MANUAL TEST OF MACHINE RINGING INCOMING TRUNKS FROM LOCAL MANUAL OFFICES No. 1 OFFICE

1. GENERAL:

1.1 This section outlines the following tests on machine ringing local and inter-office incoming trunks from manual offices.

(a) Ringing and tripping (single and two-party jack-per-station offices).
(b) Ringing and tripping (two-party selective and four-party semi-selective jack-per-line offices).
(c) Ringing and tripping (four-party full selective jack-per-line offices).
(d) Supervisory relay test.
(e) A.C. continuity test.
(f) Noisy cord and dirty plug test.
(g) Busy test.

1.2 The methods outlined, with the exceptions of tests (e), (f) and (g) provide for the tests to be made on a two person basis.

1.3 The tests described apply to call circuit trunks and jack listening or automatic listening type straightforward trunks.

1.4 In the case of a call circuit trunk, the trunk lamp is lighted steadily as a guard and disconnect signal. On jack listening straightforward trunks, the guard signal is a flashing lamp and the disconnect signal is a steady lamp. In the case of automatic listening trunks, the lamp is lighted steadily as a guard and disconnect signal. However, if the control circuit is free, the trunk will be connected to it and the lamp will flash and the tester at the "A" end will hear the order tone.

1.5 If automatic listening trunks are being tested, it is recommended that the splitting keys be arranged so that the trunks are grouped with the trunks of an occupied position. With this arrangement the "B" operator will hear the order tone sent out on the trunks being tested, and it will also permit her to handle any subscribers' calls which may come in on the positions under test. It will be possible to distinguish the subscribers' calls by noting the trunk upon which a flashing lamp appears. Neither the tester nor the "B" operator should depress a release key before identifying the trunk connected to the control circuit as indicated by the flashing lamp. If it is not possible to group the trunks with an occupied position, it will be advisable to split the trunks under test from the remainder of the "B" board and to plug an operator's telephone set into the telephone jack associated with the trunks under test. In the latter case the tester should advise the "B" operator of any subscribers' calls which may come in on the group of trunks being tested.

1.6 The tests outlined herein should be made during periods of very light load so as to avoid interference with the handling of subscribers' calls.

1.7 The ringing tests described in tests (b) and (c) provide for a test of all party rings. If desirable, the four-party rings may be divided and so scheduled that each two will be tested alternately.

2. APPARATUS:

2.1 Tests (a), (b), and (c): Test Line Circuit for testing trip relays. "B" end.

2.2 Tests (a), (b), and (c): No. 32-A or No. 32-B Test Set. "B" end.

2.3 Test (d): No. 35-C or No. 35-A Test Set. "B" end.

2.4 Tests (e) and (f): A.C. Continuity Test Circuit. "B" end.

2.5 Test (e): No. 528 (or equivalent) Receiver equipped with a No. 712 Cord terminating in a No. 109 Plug (for use with switchboards equipped with No. 92 jacks). "B" end.

2.6 Test (e): No. 528 (or equivalent) Receiver equipped with a W2J Cord terminating in a No. 110 Plug (for use with switchboards equipped with No. 49 jacks). "B" end.

2.7 Two Operator's Telephone Sets. "A" end and "B" end.

3. TEST PREPARATION:

Tests (a), (b) and (c):

3.1 With telephone sets connected to the telephone circuit of an "A" position associated with the last working section of trunk multiple and to a supervisor's telephone circuit

associated with the "B" position in which the trunks to be tested appear, establish a talking connection using an "A" cord with the listening key operated at the "A" end and the supervisor's circuit at the "B" end.

3.2 This method of establishing a talking circuit should always be used when testing straightforward trunks in preference to the method of using the operator's control circuit for completing the talking connection, since the latter method ties up positional circuits and may interfere with normal traffic.

4. METHOD:

(a) **Ringing and Tripping—Single and Two Party Jack-per-Station Offices:**

4.1 **"A" End:** After establishing a talking connection as described in 3.1 and 3.2, insert the plug of the calling cord of any cord pair, with the listening key operated, into the trunk under test. The supervisory lamp should light and two spurts of high tone should be heard on straightforward trunks when the trunk is connected to the "B" operator's telephone circuit.

4.2 **"B" End:** The following is an outline of the signals obtained on various equipment arrangements:

Call Circuit Trunks:
Guard lamp steady.

Straightforward Trunks:

Trunk Seized:
Pilot lamp extinguished.
Guard lamp steady.

