SEMI-AUTOMATIC TEST

HIGH IMPEDANCE AND CONDENSER TYPE CORD CIRCUITS

USING TEST CIRCUIT SD-62140-02 OR SD-64468-01

NO. 1 TOLL SWITCHBOARD

1. GENERAL

1.01 This section describes tests of high impedance and condenser type cord circuits using the semi-automatic test circuit of the low shunt type. It describes tests of type "A" cords, cords modified for d-c supervision on either end and unmodified cords in the same office. The tests are as follows:

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

1.02 This section is reissued to add test (F) and to revise procedures as required for type A cords.

1.03 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.

1.04 Tests (A) and (B) or (A) and (C) or (A) and (D) may be combined and conducted consecutively.

1.05 Test (E) does not apply to type "A" cord circuits and test (F) applies only to type "A" cord circuits

1.06 In the case of a-c supervisory relays the test electrical values to be used are shown in tabular form on the test circuit drawing or in the sections of A460 subdivision applying to the particular type of relay and cord circuit 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

Tests (A), (B), (D), (E) and (F)

2.01 Test circuit per SD-62140-02 or SD-64468-01.

Test (C)

2.02 Test circuit per SD-62140-02.

2.03 Portable Pad Control Feature Test Set per D-97037 (SD-62140-02).

Tests (D) and (E)

2.04 Portable Control Set (potentiometer and receiver) per SD-64468-01 or SD-62140-02 (J64703A).

2.05 One P3E cord equipped with No. 110 plugs (3P6B).

Test (F)

2.06 Telephone set. J64717A A225.322

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.

A-C and D-C Supervisory Relays

3.02 With all keys normal, operate the TST-ADJ key (DC meter key) to the TST position.

3.03 Depress TST-RLS key, turn the dial switch TST-RLS and move the 1 slider of the TEST resistance until the meter registers the specified test "release" current value for the d-c supervisory relay to be tested. Release the TST-RLS key.

3.04 Depress the TST-SOAK key, and move the 2 slider of the TEST resistance until the meter registers the specified test "soak" current value for the d-c supervisory relay to be tested. Release the TST-SOAK key.

3.05 Depress the TST-OPR key. Turn the dial switch TEST-OPR and move the 3 slider of the TEST resistance until the meter registers the specified test "operate" current value for the d-c supervisory relay to be tested. Release the TST-OPR key.

3.06 Operate the TST-INT key. The motor interrupter starts and the lamp associated with the TST-INT key flashes at a rate of 120 flashes per minute.

3.07 At this time check the test circuit by operating the TST-CKT key. Proper test circuit operation will be indicated by the d-c milliammeter deflections. The "release" current value will be indicated upon de-

3.07 (Continued)

pressing the TST-CKT key followed by two deflections indicating the "soak" current at 60 pulses per minute with "release" current deflections between each "soak" current value. Following the "release" and "soak" current values the "operate" current value will be indicated on the milliammeter at the rate of 120 pulses per minute with open circuit between each "operate" current value. After observing several deflections indicating the "operate" current, release the TST-CKT key and restore the TST-ADJ key (DC meter key).

3.08 When the cords are not arranged for d-c supervision on either cord, depress the TST-OPR-AC key and move the OPERATE slider of the TEST potentiometer until the a-c milliammeter registers the proper setting for supplying test "operate" current for the a-c supervisory relay to be tested. Release the TST-OPR-AC key.

3.09 When the cords are arranged for d-c supervision on either cord, depress the TST-OPR1-AC key and move the OPR1 slider of the TEST potentiometer until the a-c milliammeter registers the proper setting for supplying test "operate" current for the a-c supervisory relay to be tested. Release the TEST-OPR1-AC key.

Note: When the test circuit is not arranged to apply the pad control feature test to the TOLL 1 jack and when all the cords to be tested are arranged for d-c supervision on either end, adjust the TEST potentiometer as covered in 3.08 for cords not arranged for d-c supervision on either end. This is to insure that the a-c relays in the cord circuit operate as required to indicate the proper functioning of the pad control feature.

Combination Tests - Supervisory Relays, Ringing Keys, Pad Control Feature and A-C Continuity

3.10 The a-c and d-c supervisory relay test and the ringing key test, or the a-c and d-c supervisory relay test and the pad control test or the a-c and d-c supervisory relay test and a-c continuity test may be conducted consecutively by making the preparations given below:

3.11 Perform the operations described in 3.02 to 3.09 for current flow tests on the a-c and d-c supervisory relays.

3.12 If the ringing key test follows the supervisory relay test, the operations described in 3.02 to 3.09 should be made and the TST-NT and PC keys should be normal.

