dialing trunks appearing at a toll position arranged for repeated dialing.

1.05 Test (E) applies only when the all-trunks-busy registers are located in the toll office.

1.06 Test (J) applies only where the intercepting trunks in the step-by-step office are arranged to provide for toll identification tone.

1.07 Test (H) applies only to trunks provided with an intertoll dialing multiple or a SXS tandem train multiple.

1.08 Tests should preferably be made from the end position of a lineup in order to include all multiple wiring, and in case more than one lineup is involved the tests should be scheduled so that they are fairly equally distributed between the lineups.

2. APPARATUS

All Tests

2.01 Operator's Telephone Set.

Tests (B) and (C)

2.02 35 Type Test Set.

2.03 One P3E Cord equipped with a No. 310 (or No. 110) Plug at each end (3P7A) or (3P6B).

2.04 100,000 Ohm Voltmeter, such as Volt-ohmmeter per KS-7345, (if voltage is to be checked at the toll office).

Test (H)

2.05 Head receiver equipped with cord, test clip and test pick.

2.06 No. 893 cord equipped with No. 360A tools (1W13A) with 2 No. 365 tools.

3. PREPARATION

3.01 Connect an operator's telephone set to the position at which the tests are to be made.

3.02 Operate the position key to cancel the automatic ringing feature if such a key is provided.

4. METHOD

4.01 In some of the tests it is necessary to place calls for selector levels or connector terminals. The method of making a call depends upon the type of equipment involved and is described under (1), (2) and (3) below. In each case a busy test should be made to avoid connecting to a busy trunk.

(1) Dialing Trunks - Using Cords Other Than Type A Cords: Connect a trunk cord to the trunk to be tested and operate

4.01 (Continued)

┌ the monitoring key or the position dialing key as required. Dial the desired number and then operate the talking key.

(2) Dialing Trunks - Using Type A Cords:
 Connect a trunk cord to the trunk to be tested and operate the talking key and the dialing key. Dial the desired number and then restore the dialing key to normal.

→ (3) Straightforward Trunks: Connect a trunk cord to the trunk to be tested, with the talking key operated, and listen for order tone. Upon hearing order tone give the "B" operator the desired number.

(A) Paths Busy Test

With Vacant Incoming Selector Level

4.02 Place a call, as covered in 4.01, for a vacant incoming selector level in the step-by-step office over a trunk other than the one to be tested. If an intercepting operator answers inform her that the trunk is being held for test. Leave the cord circuit, used in placing the call, connected to the trunk in order to hold a busy condition on the selector terminal. If the selector level is not split, this should cause the entire level to test busy. Restore the talking and dialing keys to normal.

4.03 If the vacant level in the step-by-step office is split and connected to two or more intercepting trunks, repeat the procedure described in 4.02 a sufficient number of times to make the entire level test busy.

4.04 Place a call over the trunk to be tested for the selector level used for test and observe that the cord supervisory lamp flashes at the regular "all paths busy" rate.

4.05 At the completion of the test of a trunk, disconnect the cord circuit from the trunk jack.

4.06 To test the trunks used for making a selector level busy, substitute a tested trunk for one of the trunks used for busying purposes. Test the trunk thus released in accordance with 4.04.

Without Vacant Incoming Selector Level

4.07 If a vacant level is not available any working level on the incoming selector can be used, in which case two people are required in making the test. The tester at the toll office should establish a talking connection with an assistant at the incoming selector bay in the step-by-step office. After the tester in the toll

office has made connection to the trunk to be tested, the assistant should connect ground to the incoming selector sleeve wiper (at the test jack assembly, if possible). The tester then dials the working switch level to be used for test purposes. The incoming selector should step to the proper level and trunk hunt to the eleventh rotary step. As soon as the eleventh step is reached the assistant should remove the sleeve ground. In the eleventh rotary step position "paths busy" flashes are returned to the toll office to flash the toll cord supervisory lamp.

4.08 Upon receipt of the proper flashes disconnect the cord circuit from the trunk jack.

(B) Continuity, Polarity and Current Flow Test - Repeated Dialing Trunks

4.09 Locate a 35 type test set at the position at which tests are to be made.

4.10 Set the resistance sliders to the extreme left so that the resistance in series with the milliammeter will be at its minimum.

4.11 The keys and switches should be arranged as shown in the following table.

<u>Keys</u>	<u>Position</u>	<u>Switches</u>	<u>Position</u>
1	Open	G	Open
2	Open	L	Closed
			to 10
3	Closed	Res	0
4	Open		
BATT &			
GRD CO	Operated		
REV	Normal		

4.12 Connect the S binding post to the L1 binding post with a piece of wire.

4.13 Connect a trunk cord, with the talking key operated, to the EXT KEY - 3R jack of the test set.

4.14 Connect one plug of the P3E cord to the TEST - T & R jack of the test set.

4.15 Make a busy test of the trunk to be tested by touching the tip of the plug at the free end of the P3E cord to the sleeve of the trunk jack.

