NO. 701-A AND NO. 711-A PRIVATE BRANCH EXCHANGES

1. GENERAL

1.01 This section covers the detailed methods to be followed in making transmission tests on circuits associated with the No. 701-A and No. 711-A private branch exchanges. The manual switchboard circuits associated with the No. 701-A P.B.X. are covered in Section K27.45.

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 methods, and to Section K20.11 for general testing apparatus requirements.

2. TESTING METHODS

(A) Selector-Connectors

Regular Selector-Connectors

2.01 When selector-connectors function as selectors there is no equipment in the transmission circuit and transmission tests are not required on that part of the selector-connector.

2.02 The connector portion of selector-connectors should be tested in accordance with paragraphs 2.03 to 2.17, inclusive.

2.03 These circuits should be tested from the test jacks of the selector-connectors and the connections to the transmission measuring set completed through a vacant connector terminal of the selector-connector.

2.04 Figure 1 shows schematically the connections for the test.

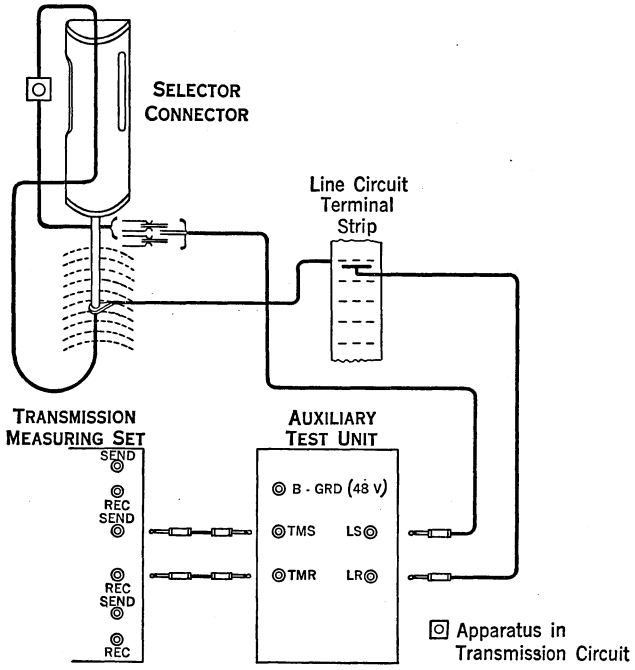

Figure 1

Preliminary Connections

2.05 Provide two regular double-ended patching cords equipped with No. 110 plugs, one No. P3C cord equipped with a No. 110 plug and a No. 240-A plug (No. 4 Terminal Open), a patching cord equipped with a No. 110 plug on one end

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and clips on the other end, (tip and sleeve) and one special patching cord equipped and connected as follows:

110-Type Plug connected to a	234-Type or Similar Plug
Tip	No. 1 Terminal
Ring	No. 2 Terminal
Sleeve	No. 3 Terminal
	No. 4 Terminal Open

2.06 Connect the TMS and TMR jacks of the auxiliary test unit respectively to the sending and receiving jacks of the transmission measuring set using two of the regular patching cords.

2.07 Connect the B-GRD jack (48 V) of the auxiliary unit to 48 volt battery and ground, (battery on tip and ground of sleeve) using the patching cord equipped with a No. 110 plug and clips.

Note: This battery and ground may be obtained from any source convenient to the location of the testing apparatus.

2.08 Connect the LR jack of the auxiliary test unit to the vacant connector terminal using the special patching cord of paragraph 2.05, and remove the intercepting trunk from the vacant connector terminal.

Note: In the No. 711-A P.B.X. it is necessary to remove the "busy" ground from the vacant connector terminal.

2.09 Insert the No. 110 plug of the No. P3C cord, in the LS jack of the auxiliary test unit.

Testing Procedure

2.10 Operate the following keys of the auxiliary test unit to the positions specified. Keys not mentioned should remain in the normal position.

Key 1 to OPEN — Key 3 to MET
Key 2 to OPEN — Key 4 to MET
Key 15 depressed and locked

2.11 Insert the No. 240-A plug of the No. P3C cord connected to the LS jack of the auxiliary test unit in the test jack of an idle selector-connector to be tested and operate key 1 of the auxiliary test unit to TEST.

Note: Before operating key 1 of the auxiliary test unit to TEST, inspect the shaft and wiper to determine if the selector-connector is still idle. If it is not idle, another selector-connector should be selected for test and the procedure of paragraph 2.11 carried out.

2.12 Dial the number of the vacant terminal to which the LR jack of the auxiliary test unit is connected.

2.13 Operate key 1 and key 2 of the auxiliary test unit to HOLD.

2.14 With the transmission measuring set in the measuring condition, test the selector-connector for cutouts by tapping the cover and carefully tapping the wiper cords with a pencil.