3.13 When the pad control feature test follows the a-c and d-c supervisory relay test, the TST-PC key must be operated in addition to performing the operations described in 3.02 to 3.09.

3.14 If the a-c continuity test follows the supervisory relay test, perform the operations described in 3.02 to 3.09 after having operated the test circuit TST-NT key.

4. METHOD

(A) Test of A-C and D-C Supervisory Relays

4.01 After performing the operation covered in 3.02 to 3.09 insert the plug of one cord of the cord circuit being tested into the TRK jack of the test circuit as follows: When a cord circuit arranged for d-c supervision on one end is being tested use the rear cord at an outward position or the front cord at an inward position. When a cord circuit arranged for d-c supervision on either end is used, use the front cord at an outward position and the rear cord at an inward position. Note that the cord supervisory lamp flashes twice at a rate of 60 i.p.m. thus indicating the operation of the supervisory relay on the test "soak" current value. Following the two flashes, test "operate" current is automatically applied through an interrupter and the cord supervisory lamp should flash at a rate of 120 i.p.m. indicating the operation and release of the d-c supervisory relay. At least three flashes of the lamp at the rate of 120 i.p.m. should be observed.

4.02 When the cord circuit is arranged for d-c supervision on either end, remove the plug from the TRK jack and insert the other plug of the same cord circuit into the TRK jack. The supervisory lamp associated with this cord should flash as covered in 4.01.

4.03 After observing at least three flashes of the cord supervisory lamp as covered in 4.01 or in 4.01 and 4.02 as required, insert the free plug of the cord circuit under test into the TOLL jack for cords arranged for d-c supervision on one end or into the TOLL 1 jack for cords arranged for d-c supervision on either end. Alternating current is applied to the a-c supervisory relay for one second and the lighting of the cord supervisory lamp associated with the plug in the TOLL or TOLL 1 jack is an indication of the operation of the a-c supervisory relay.

4.04 The supervisory lamp associated with the plug in the TOLL or TOLL 1 jack should remain lighted. Momentarily operate the associated talking key to extinguish the supervisory lamp before proceeding with the next test.

4.05 If the pad control feature, ringing key or a-c continuity test are to follow this test, do not remove the cord circuit cords from the test circuit. If these tests are not to be made remove the cords from the test circuit.

(B) Ringing Key Test

4.06 If this test is conducted individually, all test circuit keys should be normal. Insert the plug of the rear cord, at an outward position or the front cord, at an inward position, into the TRK jack. Insert the plug of the other cord into the TOLL jack, when the cord circuit is arranged for d-c supervision on one end and into the TOLL 1 jack when the cord circuit is arranged for d-c supervision on either end.

Note: If this test follows the supervisory test the plugs of the cord circuit will not have been removed from the test circuit jacks and the TST-NT and PC keys of the test circuit should be normal as covered in 3.12.

4.07 Operate the ringing key associated with the cord in the TRK jack. Note that the supervisory lamp associated with the cord in the TOLL or TOLL 1 jack lights indicating the application of ringing current through the ringing key under test.

4.08 Momentarily operate the associated cord circuit talking key to extinguish the supervisory lamp associated with the cord in the TOLL or TOLL 1 jack.

4.09 Operate the ringing key associated with the cord in the TOLL or TOLL 1 jack. The supervisory lamp associated with this cord should relight indicating the application of ringing current through the ringing key under test.

