TOLL CORD CIRCUITS AND ASSOCIATED OPERATORS' TELEPHONE CIRCUITS

1. GENERAL

1.01 This section covers detailed methods to be followed in making transmission tests on toll cord circuits and associated operators' telephone circuits and replaces the information given in 3A(f) of Section K21.01.

1.02 Information covered in this section of practices is outlined as follows:

1.03 Reference should be made to Section K20.01 for general testing instructions and to Section K20.11 for general testing apparatus requirements.

2. NO. 1 OR SIMILAR TYPE TOLL OFFICE

(a) Cord Circuits Not Equipped with Terminations

2.01 Toll cord circuits in No. 1 and similar type toll offices may be arranged for through connections, terminating connections or for through and terminating connections.

2.02 Through cord circuits have a different arrangement of apparatus than terminating cord circuits and transmission tests should be made for both arrangements.

2.03 Obtain the proper sleeve condition for the type of cord circuit to be tested.

Note: This is accomplished by connecting the sleeve conductors of two switchboard cords having the same type of plug as the cord circuit under test respectively to the S_1 and S_2 terminals of the transmission measuring set. The plugs of these cords are inserted in spare switchboard jacks of the proper type to establish the cord circuit condition.

2.04 Insert the plugs of a cord circuit to be tested in the sending and receiving jacks of the transmission measuring set.

Note: These plugs are designated front and rear in the case of through cords, but for terminating cords and through and terminating cords they are designated as Toll and Trunk.

2.05 Figure 1 shows schematically the connections for the test.

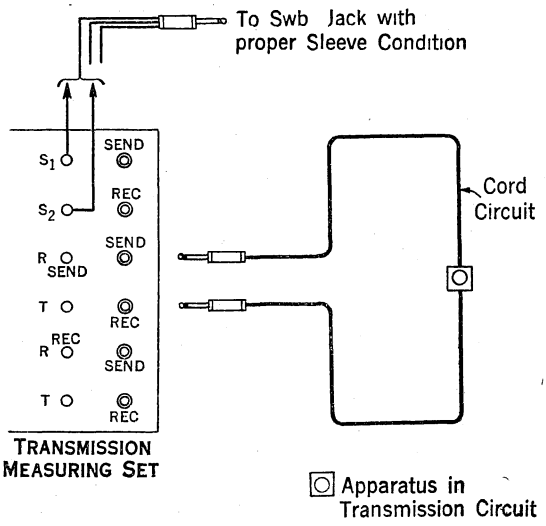

Figure 1

2.06 Restore to normal any keys associated with the cord circuit under test.

2.07 With the transmission measuring set in the measuring condition, perform the operations outlined in paragraphs 2.08 to 2.10 inclusive.

Note: If A.C. continuity tests are regularly made on the cord circuits these operations may be omitted.

2.08 Rotate the plugs of the cord circuit slowly in the test jacks to detect cutouts due to defective or dirty plugs.

2.09 Manipulate the cords and plugs in the following manner to detect possible cutouts or faulty connections: Pull on each 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 four 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 to the tip and ring of the plug.

2.10 Test all keys associated with the cord circuit for cutouts in the normal and operated position (except ringing and splitting keys in the operated position) by tapping the key top lightly using the rubber eraser end of a pencil.

For lever type keys, move the levers slightly forward and backward, while exerting a slight pressure to the left and right to take up any play or side lash.
For plunger type keys, directly connected in the transmission circuit, move the plungers with a circular motion and test for plunger-spring clearance by depressing the plungers slightly.

2.11 Measure the transmission loss of the cord circuit with the keys normal.

2.12 Measure the current supply of each cord that provides talking battery.

2.13 Repeat the above procedure for each of the remaining cord circuits of the same type.

2.14 Establish the condition for each of the other types of cord circuits by changing the sleeve connections to the proper switchboard jacks as outlined in paragraph 2.03.

2.15 Measure the transmission loss of each cord circuit with the keys normal and, if not previously measured, the current supply of each cord that provides talking battery.

(b) Cord Circuits Equipped with Terminations

2.16 Cord circuits equipped with terminations should be tested in the same manner as those not equipped with terminations as outlined in paragraphs 2.01 to 2.15 inclusive.

