

MANUAL TEST

HIGH IMPEDANCE CORD CIRCUITS

USING TEST CIRCUIT SD-62148-01 OR SD-62148-02

NO. 1 TOLL SWITCHBOARD

1. GENERAL

1.01 This section describes tests of high impedance cord circuits in No. 1 toll offices by means of the manual test circuit of the low shunt type.

1.02 This section is reissued to add a test for cord circuits modified for d-c supervision on either cord, a test of the positional busy test relays, and a test of the lockout feature on type "A" cord circuits.

1.03 The tests covered are:

- (A) Test of D-C Supervisory Relay
- (B) Test of A-C Supervisory Relay
- (C) Pad Control Feature Test
- (D) Ringing Key Test
- (E) A-C Continuity Test
- (F) Talking and Monitoring Key Strap Test
- (G) Test of Position Busy Test Relays
- (H) Test of Lockout Features

1.04 The tests apply to through, through and terminating, and terminating cord circuits equipped with B43, B203 or No. 190F d-c supervisory relays and No. 190E or 196A a-c supervisory relays.

1.05 Tests (B) and (C), or (B) and (D), or (B) and (E) may be combined and conducted consecutively.

1.06 Test (F) does not apply to type "A" cord circuits and Test (H) applies only to type "A" cord circuits.

1.07 In the case of a-c supervisory relays the test electrical values to be used are shown in tabular form in the sections of the A460 subdivision applying to the particular

type of relay involved. It will be noted from the tables that the meter readings are considerably in excess of the circuit requirement values since a shunt resistance is employed in the adjusting circuit. The a-c milliammeter readings specified in the tables should be used instead of current flow values through the relays.

2. APPARATUS

Test (A)

2.01 One P2P Cord equipped with a No. 310 Plug and a No. 309 Plug (2P10A).

2.02 35-type Test Set.

Test (B)

2.03(a) When the Cords are not arranged for D-C supervision on either end. Test Circuit per SD-62148-01 or SD-62148-02.

(b) When the Cords are arranged for D-C supervision on either end. Test Circuit per SD-62148-01.

Test (C)

← 2.04 Test Circuit per SD-62148-02.

2.05 Portable Pad Control Feature Test Set per D-97037 (SD-62148-02) or Portable Pad Control Feature Test Set per J-64709A (SD-62148-02) with Two P3E Cords six feet long equipped with No. 310 Plugs (3P7A).

Tests (D), (E), (F), and (H)

2.06 Test Circuit per SD-62148-01 or SD-62148-02.

Tests (E), and (F)

2.07 Portable Control Set (Potentiometer and Receiver) per SD-62148-01 or SD-62148-02 (J64703A).

2.08 One P3E Cord equipped with No. 310 Plugs (3P7A).

→ Test (G)

2.09 Test Circuit per SD-62148-01.

2.10 Operator's Telephone Set.

Test (H)

↳ 2.11 Operator's Telephone Set.

3. PREPARATION

3.01 The frequency of the ringing supply of the office should be checked often enough to insure that it remains within its specified limits.

3.02 For the a-c supervisory relays the meter settings for "standard operation" should be used unless the line circuit conditions are such that the relays are adjusted to the "special operation" current values.

→ 3.03 To avoid possible grounding of the battery supply lead, connect the cord to the test set first and when disconnecting, remove the cord from the test set last.

4. METHOD(A) Test of D-C Supervisory Relay

→ 4.01 On the 35-type test set, strap the L1 and GRD terminals together and operate the L switch to the 10 position.

4.02 Operate the REV key and connect the TEST BATT and GRD jack of the 35-type test set to the B-G jack in the switchboard multiple, using a 2P10A cord.

→ 4.03 Insert the plug of the cord associated with the supervisory relay to be tested into the T and R jack of the 35-type test set.

4.04 Depress key 3 and move the associated sliders until the meter registers the specified "release" current value for the supervisory relay to be tested.