2.15 Measure the transmission loss.

2.16 Release the selector-connector by operating key 1 and key 2 of the auxiliary test unit to OPEN, and remove the No. 240-A plug from the selector-connector test jack.

2.17. When the testing is completed restore the intercepting trunk or "busy" ground to the vacant connector terminal.

Rotary Hunting Selector-Connectors

2.18 The rotary hunting selector-connector is similar to the regular selector-connector and is tested in the same manner following the method given in paragraphs 2.03 to 2.17, inclusive.

(B) Connectors

Regular Connectors

2.19 This circuit is tested in the same manner as the regular selector-connector following the method outlined in paragraphs 2.03 to 2.17, inclusive.

Rotary Hunting Connectors

2.20 The rotary hunting connector is similar to the regular connector and is tested in the same manner following the method given in paragraphs 2.03 to 2.17, inclusive.

Incoming Regular Connectors

2.21 The incoming regular connector is similar to the regular connector and is tested in the same manner following the method given in pargaraphs 2.03 to 2.17, inclusive.

Incoming Rotary Hunting Connectors

2.22 The incoming rotary hunting connector is similar to the incoming regular connector, and is tested in the same manner, following the method given in paragraphs 2.03 to 2.17, inclusive.

(C) Central Office Trunk Circuits

One-Way Direct Dial Trunk Circuits to Manual Offices

2.23 This circuit may be tested by either the loop or straightaway methods. The loop method can be used if there are three or more circuits in the group. Where the group consists of less than three circuits, the tests are made by the straightaway method.

Loop Methods

2.24 Under this method the circuits are tested at the relay rack terminal strip of the No. 701-A or No. 711-A P.B.X. during a period of light traffic load.

2.25 The loop is established at the "A" board of the manual office by means of a switchboard cord circuit or where required a trunked connection to the "B" board.

2.26 The circuits are completed to the transmission measuring set at the P.B.X. by means of patching cords from the relay rack terminal strips.

2.27 Figure 2 shows schematically the connections for the test.

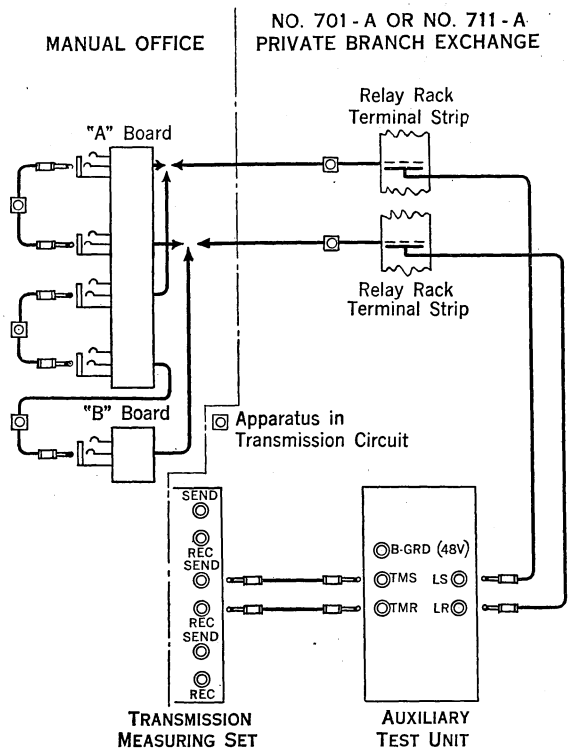

Figure 2

Preliminary Connections

2.28 Provide two regular double-ended patching cords equipped with No. 110 plugs, one patching cord equipped with a No. 110 plug on one end and clips on the other, and two special patching cords equipped and connected as indicated below:

110-Type Plug connected to a	**234-Type or Similar Plug**
Tip	No. 1 Terminal
Ring	No. 2 Terminal
Sleeve	No. 3 Terminal
	No. 4 Terminal Open

2.29 Connect the TMS and TMR jacks of the auxiliary test unit, respectively to the sending and receiving jacks of the transmission measuring set using two regular patching cords.

2.30 Connect the B-GRD (48 V) jack of the auxiliary test unit to 48-volt battery and ground (battery on tip and and ground on sleeve) using the patching cord equipped with a No. 110 plug on one end and clips on the other.

Note: This battery and ground may be obtained from any source convenient to the location of the testing apparatus.

Testing Procedure

2.31 Operate the following keys of the auxiliary test unit to the positions specified. Keys not mentioned should remain in the normal position.