Control Circuit Seized:
Pilot lamp steady.
Guard lamp flashes.

4.3 Insert the plug of a No. 32 type test set into the TR jack of the test line circuit.

4.4 Insert the plug of the trunk cord into the S jack of the test line circuit. The following signals should be obtained:

Call Circuit Trunks:
Guard lamp extinguished.

Straightforward Trunks:
Pilot lamp extinguished.
Guard lamp extinguished.

4.5 **Await the beginning of the ringing interval** as indicated by the ringing of the test bell and then operate and release the WH key of the No. 32 type test set. This operation causes the test circuit to connect the ringing circuit to the "non-operate" test resistance. At the end of approximately .5 second the ringing circuit is automatically transferred to the bell and, if the ringing is not tripped, the bell will ring throughout the remainder of the ringing interval. Failure of the bell to rering after the key is operated indicates that the relay has tripped falsely.

4.6 **Await the beginning of a ringing interval** and then immediately apply the trip test by operating and releasing the RED key of the No. 32 type test set. Failure of the trip relay to operate will be indicated by continued ringing of the test bell.

4.7 With this method of applying the test resistance, a single test is sufficient and, unless failures occur, repeat tests need not be made. No attempt should be made to make more than one test during a ringing interval, and care should be taken to always start each test at the beginning of the interval so as to guard against applying the test resistances during the silent interval.

4.8 **"A" End:** The tester should note that a satisfactory audible ringing signal is heard during the ringing period.

4.9 **"B" End:** Withdraw the plug of the trunk cord from the test line and after the guard signal appears, re-insert the plug. This should cause the test bell to ring again.

4.10 **"A" End:** The "A" tester should listen for the audible ringing signal and then, **during a ringing interval,** withdraw the "A" cord from the O.G.T. jack and reinsert it.

"B" End: The test bell should stop ringing and the disconnect signal should appear. See paragraph 1.4.

4.11 **"B" End:** After waiting for a time corresponding to a complete ringing interval, remove the trunk from the test line and insert it into the busy-back jack.

4.12 **"A" End:** The tester should note that the "A" cord supervisory lamp flashes and that a satisfactory busy tone is heard. Then remove the "A" cord from the O.G.T. jack.

4.13 **"B" End:** The tester should note the disconnect signal before withdrawing the trunk cord from the busy-back jack and proceeding to the next trunk.

4.14 As the "B" tester moves from position to position during the progress of the test, it may be necessary to re-arrange the splitting arrangement of the board and the traffic forces should be advised accordingly.

(b) **Ringing and Tripping—Two-Party Selective and Four-Party Semi-Selective Jack-per-Line Offices:**

4.15 "B" End: After establishing a talking connection as described in 3.1 and 3.2, test the trunk as outlined in test (a) with the W party ringing key depressed.

4.16 After completing the tripping and rering tests and before plugging the trunk cord into the busy-back jack, withdraw the trunk cord from the test line, depress the J party ringing key, and insert the cord into the R jack of the test line. The proper bell should ring.

4.17 If the trunk is arranged for four-party semi-selective ringing, depress the M key. The proper bell should ring.

4.18 Withdraw the plug, depress the R key and insert the plug into the S jack of the test line. The proper bell should ring.

4.19 The above tests are based on the standard ringing sequence as follows:

Party	
W	1 ring on ring
R	2 rings on ring
J	1 ring on tip
M	2 rings on tip

If any other ringing sequence is used, the tests should be made, depressing the party ringing keys necessary to give the correct ringing current as indicated above.

(c) **Ringing and Tripping—Four-Party Full Selective Jack-per-Line Offices:**

4.20 Establish a talking connection as described in 3.1 and 3.2.

4.21 "B" End: With the W party ringing key depressed, make the tests described in test (a) for single-party offices.

4.22 Before plugging the trunk into the busy-back jack, repeat the pretrip and trip test with the R party ringing key depressed. The operations of this and of paragraph 4.21 check both windings of the trip relay.

4.23 After completing the tripping and rering tests on the R party, withdraw the plug from the test line, depress the J key and ascertain that the proper bell rings. Depress the M key. The proper bell should ring.