4.05 With key 3 held operated, depress key 2 and move the associated sliders to the left until the meter registers the specified test "soak" current value for the supervisory relay to be tested. Release keys 2 and 3.

4.06 Depress key 1 and move the associated sliders to the left until the meter registers the specified test "operate" current value for the supervisory relay to be tested.

4.07 Make sure that all talking and splitting keys associated with cord circuits under test are in a normal (non-operated) position. With key 3 held operated, operate key 2 two times at the rate of one interruption per second and with a ratio of "make" to "break" of 1 to 1. Note that the cord supervisory lamp follows the operation of key 2. Restore keys 2 and 3 to normal.

4.08 Approximately 1/2 second after the "soak" and "release" currents are disconnected, operate and release key 1 at least 3 times and at the rate of approximately two interruptions per second and with a ratio of "make" to "break" of approximately 3 to 2. Note that the cord supervisory lamp follows the operation of key 1.

Note: The rate of interruptions is in accordance with the exact requirements set for the relays, but it is recognized that the method covered can apply these requirements only approximately.

↳ 4.09 When the cord circuit is arranged for d-c supervision on either end, remove the plug from the T and R jack of the 35-type test set and insert the other plug of the same cord circuit into the T and R jack. Repeat tests in 4.04 to 4.08.

↳ 4.10 Remove all plugs from jacks used during the test.

(B) Test of A-C Supervisory Relay

Cords Not Arranged for D-C Supervision on  
Either End. ←

4.11 At the test circuit panel, operate the TA key to the TEST position noting that the TEST-PC key, where provided, is normal. Depress key OPR-AC-TEST and move the OPR slider of the potentiometer until the a-c milliammeter registers the specified setting for supplying test "operate" current for the a-c supervisory relay to be tested. Release the OPR-AC-TEST key.

4.12 When two types of a-c relays or the same type relays with windings in series on some and windings in parallel on others are to be tested depress key OPR-1-AC-TEST and move the slider OPR-1 of the potentiometer until the meter registers the specified test "operate" current value for the second type a-c supervisory relay. Release the OPR-1-AC-TEST key.

4.13 First insert the plug of the trunk cord of the cord circuit under test into the TRK or TOLL jack and then insert the plug of

the toll cord into the TOLL (or TOLL-1 jack of the test circuit, depending on the arrangement of the a-c relay being tested). Alternating current is applied to the a-c supervisory relay for approximately one second. The toll cord supervisory lamp should light.

Note: If two types of a-c relays or the same type relays, some of which have windings in series and others with windings in parallel are to be tested, the TOLL jack should be used for the test value set up on the OPR-AC-TEST key and the OPR slider, while the TOLL-1 jack should be used for the test value set up on the OPR-1-AC-TEST key and OPR-1 slider. When more than two types of relays or circuit conditions are encountered, the additional current values necessary should be set up on the OPR-AC-TEST key and OPR slider and the OPR-1-AC-TEST key and OPR-1 slider, following the tests on relays employing the initial settings.

4.14 Momentarily operate the talking key of the cord circuit under test. The toll cord supervisory lamp should be extinguished.

4.15 If the pad control feature, ringing key, or a-c continuity tests are to follow this test, do not remove the cords from the test circuit. If these tests are not to be made, remove the cords from the test circuit and restore all keys to normal.

Cords Arranged for D-C Supervision on  
Either End.

4.16 At the test circuit panel, operate the TA key to the TEST position. Depress key OPR-1-AC-TEST and move OPR-1 slider of the potentiometer until the a-c milliammeter registers the specified setting for supplying test "operate" current for the a-c supervisory relay to be tested. Release the OPR-1-AC-TEST key.

4.17 First insert the plug of the trunk cord of the cord circuit under test into the TRK or B jack and then insert the plug of the toll cord into the TOLL-1 or A1 jack of the test circuit. Alternating current is applied to the a-c supervisory relay for approximately one second. The toll cord supervisory lamp should light.