4.10 Momentarily operate the associated cord circuit talking key to extinguish the supervisory lamp.

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

(C) Pad Control Feature Test

When made after the A-C and D-C Supervisory Relay Test

4.12 Note that the TST-PC key is operated as mentioned in 3.13.

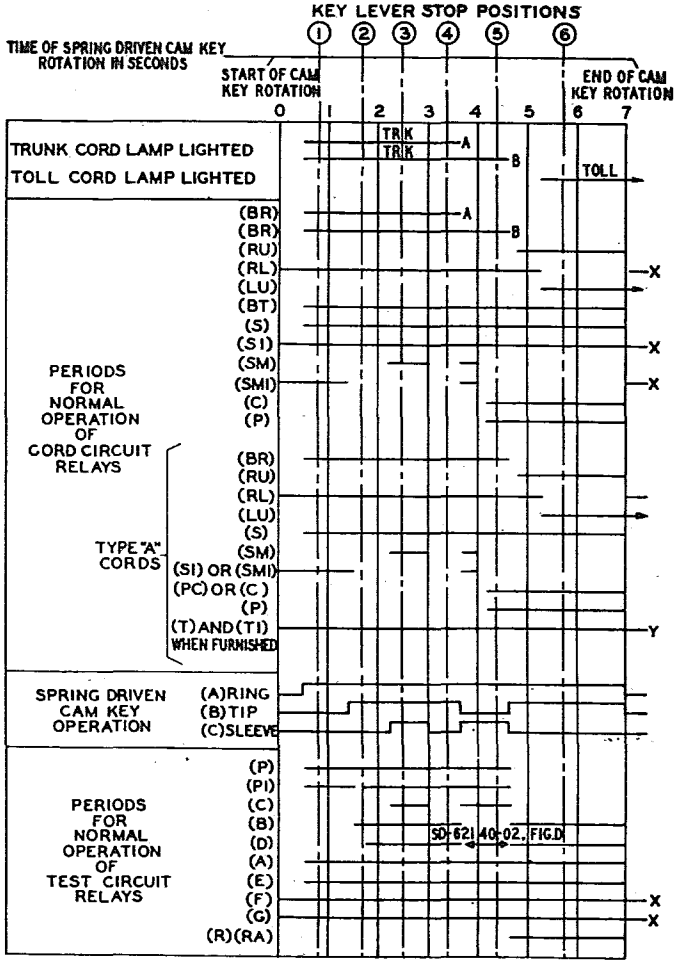
Note: When one plug of the cord circuit is in the TOLL 1 jack and the test circuit is not arranged to apply the pad control feature test to the TOLL 1 jack, remove the plug and insert it in the TOLL jack.

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

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

4.15 Momentarily operate the talking key to extinguish the cord supervisory lamp and rotate the spring driven cam key in the portable pad control feature test set. The lamp associated with the plug in the TRK jack (trunk cord) should light approximately 1/2 second after the spring driven cam key starts to restore to normal and remains lighted for about four seconds. This lamp should then be extinguished and after approximately one second, the lamp associated with the plug in the TOLL or TOLL 1 jack (toll cord should light steadily.

4.16 Momentarily operate the talking key of the cord circuit under test. The lamp associated with the plug in the TOLL or TOLL 1 jack (toll cord) should be extinguished.



X-REMOVAL OF CORDS FROM TEST CIRCUIT.
→-RELEASED BY OPERATION OF TALK KEY.
Y-OPERATED BY OPERATION OF TALK KEY.
A-CORD CIRCUIT SD-62534-01, FIG. E. "V"-WIRING OR SD-62535-01, FIG. E "V" WIRING.
B-CORD CIRCUITS OTHER THAN "A".

Fig. 1

Note: A retest can be made after this operation if desired.