4.16 If the trunk is not busy, plug the free end of the P3E cord into the trunk jack.

┌ 4.17 Operate the monitoring key or the position dialing key as required to prepare for dialing. Dial a local office number. Do not ring on the trunk. Restore the monitoring or dialing key to normal.

4.18 Close the locking lever of key 1 and observe the reading of the milliammeter. If the trunk is properly connected, the meter should show a positive reading of current, ordinarily between .0114 and .0135 ampere, except when the toll cords are equipped with 89 type relays in which case the limit should ordinarily be between .0130 and .0150 ampere.

4.19 If the value falls outside the limits specified in the preceding paragraph check the voltage conditions as covered in the following paragraph. The current limits are given in the following tables.

Note: If the current limits indicated are not met, it may be because of incorrect compensating resistance values at the local office or because of low trunk insulation resistance. The values of current in the tables do not take into account any leakage current that may exist.

Toll Cords With Other Than 89 Type Relays

<u>Voltage at Local Office</u>	<u>Voltage at Toll Office</u>	<u>Trunk Loop Current Limits</u>
45	43.3	.0107 to .0121
46	44.2	.0110 to .0124
47	45.2	.0112 to .0127
48	46.2	.0114 to .0129
49	47.1	.0117 to .0132
50	48.1	.0119 to .0135

Toll Cords With 89 Type Relays

<u>Voltage at Local Office</u>	<u>Voltage at Toll Office</u>	<u>Trunk Loop Current Limits</u>
45	43.5	.0122 to .0135
46	44.4	.0125 to .0138
47	45.4	.0128 to .0141
48	46.3	.0130 to .0144
49	47.3	.0133 to .0147
50	48.3	.0136 to .0150

4.20 The voltage may be read at either the local or the toll office. If the voltage value is obtained from the local office, the value as read at the distributing fuse panel containing the individual fuses for the trunks should be employed rather than the power board voltage. If the voltage is obtained at the toll office, a voltmeter of 100,000 ohms resistance should be used and connected to the tip and ring of an idle toll switching trunk. The voltage cannot be obtained by making connection to the switchboard jack since the jack is not cut through to the trunk conductors when the trunk is idle. Connection can be made to the trunk conductors at the M.D.F. The voltage need only be read on one trunk in a group.

4.21 Remove the P3E cord from the trunk jack and open the locking lever of key 1.

4.22 Repeat the operations covered in 4.15 to 4.19 and 4.21 for any additional trunks to be tested.

(C) Continuity, Polarity and Current Flow Test - Loop Dialing Trunks - Loop Dialing Position

4.23 Proceed as described in 4.09 to 4.16 inclusive. Operate the monitoring key or the position dialing key as required to prepare for dialing. Restore the monitoring or dialing key to normal.

4.24 Close the locking lever of key No. 1 and operate the REV key.

4.25 Observe the reading of the milliammeter. If the trunk is properly connected the meter should show a positive reading of current, ordinarily between .0365 and .0460 ampere for 800 ohm loops and between .0275 and .0340 ampere for 1200 ohm loops and between .0190 and .0230 ampere for 2000 ohm loops.

4.26 If the value falls outside the limits specified in the preceding paragraph check the voltage conditions as covered in the following paragraph. The current limits are given in the following tables.

Note: If the current limits indicated are not met, it may be because of incorrect compensating resistance values at the local office or because of low trunk insulation resistance. The values of current in the tables do not take into account any leakage current that may exist.

800 Ohm Loop

<u>Voltage at Local Office</u>	<u>Voltage at Toll Office</u>	<u>Trunk Loop Current Limits</u>
45	44.5	.0340 to .0410
46	45.5	.0350 to .0420
47	46.4	.0355 to .0430
48	47.4	.0365 to .0440
49	48.4	.0375 to .0450
50	49.4	.0380 to .0460

1200 Ohm Loop

<u>Voltage at Local Office</u>	<u>Voltage at Toll Office</u>	<u>Trunk Loop Current Limits</u>
45	44.3	.0260 to .0305
46	45.3	.0265 to .0315
47	46.3	.0270 to .0325
48	47.2	.0275 to .0330
49	48.2	.0280 to .0335
50	49.2	.0290 to .0340