4.18 Momentarily operate the talking key of the cord circuit under test. The toll cord supervisory lamp should be extinguished.

4.19 Disconnect the cords from the test circuit and restore all keys to normal.

#### (C) Pad Control Feature Test

4.20 After performing the operations covered in 4.11 to 4.14, operate the PC key at the test circuit panel.

4.21 Insert the black plug of the W5A cord of the pad control feature test set into the B-G jack of the testing circuit.

4.22 Insert the red plug of the W5A cord of the pad control feature test set into the REC jack of the testing circuit.

4.23 First insert the plug of the toll cord and then insert the plug of the trunk cord circuit to be tested into the TOLL and TRK jacks, respectively, of the test circuit.

4.24 Rotate the spring driven cam key in the portable pad control feature test set. The trunk cord lamp should light approximately 1/2 second after the spring driven cam key starts to restore to normal and remains lighted for about three seconds. The trunk lamp should then be extinguished and after approximately one second, the toll cord lamp should light steadily.

4.25 Momentarily operate the talking key of the cord circuit under test. The toll cord lamp should be extinguished.

Note: It is necessary to perform this operation before retests can be made of the pad control features.

4.26 Disconnect the cords from the test circuit.

4.27 Restore all keys to normal.

4.28 The normal operation of the trunk and toll cord lamps and relays, together with the sequence of operations of the relays in the test circuit are shown in Fig. 1.

4.29 The normal operations of the trunk and toll cord supervisory lamps, as well as the troubles in the cord circuit which are indicated by other lamp operations, are shown by Fig. 2.

(D) Ringing Key Test

4.30 When conducting this test, note that all test circuit keys are normal.

4.31 First insert the plug of the toll cord and then insert the trunk cord of the cord circuit to be tested into the TOLL and TRK jacks, respectively, of the test circuit.

4.32 Operate the trunk cord ringing key. Note that the toll cord supervisory lamp lights, indicating the application of ringing current through the ringing key under test.

4.33 Operate the talking key of the cord circuit associated with the ringing key under test. The toll cord supervisory lamp should be extinguished.

4.34 Restore the talking key to normal.

4.35 Operate the toll cord ringing key. The toll cord supervisory lamp should relight indicating the application of ringing current through the ringing key under test.

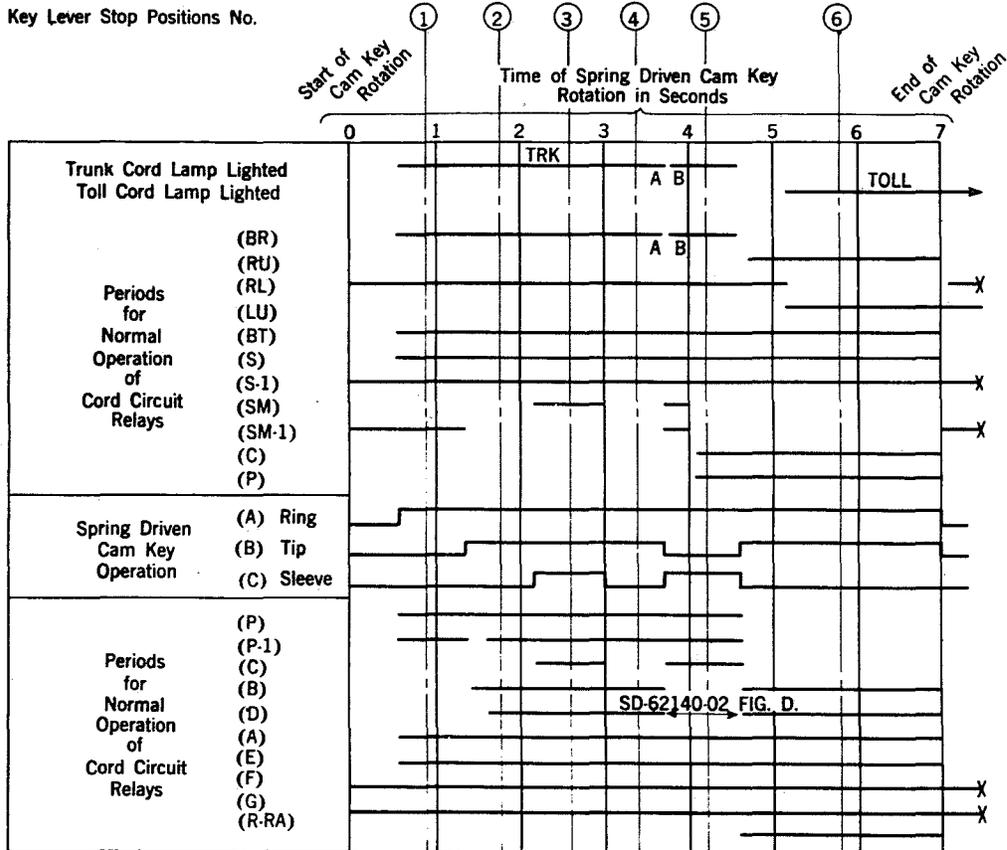
4.36 Operate the talking key of the cord circuit associated with the ringing key under test. The toll cord supervisory lamp should be extinguished.