2.17 In order to determine that the 600-ohm terminations provided in the cord circuit are associated in the proper manner by the operation of the splitting and ringing keys and by the dialing circuit, the procedures outlined in paragraphs 2.18 to 2.53 inclusive should be made.

Note: The bridged loss of the 600-ohm termination, as measured in accordance with the procedures outlined in the following paragraphs, should be between 3 db and 4 db. If the measured loss is outside the limits just given, the condition should be investigated.

(b_1) Through and Terminating Cords

2.18 The terminations associated with the splitting and ringing keys may be connected to either end of the cord circuit and it is, therefore, necessary to make tests with each of these keys in both of the operated positions.

2.19 To prepare the transmission measuring set for the test connect the sleeve conductor of a switchboard cord having the same type plug as the cord circuit under test to the S_1 terminal of the transmission measuring set and insert this cord in the proper spare switchboard jack to establish the cord circuit condition. Connect the sending T and R terminals respectively to the receiving T and R terminals.

Note: When a transmission measuring set of the No. 3 type is used, these connections are made through the jack contacts of the set when a dummy plug is removed from a jack other than the one to be used in this test.

2.20 Figure 2 shows schematically the connections for the test.

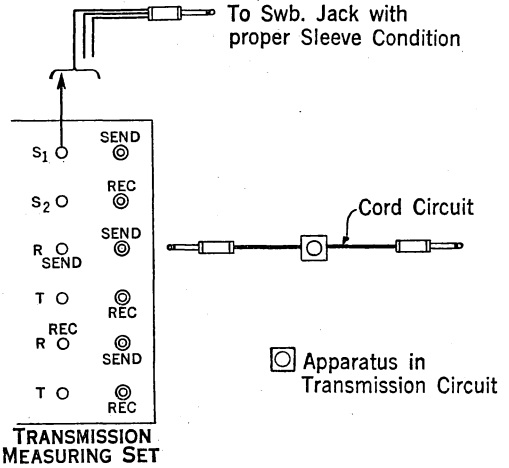

Figure 2

2.21 Insert the Trunk and Toll Plug in the sending jack of the transmission measuring set and proceed as outlined in paragraphs 2.22 to 2.25 inclusive.

2.22 Operate the **splitting key** to the Talk on Toll Cord position, other keys should be in the normal position.

2.23 Measure the transmission loss.

2.24 Restore the splitting key to the normal position and operate the **ringing key** to the Ring on Toll Cord position.

2.25 Measure the transmission loss.

2.26 Insert the Toll Plug in the sending jack of the transmission measuring set and proceed as outlined in paragraphs 2.27 to 2.32 inclusive.

2.27 Operate the **splitting key** to the Talk on Trunk Cord position, other keys should be in the normal position.

2.28 Measure the transmission loss.

2.29 Restore the splitting key to the normal position and operate the **ringing key** to the Ring on Trunk Cord position.

2.30 Measure the transmission loss.

2.31 With the splitting and ringing keys in the normal position, operate the listening key to the front position and operate the dial to the "off-normal" position to check the termination associated with the dialing circuit.

Note: The dial must be held in the "off-normal" position until the measurement is completed in cases where repeated dialing toll trains are used.

2.32 Measure the transmission loss.

(b_2) Through Cords

2.33 The terminations associated with the splitting and ringing keys may be connected to either end of the cord circuit and it is, therefore, necessary to make tests with each of these keys in both of the operated positions.

2.34 Prepare the transmission measuring set as described in paragraph 2.19

2.35 Insert the front cord in the sending jack of the transmission measuring set and proceed as outlined in paragraphs 2.36 to 2.39 inclusive.

2.36 Operate the **splitting key** to the Talk on Rear Cord position, other keys should be in the normal position.

2.37 Measure the transmission loss.

2.38 Restore the splitting key to the normal position and operate the **ringing key** to the Ring on Rear Cord position.

2.39 Measure the transmission loss.

2.40 Insert the rear cord in the sending jack of the transmission measuring set and proceed as outlined in paragraphs 2.41 to 2.44 inclusive.

2.41 Operate the **splitting key** to the Talk on Front Cord position, other keys should be in the normal position.

2.42 Measure the transmission loss.

2.43 Restore the splitting key to the normal position and operate the **ringing key** to the Ring on Front Cord position.