4.24 The above tests are based on the standard ringing sequence as follows:

Party	Ringing Current
W	± — on ring
R	± + on ring
J	± — on tip
M	± + on tip

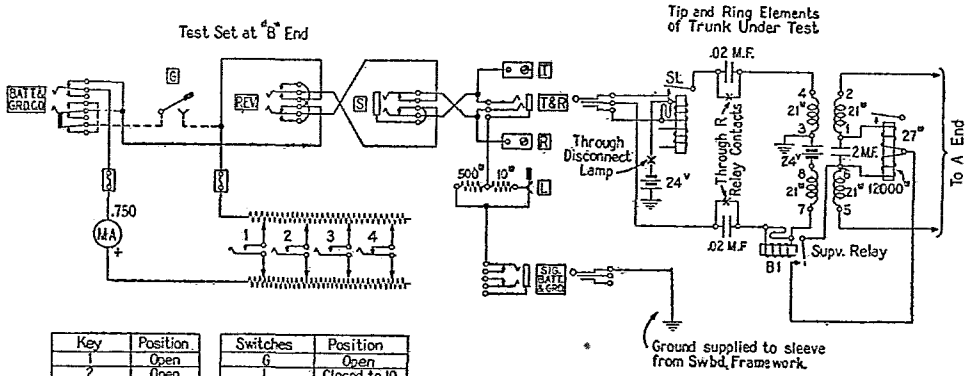
If any other ringing sequence is used, the tests should be made, depressing the party ringing keys necessary to give the correct ringing current as indicated above.

(d) **Supervisory Relay Test: Trunks Incoming From No. 1 Office:**

4.25 When testing trunks incoming from a No. 1 office, the testing procedure to be followed, after establishing a talking connection as described in 3.1 and 3.2 is outlined in paragraphs 4.26 to 4.36.

4.26 "A" End: Insert the plug of a regular subscriber's cord circuit into the jack of the trunk under test.

Note: In order to insure that the "A" cord supervisory relay and associated lamp will respond properly to the operations of the "B" supervisory relays, the "A" cord selected for the test should meet the READJUST requirements of Section 491.001 and associated appendix. Otherwise, the test results indicating failures in "B" supervisory relays may be unreliable.



Key	Position
1	Open
2	Open
3	Open
4	Closed
Batt. & Grd. Co.	Operated
Rev.	Normal

Switches	Position
G	Open
L	Closed to 10
Resist. Switches	25000 for 35-A 0 for 35-C

Fig. 1

4.27 Arrange the current flow test set keys and switches as shown in Fig. 1.

4.28 Insert the plug of the trunk into the T & R jack of the test set. Connect the tip of the SIG BATT & GRD jack to ground as shown in Fig. 1.

4.29 With sliders of key No. 1 moved to the extreme left so as to cut out all resistance depress key No. 1. Tripping of ringing will be indicated by the milammeter. **Do not operate the MIL-AMPS key until ringing has been tripped.**

4.30 With the locking lever of key No. 4 closed as shown in Fig. 1, set up the specified "release" value.

4.31 Without releasing key No. 4, depress key No. 3 and set up the specified "operate" value.

4.32 Without releasing keys No. 3 or No. 4 depress key No. 2 and set up the specified "saturate" value. In applying TEST values to supervisory relays on trunks proceed as follows:—

4.33 **"B" End:** Depress the No. 2 key of the test set and insert the plug of the trunk cord to be tested into the T & R jack of the test set. Until ringing is tripped, the needle of the milammeter will indicate a larger current flow than the "saturate" value during the silent period or will vibrate during the ringing period. Release the No. 2 key when ringing is tripped as indicated by the needle, assuming a steady position at the "saturate" value.

4.34 After ringing has been tripped, apply "saturate" current by depressing keys No. 2 and No. 3 at the same time. After one second release key No. 2 (reducing current to "operate" value) and follow immediately by depressing and releasing key No. 3, three times, at a rate of approximately two times per second. The period relation of "make" to "break" or "on" to "off" should be at an approximate ratio of 3:2.

4.35 **"A" End:** The tester will observe that the supervisory lamp in the "A" cord circuit follows the operation of the relay as keys Nos. 2 and 3 at the "B" end are depressed and released. Usually it will be necessary for the relay to follow only three applications of the "operate" current. When it is desired to obtain more flashes, the "saturate" current (key No. 2) should be applied for one second for each three applications of the "operate" current.

4.36 Proceed with each trunk in turn. Always trip the ringing as described in paragraph 4.32 before attempting to apply the "operate" or "release" current to the supervisory relay.

Note: **"B" End:** The various current values should be checked occasionally to make sure that they have not changed due to voltage variations.