4.37 Restore the talking key to normal.

4.38 Remove all cords from jacks of the test circuit and restore all keys to normal.

(E) A-C Continuity Test

4.39 When conducting this test, operate the TST-NT key at the test circuit panel and note that all other test circuit keys are normal.



NOTE, X - Removal of cords from test circuit.  
 -> Released by operation of talking key.  
 A - Cord Circuit per SD-62534-01, Fig E, "V" wiring  
 B - Cord Circuit per SD-62534-01, Fig E, "W" wiring or Fig. F

Fig. 1

4.40 Insert the trunk and toll plugs of the cord circuit to be tested into the TOLL and TRK jacks, respectively, of the test circuit.

4.41 At the switchboard, connect the CKT jack of the portable control set (potentiometer and receiver) to the REC jack of the test circuit, using a P3E cord.

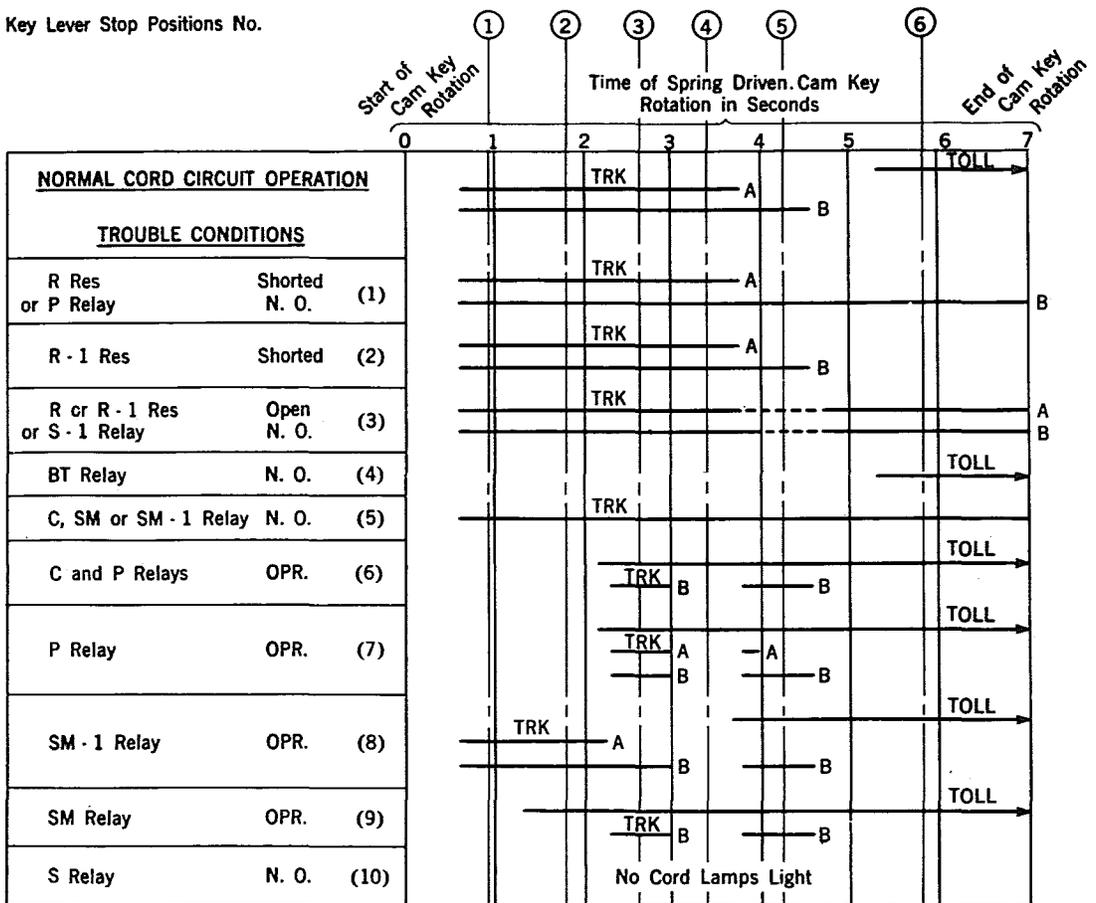
Note: A check should occasionally be made to see that the interrupter is functioning properly. This may be done by partially withdrawing one of the cords so that the sleeve of the plug makes contact with the sleeve of the jack and the tip of the plug makes contact with the ring of the jack. A loud tone should be heard in the test receiver. If the tone is heard, fully insert the cord and proceed with the test.

4.42 Turn the knob of the potentiometer until a minimum tone is heard. This condition should exist when the pointer is approximately at "0." If a minimum tone is heard at some other point, an unbalance condition is indicated. The severity of the unbalance will be indicated by the departure of the pointer from "0." Experience will determine the degree of unbalance which should be investigated. However, if an appreciable tone is heard at all positions of the pointer, it is an indication of trouble.