2.44 Measure the transmission loss.

2.45 To check the termination associated with the dialing circuit, insert the Toll Plug in the sending jack of the transmission measuring set and follow the procedure given in paragraphs 2.31 and 2.32.

(b_3) Terminating Cords

2.46 The terminations associated with the splitting and ringing keys may be connected only to the Toll Cord of the cord circuit and it is, therefore, necessary only to make tests with these keys in the Trunk Cord position.

2.47 Prepare the transmission measuring set as described in paragraph 2.19.

2.48 Insert the Toll Plug in the sending jack of the transmission measuring set and proceed as outlined in paragraphs 2.49 to 2.52 inclusive.

2.49 Operate the **splitting key** to the Talk on Trunk Cord position, other keys should be in the normal position.

2.50 Measure the transmission loss.

2.51 Restore the splitting key to the normal position and operate the **ringing key** to the Ring on Trunk Cord position.

2.52 Measure the transmission loss.

2.53 To check the termination associated with the dialing circuit, insert the Toll Plug in the sending jack of the transmission measuring set and follow the procedure given in paragraphs 2.31 and 2.32.

(c) Operators' Telephone Circuits

2.54 Figure 3 shows schematically the connections for the tests of the operators' telephone circuits.

2.55 Insert the No. 220 plug in the telephone set jack associated with the position under test, with the key of the plug in the normal position.

2.56 On the transmission measuring set connect the sending T and R terminals respectively to the receiving T and R terminals.

Note: When a transmission measuring set of the No. 3 type is used, these connections are made through the jack

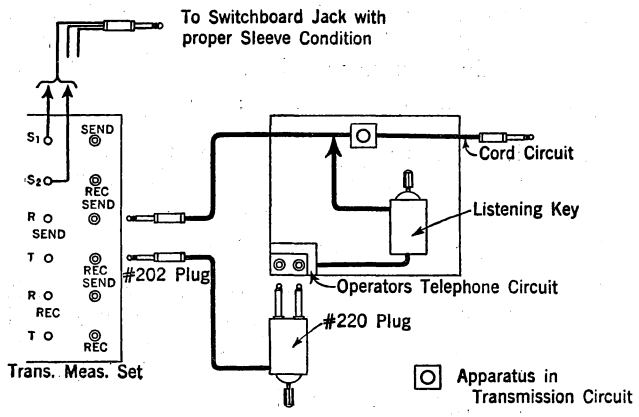

Figure 3

contacts of the set when a dummy plug is removed from a jack other than the one to be used in this test.

2.57 From the results of tests on the cord circuits of the position, choose a cord circuit which shows no transmission troubles and use it to make the following tests of the operator's telephone circuit.

2.58 Insert the plug (Toll, Trunk, Front or Rear as the case may be) of the cord circuit to which the operator's telephone circuit is connected when in the talking condition, in the proper type sending jack of the transmission measuring set.

Note: When the listening key of a cord circuit is operated, the telephone circuit is bridged on one end of the cord circuit, depending on the wiring arrangement of the latter circuit. Transmission measurements of the telephone circuit wiring should be made using the cord adjacent to the telephone circuit bridge.

2.59 Measure the transmission loss with all keys of the cord circuit normal.

2.60 Operate the listening key associated with the cord circuit so that the operator's telephone circuit is connected across the cord circuit in the talking condition.

2.61 Measure the transmission loss.

Note: The difference between the measments made in paragraphs 2.59 and 2.61 will be the loss of the operator's telephone circuit in the bridged talking condition.

2.62 Operate the listening key to the monitoring position.

2.63 Measure the transmission loss.

Note: The difference between the measurements made in paragraphs 2.59 and 2.63 will be the loss of the operator's telephone circuit in the bridged monitoring condition.

2.64 Remove the strapping between the sending and receiving T and R terminals of the transmission measuring set.

2.65 Insert the No. 202 plug associated with the No. 220 plug in the receiving jack of the transmission measuring set.

2.66 Operate the key of the No. 220 plug to the R position.

2.67 Measure the transmission loss.

Note: The difference between the measurements made in paragraphs 2.59 and 2.67 will be the loss of the operator's telephone circuit in the receiving monitoring condition.