Trunks Incoming From Other Than No. 1 Offices:

4.37 When testing trunks incoming from other than a No. 1 office, the testing procedure to be followed after establishing a talking connection as described in 3.1 and 3.2 is outlined in paragraphs 4.38 to 4.48.

4.38 **"A" End:** Insert the plug of a regular subscribers' cord circuit into the jack of the trunk under test.

4.39 Arrange the current flow test set keys and switches as shown in Fig. 1.

4.40 Insert the plug of the trunk into the T & R jack of the test set. Connect the tip of the SIG BATT & GRD jack to ground as shown in Fig. 1.

4.41 With the sliders of key No. 1 moved to the extreme left so as to cut out all resistance, depress key No. 1. Tripping of ringing will be indicated by the milammeter. **Do not operate the MIL-AMPS key until ringing has been tripped.**

4.42 With the locking lever of key No. 4 closed as shown in Fig. 1, set up the specified "release" value.

4.43 Without releasing key No. 4, depress key No. 3 and set up the specified "operate" value.

4.44 Without releasing keys No. 3 or No. 4 depress key No. 2 and set up the specified "saturate" value. In applying TEST values to supervisory relays on trunks, proceed as follows:

4.45 **"B" End:** Depress the No. 2 key of the test set and insert the plug of the trunk cord to be tested into the T & R jack of the test set. Until ringing is tripped, the needle of the milammeter will indicate a larger current flow than the "saturate" value during the silent period or will vibrate during the ringing period. Release the No. 2 key when ringing is tripped as indicated by the needle, assuming a steady position at the "saturate" value.

4.46 After ringing has been tripped, apply "saturate" current by depressing keys No. 2 and

No. 3 at the same time. After one second release key No. 2 reducing current to "operate" value and follow immediately by releasing and depressing key No. 3.

4.47 **"A" End:** The tester will observe that the supervisory lamp in the "A" cord circuit is extinguished as key No. 3 at the "B" end is depressed.

4.48 Proceed with each trunk in turn. Always trip the ringing as described in paragraph 4.45 before attempting to apply the "operate" or "release" current to the supervisory relay.

Note: **"B" End:** The various current values should be checked occasionally to make sure that they have not changed due to voltage variations.

(e) **A.C. Continuity Test:**

4.49 When testing three-wire inter-unit trunks, an "A" cord should be inserted into the outgoing end of each trunk to be tested.

4.50 Before making an A.C. continuity test, the operation of the tone interrupter should be checked by inserting the plug attached to the test receiver into the REC jack of the test circuit. While listening in the test receiver, partially insert the plug of the first trunk to be tested into the CON jack, so that the tip of the plug makes contact with the ring spring of the jack, and the sleeve of the plug makes contact with the sleeve of the jack. If tone is received, it is an indication that the interrupter is functioning properly.

4.51 Upon receiving tone, complete the insertion of the plug of the trunk to be tested into the CON jack of the testing circuit.

4.52 After completion of insertion of the cord of the trunk under test into the CON jack, it is probable that a slight tone will be heard in the receiver. This tone can be expected and is not an indication of trouble. After testing several trunks, the tester should become familiar with the volume of the tone which is heard on normal trunks. Trunks on which this volume is increased appreciably should be considered in trouble.

(f) **Noisy Cord and Dirty Plug Test:**

4.53 When testing cords and plugs of three-wire inter-unit trunks, an "A" cord should be inserted into the outgoing end of each trunk to be tested.

4.54 Before starting the test with A.C. continuity test circuit, check the operation of the interrupter as outlined in paragraph 4.50.

4.55 Manipulate the cord and plug in the following manner to detect possible cutouts or faulty connections: Pull on the cord directly downward and downward at an angle to the right and to the left and shake the cord. Hold the plug in the jack with one hand and grasp the cord with the other hand approximately 4 inches from the plug. Move the cord about the plug with a cranking motion. Turn the plug around in the jack so as to cause the jack springs to make contact at all possible points of the tip and ring of the plug.

4.56 Changes in volume of tone in response to movement of the cord or plug will indicate which is defective.

4.57 Note frayed cords which require repairs.

(g) **Busy Test:**

4.58 Make sure that the positions to be tested are not grouped so as to transfer the busy test to another position.

4.59 Connect an operator's telephone set to the position.

4.60 Touch the sleeve of a trunk to the tip of each trunk in turn. Note that a distinct busy test is heard on each trunk.

5. REPORTS:

5.1 The required record of this routine should be entered on the proper form.