4.43 Listen in the receiver during the following tests for any clicks or changes in the volume of the tone which would indicate a cut-out or other trouble condition.

4.44 Manipulate the cords and plugs in the following manner: Hold the plug in the jack with one hand and shake the cord with the other hand. Turn the plug around in the jack

Key Lever Stop Positions No.



Periods when trunk and toll cord lamps light.  
 Horizontal lines indicate length of time lamps are lighted.  
 A - Cord Circuit per SD-62534-01, Fig. E, "V" wiring.  
 B - Cord Circuit per SD-62534-01, Fig. E, "W" wiring or Fig F.

Fig. 2

so as to cause the jack springs to make contact at all possible points of the tip and ring of the plug.

Note: Scratchy noises while the plug is being rotated should be disregarded.

→ 4.45 Operate the talking and monitoring keys successively. A slight click may be heard when the key is operated to the talking position. On cords arranged for use with a position circuit (type "A" cord), it is possible to obtain a loud tone while operating or restoring the talking key. However, no loud tone should be heard after the key has been operated or restored.

↳ 4.46 Apply slight pressure sidewise in each direction on all key levers. This checks the follow of the inner tip and ring springs to insure against momentary or prolonged breaks in the cord circuit through the keys, due to defective adjustments or excessive wear. With the keys on the cord circuit under test in normal position, tap lightly on the key top in order to detect defective key contacts or loose connections in the talking circuit.