2.68 Operate the listening key of the cord circuit to the talking position.

2.69 Operate the key of the No. 220 plug to the T position.

2.70 Measure the transmission loss.

Note: The difference between the measurements made in paragraphs 2.59 and 2.70 will be the loss of the operator's telephone circuit in the transmitting condition.

3. NO. 3 OR SIMILAR TYPE TOLL OFFICE

(a) Cord Circuits Not Equipped with Terminations

3.01 The sleeve condition for toll cord circuits in No. 3 and similar type toll offices is obtained by connecting the sleeve conductors of two switchboard cords having the same type of plug as the cord circuit under test, respectively to the S_1 and S_2 terminals of the transmission measuring set, and by inserting the plugs of these cords in spare switchboard jacks of the proper type to establish the cord circuit condition.

3.02 Insert the front and rear plugs of a cord circuit to be tested in the sending and receiving jacks of the transmission measuring set.

3.03 Figure 1 shows schematically the connections for the test.

3.04 Restore to normal any keys associated with the cord circuit under test.

3.05 With the transmission measuring set in the measuring condition the cords and jacks and keys associated with the cord circuit should be manipulated in accordance with paragraphs 2.07 to 2.10 inclusive in order to detect cutouts, etc.

3.06 Measure the transmission loss of the cord circuit with the keys normal.

3.07 Repeat the above procedure for each of the remaining cord circuits.

(b) Cord Circuits Equipped with Terminations

3.08 Cord circuits equipped with terminations should be tested in the same manner as those not equipped with terminations as outlined in paragraphs 3.01 to 3.07 inclusive.

Note: In pad control offices a 600-ohm termination is used. In other cases the termination may be either 600-ohms or 1200-ohms.

3.09 In order to determine that the terminations provided in the cord circuit are associated in the proper manner by the operation of the splitting and ringing keys the procedures outlined in paragraphs 3.10 to 3.22 inclusive should be made.

Note: The bridged loss of the 600-ohm termination, as measured in accordance with the procedures outlined in the following paragraphs, should be between 3 db and 4 db. If the measured loss is outside the limits just given, the condition should be investigated. The bridged loss for the 1200-ohm termination as measured in accordance with the procedures outlined in the following paragraphs should be between 1.5 and 2.5 db.

3.10 The terminations associated with the splitting and ringing keys may be connected to either the front or the rear cords, and it is necessary to make tests with each of these keys in both of the operated positions.

Note: The splitting key is associated with the cord circuit when the listening key is operated to the TALK position.

3.11 To prepare the transmission measuring set for the test connect the sleeve conductor of a switchboard cord having the same type plug as the cord circuit under test to the S_1 terminal of the transmission measuring set and insert this cord in the proper spare switchboard jack to establish the cord circuit condition. Connect the sending T and R terminals respectively to the receiving T and R terminals.

Note: When a transmission measuring set of the No. 3 type is used, these connections are made through the jack contacts of the set when a dummy plug is removed from a jack other than the one to be used in this test.

3.12 Figure 2 shows schematically the connection for the test.

3.13 Insert the rear plug of the cord circuit in the sending jack of the transmission measuring set and proceed as outlined in paragraphs 3.14 to 3.17 inclusive.

3.14 With the listening key operated to the TALK position operate the **splitting** key to the front position.

3.15 Measure the transmission loss.

3.16 Restore the splitting key to the normal position and with the listening key in the normal position, operate the **ringing** key to the front position.

3.17 Measure the transmission loss.

3.18 Insert the front plug of the cord circuit in the sending jack of the transmission measuring set and proceed as outlined in paragraphs 3.19 to 3.22 inclusive.

3.19 With the listening key operated to the TALK position operate the **splitting** key to the rear position.

3.20 Measure the transmission loss.

3.21 Restore the splitting key to the normal position and with the listening key in the normal position operate the **ringing** key to the rear position.

3.22 Measure the transmission loss.

(c) Operators' Telephone Circuits

3.23 Operators' telephone circuits should be tested in the same manner as those of the No. 1 Toll Office, the methods for which are given in paragraphs 2.54 to 2.70 inclusive.