4.17 Disconnect the cords from the test circuit.

4.18 Restore all keys to normal.

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

4.20 The normal operation 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 Figure 2.

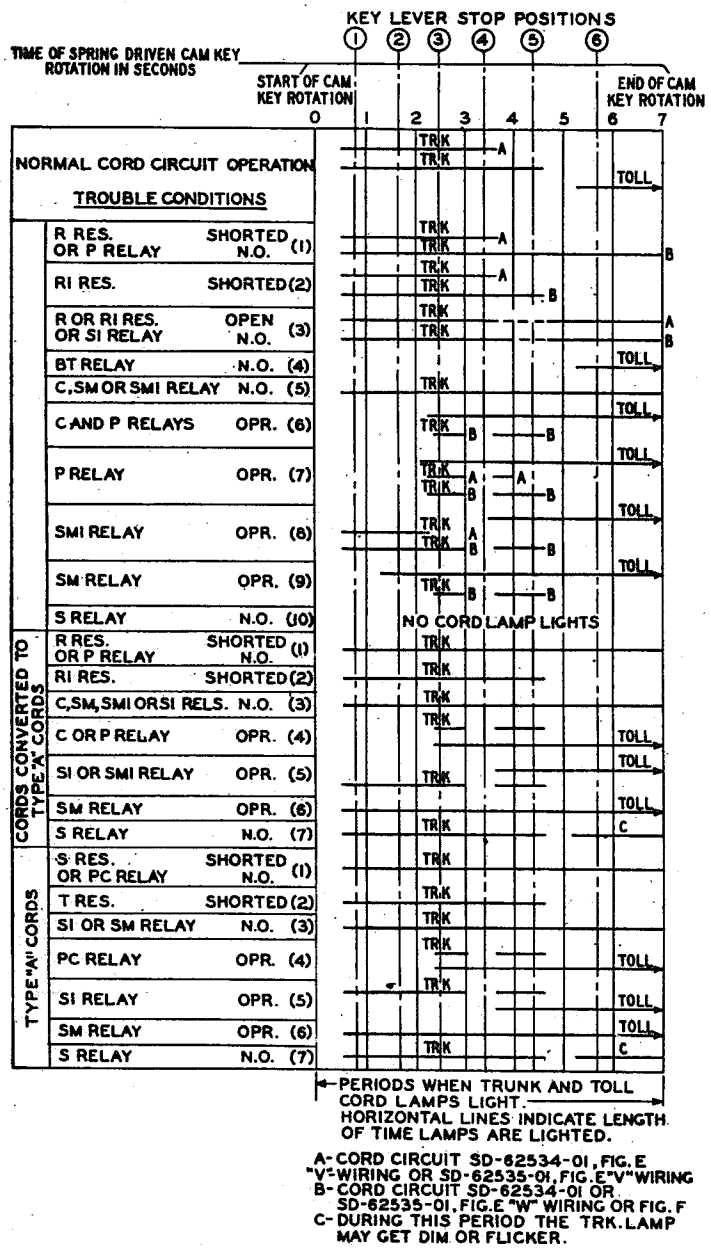


Fig. 2

When Test is Conducted Individually

4.21 After performing the operations covered in 3.08 insert the plug of the rear cord at an outward position or the front cord at an inward position into the TRK jack. Insert the plug of the other cord into the TOLL jack.

4.22 Operate the TST-PCO key in the test circuit and note that all other test keys are normal.

4.23 Perform the operations covered by 4.13 to 4.18.

4.24 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 in Figures 1 and 2.

(D) A-C Continuity Test

4.25 If this test is conducted individually, all test circuit keys should be normal except the TST-NTO key which should be operated at the control panel.

4.26 Insert the plug of the rear cord, at an outward position, or the front cord, at an inward position, into the TRK jack. Insert the plug of the other cord into the TOLL or TOLL 1 jack.

Note: If this test follows the supervisory relay test, perform the operations described in 3.14. The plugs of the cord circuit will not have been disconnected from the TRK and TOLL or TOLL 1 jacks, of the test circuit.

4.27 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 listening in the receiver and turning the knob of the potentiometer until a maximum tone is heard. If appreciable tone is heard proceed with the test.

4.28 Turn the knob of the potentiometer until the 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 unbalanced 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.

Note: When T and R keys are provided in the control test set and an unbalanced condition exists, which is

4.28 (Continued)

caused by an open circuit, the operation of the T and R keys successively will determine which conductor is in trouble. The open circuit is in the conductor associated with the key which, when depressed, produces no change in tone.

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

4.30 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 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.

4.31 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.

4.32 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 all keys of the cord pair on test in normal position, tap lightly on the associated key top to detect loose connections and defective key contacts in the talking circuit.

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

4.33 Operate the talking key to the talking position and perform the operation described in 4.32 on the splitting and ringing keys.

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

(E) Talking and Monitoring Key Strap Test

4.35 This test applies only to cord circuits not arranged for use with a position circuit.

4.36 Operate the TST-NTO key at the control panel and note that all other test keys are normal.

4.37 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.

4.38 Insert the plug of the rear cord of cord circuit No. 1 when an outward position is being tested or the front cord of cord circuit No. 1, when an inward position is being tested, into the TRK jack of the test circuit.

4.39 Insert the plug of the rear cord of the last cord circuit, when an outward position is being tested or the front cord of the last cord circuit, when an inward position is being tested, into the TOLL jack of the test circuit.

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

4.41 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 unbalanced condition is indicated. Experience will determine the degree of unbalance which should be investigated.

Note: When T and R keys are provided in the control test set and an unbalanced condition exists, which is caused by an open circuit, the operation of the T and R keys successively will determine which conductor is in trouble. The open circuit is in the conductor associated with the key which, when depressed, produces no change in tone.

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

4.43 Apply slight pressure to both talking key levers from each side. Tap lightly on the associated key top to detect loose connections and defective key contacts.

4.44 Restore the talking key of cord No. 1 to normal. Apply slight pressure from each side of the key lever.

4.45 Operate both talking keys to the monitoring position and repeat the test.

4.46 Remove the plug of cord No. 1 from the TRK jack and repeat the test 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.

4.47 Remove both cords from the TRK and TOLL jacks.

4.48 Restore all keys to normal and remove the portable test set.

(F) Test of Lockout Feature

4.49 This test applies only to type "A" cord circuits.

4.50 Insert the plug of an operators telephone set into the telephone set jacks at the position under test.

4.51 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.

4.52 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.

4.53 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 operators receiver indicating that the lockout feature is functioning satisfactorily.

4.54 Operate the monitoring key associated with the cord in the TRK jack. Tone should be heard in the operators receiver.

4.55 Again operate the talking key associated with the cord in the TRK jack. No tone should be heard in the operators receiver.

4.56 Restore the talking key of the idle cord circuit to normal. Tone should be heard in the operators receiver.

4.57 Reoperate the talking key of the idle cord circuit. Tone should still be heard in the operators 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.