Note: With the later type vertical key (A type) side pressure on the key lever has no effect on the key contacts and with such keys, contact follow should be checked by slight movement of the ringing and splitting keys in the direction of normal operation.

4.47 Operate the talking key to the talking position and perform the operations described in 4.46 on the splitting and ringing keys.

4.48 Remove all cords from the test circuit and restore all keys to normal.

#### (F) Talking and Monitoring Key Strap Test

4.49 Operate the TST-NT key at the test circuit panel and note that all other test keys are normal.

4.50 At the switchboard, connect the CKT jack of the portable control set (potentiometer and receiver) to the REC jack of the test circuit, using a P3E cord.

4.51 Insert the plug of the trunk cord of cord circuit No. 1 on the position to be tested into the TRK jack of the test circuit.

4.52 Insert the plug of the trunk cord of the last cord circuit on the position into the TOLL jack of the test circuit.

4.53 Operate the talking keys of both cord circuits under test.

4.54 Turn the knob of the potentiometer until a minimum tone is heard. This condition should exist when the pointer is approximately at "0." If a minimum tone is heard at some other position, an unbalance condition is indicated. Experience will determine the degree of unbalance which should be investigated.

4.55 Listen in the receiver during the following tests for any clicks or changes in the volume of tone which would indicate a cut-out or other trouble condition.

4.56 Apply slight pressure to both talking key levers on each side. Tap lightly on the associated key tops to detect defective key contacts on loose connections.

4.57 Restore the talking key of cord No. 1 to normal and apply slight pressure on each side of the key lever.

4.58 Operate both talking keys to the monitoring position and repeat the tests.

4.59 Remove the plug of cord No. 1 from the TRK jack and repeat the tests using a different cord on the position in place of cord No. 1 each time until all talking and monitoring key straps on the position have been tested.

4.60 Remove both trunk cords from the TRK and TOLL jacks.

4.61 Remove the cord from the CKT and REC jacks and restore the TST-NT key of the test circuit to normal.

#### → (G) Test of Position Busy Test Relays

4.62 Insert the plug of an operator's telephone set into the operator's telephone jack of the position to be tested. On type "A" cord circuits operate the talking key of the cord circuit to be tested.

4.63 Operate the BT key (when provided) of the testing circuit to supply the correct potential to the sleeve of the BT multiple jack for the operation of the positional busy test relay.

4.64 Test the cord circuit by touching the tip of the plug to the sleeve of the BT multiple jack. A click (busy test) should be heard in the receiver of the operator's telephone set.

4.65 Where a busy test on either cord is provided interchange cords of the cord circuit being tested and repeat test in 4.64.

(H) Test of Lockout Features

- 4.66 This test applies only to type "A" cord circuits.
- 4.67 Insert the plug of an operator's telephone set into the telephone set jacks at the position under test.
- 4.68 Insert the front plug of an inward position or the rear plug of an outward position into the TRK jack of the test circuit and operate the TST-NTO key.
- 4.69 Operate the talking key associated with the cord circuit under test. Tone should be heard in the telephone set receiver. Restore the talking key to normal. Tone should not be heard in the receiver.
- 4.70 Operate the talking key associated with another idle cord circuit in the same position. Tone should not be heard in the receiver. Again operate the talking key associated with the cord in the TRK jack. No tone

should be heard in the operator's receiver indicating that the lockout feature is functioning satisfactorily.

- 4.71 Operate the monitoring key associated with the cord in the TRK jack. Tone should be heard in the operator's receiver.
- 4.72 Again operate the talking key associated with the cord in the TRK jack. No tone should be heard in the operator's receiver.
- 4.73 Restore the talking key of the idle cord circuit to normal. Tone should be heard in the operator's receiver.
- 4.74 Reoperate the talking key of the idle cord circuit. Tone should still be heard in the operator's receiver. Restore all keys and test connections to normal.

5. REPORTS

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

SD 56344  
Part, Test cut.