2000 Ohm Loop

<u>Voltage at Local Office</u>	<u>Voltage at Toll Office</u>	<u>Trunk Loop Current Limits</u>
45	43.9	.0175 to .0205
46	44.9	.0180 to .0210
47	45.8	.0185 to .0215
48	46.8	.0190 to .0220
49	47.8	.0195 to .0225
50	48.8	.0200 to .0230

4.27 The voltage may be read at either the local or toll office. If the voltage value is obtained from the local office, the value as read at the distributing fuse panel containing the individual fuses for the trunks should be employed rather than the power board voltage. If the voltage is obtained at the toll office, a voltmeter of 100,000 ohms should be used and connected to the tip and ring of an idle toll switching trunk. The voltage cannot be obtained by making connection to the switchboard jack since the jack is not cut through to the trunk conductors when the trunk is idle. Connection can be made to the trunk conductors at the M.D.F. The voltage need only be read on one trunk of a group.

4.28 Remove the P3E cord from the trunk jack and open locking lever of key 1.

4.29 Repeat the operations covered in 4.15, 4.16, 4.23 to 4.26 and 4.28 for any additional trunks to be tested.

(D) Continuity, Polarity and Current Flow Test - Loop Dialing Trunks - Repeated Dialing Position

4.30 Proceed as covered in 4.09 to 4.17, inclusive.

4.31 Close the locking lever of key No.1 and observe the reading of the milliammeter. If the trunk is properly connected, the meter should show a positive reading of current, ordinarily between .0145 and .0175 ampere for 800 ohm and 1200 ohm loops and between .0190 and .0230 ampere for 2000 ohm loops.

4.32 If the value falls outside the limits specified in the preceding paragraph, check the voltage conditions as covered in the following tables.

Note: If the current limits indicated are not met, it may be because of incorrect compensating resistance values at the local office or because of low trunk insulation resistance. The values of current in the tables do not take into account any leakage current that may exist.

800 Ohm Loop

<u>Voltage at Local Office</u>	<u>Voltage at Toll Office</u>	<u>Trunk Loop Current Limits</u>
45	44.5	.0138 to .0155
46	45.5	.0139 to .0160
47	46.4	.0142 to .0165
48	47.4	.0145 to .0165
49	48.4	.0148 to .0170
50	49.4	.0150 to .0175

1200 Ohm Loop

<u>Voltage at Local Office</u>	<u>Voltage at Toll Office</u>	<u>Trunk Loop Current Limits</u>
45	44.3	.0138 to .0155
46	45.3	.0139 to .0160
47	46.3	.0142 to .0165
48	47.2	.0145 to .0165
49	48.2	.0148 to .0170
50	49.2	.0150 to .0175

2000 Ohm Loop

<u>Voltage at Local Office</u>	<u>Voltage at Toll Office</u>	<u>Trunk Loop Current Limits</u>
45	43.9	.0175 to .0205
46	44.9	.0180 to .0210
47	45.8	.0185 to .0215
48	46.8	.0190 to .0220
49	47.8	.0195 to .0225
50	48.8	.0200 to .0230

4.33 The voltage may be read at either the local or toll office. If the voltage value is obtained from the local office, the value as read at the distributing fuse panel containing the individual fuses for the trunks should be employed rather than the power board voltage. If the voltage is obtained at the toll office, a voltmeter of 100,000 ohms should be used and connected to the tip and ring of an idle toll switching trunk. The voltage cannot be obtained by making connection to the switchboard jack since the jack is not cut through to the trunk conductors when the trunk is idle. Connection can be made to the trunk conductors at the M.D.F. The voltage need only be read on one trunk of a group.

4.34 Remove the P3E Cord from the trunk jack and open the locking lever of key 1.

4.35 Repeat the operations covered in 4.15, 4.16, 4.17, 4.31, 4.32 and 4.34 for any additional trunks to be tested.

(E) Group Busy Test

4.36 Dialing Trunks: Connect a trunk cord, with the cord keys normal, to the first trunk in the group to be tested.

4.37 When the position is arranged for loop dialing operate the keys necessary to connect the dialing circuit. When the position is arranged for repeated dialing and the sleeve relay is not arranged to operate on plug in, operate the keys necessary to connect the dialing circuit and move the dial off normal.

4.38 Repeat this operation until a trunk cord has been connected to each idle trunk associated with the group busy lamp.

4.39 Proceed as covered in 4.44 to 4.46.

4.40 Straightforward Trunks: Connect a trunk cord to the first trunk in the group to be tested and call any connector terminal number ending in 99.

4.41 If the supervisory lamp does not flash at the regular busy-back rate, listen for the answer of an intercepting operator. When the operator answers advise here that the terminal is being held for test. The talking key should then be restored to normal.

4.42 If the supervisory lamp flashes, indicating a busy terminal, restore the talking key.

4.43 Repeat these operations until a trunk cord has been connected to each idle trunk associated with the group busy lamp. Do not call the same terminal over more than three trunks.

4.44 Observe that the group busy lamp lights and that all multiple appearances are lighted. Check for dim lamps.

4.45 Remove and quickly reinsert each trunk cord in turn and observe that the group busy lamp is extinguished while the plug is out of the jack.

4.46 Remove all cords from the trunk jacks.

(F) All-Trunks-Busy Register Test

4.47 This test covers methods involving not only a check of the proper operation of the register circuit when all trunks in an office group are made busy but also a check to see that the contacts of the lamp group busy relay, individual to each lamp group, properly make in their normally operated position to avoid false registrations when only a portion of the trunks are busy. If it is only desired to check that the register operates when all trunks are busy, omit the portion of the test covered in 4.51.

4.48 Advise the supervising operator that a test is to be made which will result in all trunks to the "_____ " office being busy for a short interval of time.

4.49 Take the readings of all working all-trunks-busy registers, recording the register numbers and the names of the trunk groups. After completing tests of all groups to be tested at one time, take the readings of all working all-trunks-busy registers again. Note that no registers have been operated falsely on groups not under test.

4.50 Make all trunks associated with the register under test busy following the method given in Test (E). The all-trunks-busy register should operate once.

4.51 Remove and quickly reinsert a trunk cord in each of the lamp groups associated with the register under test. The register should operate a corresponding number of times.

4.52 As soon as the operations covered in the above paragraphs have been completed, remove all cords from the trunk jacks. Then verify that the register has operated properly.

4.53 Report to the Traffic Department the number of operations made on each register.

(G) Test of Busy Lamps

4.54 Note that the trunk to be tested is not busy by observing that the associated busy lamps are extinguished.

4.55 Connect a trunk cord, with the cord keys normal, to the trunk to be tested. Observe that the busy lamps associated with the trunk are lighted at all appearances. Check for dim lamps.

4.56 Remove the plug from the trunk jack. Observe that the busy lamps are extinguished at all appearances.

(H) Test of Idle Indicating Lamps

4.57 Note that the idle trunk indicating lamps of one circuit of the group to be tested are lighted at all multiple appearances. Check for dim lamps.

4.58 Connect a trunk cord, with the cord keys normal, to the jack of the circuit which has the idle trunk indicating lamps lighted. Observe that the associated idle trunk indicating lamps are extinguished and the idle indicating lamps associated with the next idle circuit in the group are lighted in all multiple appearances. Check for dim lamps.

Note: In the following procedures, note those circuits which are busy and which have not been tested. These circuits should be tested as they become idle, as indicated by the lighting of the associated idle trunk indicating lamps.

4.59 Continue to connect cords to idle circuits until all indicating lamps in the group have been tested and all the trunks in the group are busy.

4.60 Remove the plug from one of the trunk jacks of the group under test. Observe that the idle indicating lamps associated with the released trunk light.

4.61 Remove the plugs from all trunk jacks of the group under test. Observe that the idle indicating lamps of the lowest numbered idle trunk in the group light.

(J) Toll Identification Tone Test

4.62 Place a call, as covered in 4.01, over the trunk to be tested for any number which is intercepted from either a selector level or a connector terminal. Unless the intercepting trunk is busy, which will be indicated by the flashing of the supervisory lamp at the busy-back rate, the intercepting operator should answer.

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4.63 When the intercepting operator answers, advise her that a test is being made and verify that she received the toll identification tone until she operated the tone removal key. In the case of trunks arranged for coin service, the tone should not be heard at the toll board (except where the local office arrangement is such that the tone is supplied from the intercepting trunk rather than from the toll transmission selector.)

4.64 Remove the cord from the trunk jack.

↳ (K) Busy Indication Test - When Intertoll Dialing or SXS Tandem Train Multiple is Provided

↳ 4.65 Insert the plug of a trunk cord into the O.G.T. jack of the trunk under test. Use the head receiver and check that

↳ ground is supplied to the associated selector multiple as a busy indication.

4.66 Apply ground to the S lead from the "Intertoll Dialing Outgoing Trunk" circuit or the "SXS Tandem Selector" circuit using the 893 cord and No. 365 tools. Remove the plug from the O.G.T. jack and check for busy by touching the tip of the plug to the sleeve of the jack. Observe that a click is heard in the operators receiver indicating that busy potential has been applied.

↳ 4.67 Remove all test connections provided for this test.

5. REPORTS

5.01 The required record of these tests should be entered on the proper form.

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