Key 1 to OPEN	Key 5 to BATT
Key 2 to OPEN	Key 6 to BATT
Key 3 to MET	Key 12 to SL
Key 4 to MET	

2.32 Select two idle trunk circuits at the relay rack terminal strips and connect the special patching cords of paragraph 2.28 to the tip, ring and sleeve terminals of the respective terminal strips using the ends equipped with the 234 type or similar plug.

2.33 Connect the other ends of the patching cords to the LS and LR jacks respectively of the auxiliary test unit.

2.34 Insert an attendant's telephone set in the TELEPHONE SET jacks of the auxiliary test unit and operate key 1 of the auxiliary test unit to TEST.

2.35 When the operator at the manual office answers, request her to complete the call in the regular way to the other trunk to be tested.

2.36 Operate keys 1 and 2 of the auxiliary test unit to HOLD.

2.37 Measure the transmission loss.

Note: This is the loss of the two trunk circuits and a looping cord circuit.

2.38 Disconnect the trunks by operating key 1 and key 2 of the auxiliary test unit to OPEN.

Straightaway Method

2.39 Under this method the circuit is tested at the relay rack terminal strip of the No. 701-A or No. 711-A P.B.X. during a period of light traffic load.

2.40 The circuit is completed for test to the sending transmission measuring set at the manual office switchboard by means of a switchboard cord circuit.

2.41 Figure 3 shows schematically the connections for the test.

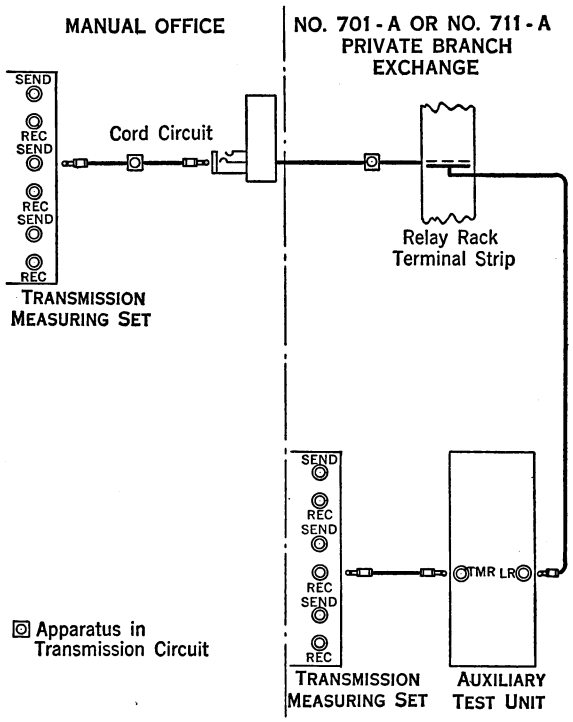

Figure 3

Preliminary Connections

2.42 At the P.B.X. provide a regular double-ended patching cord equipped with No. 110 plugs, one patching cord equipped with a No. 110 plug on one end and clips on the other and special patching cord equipped and connected as indicated below.

110-Type Plug connected to a **234-Type or Similar Plug**	
Tip	No. 1 Terminal
Ring	No. 2 Terminal
Sleeve	No. 3 Terminal
	No. 4 Terminal Open

2.43 At the P.B.X. connect the receiving jack of the transmission measuring set to the TMR jack of the auxiliary test unit using a regular patching cord.

2.44 Connect the B-GRD (48 V) jack of the auxiliary test unit to 48-volt battery and ground (battery on tip and ground on sleeve) using the patching cord equipped with a No. 110 plug on one end and clips on the other.

Note: This battery and ground may be obtained from any source convenient to the location of the testing apparatus.

2.45 Connect the LR jack of the auxiliary test unit to the tip, ring and sleeve terminals of the trunk to be tested at the relay rack terminal strip using the special patching cord of paragraph 2.42.

Testing Procedure

2.46 Operate the following keys of the auxiliary test unit to the positions specified. Keys not mentioned should remain in the normal position.

Key 1 to OPEN	Key 5 to BATT
Key 2 to OPEN	Key 6 to BATT
Key 3 to MET	Key 12 to SL
Key 4 to MET	

2.47 Insert an attendant's telephone set in the TELEPHONE SET jacks of the auxiliary test unit and operate key 2 of the auxiliary test unit to TEST.

2.48 Establish communication with the assistant tester at the manual office and have the sending jack of the transmission measuring set connected to the trunk under test by means of a switchboard cord circuit. Operate key 2 of the auxiliary test unit to HOLD.

2.49 Measure the transmission loss.

Note: This will be the loss of the trunk circuit and a switchboard cord circuit.

2.50 Upon completion of the test the patching cord should be removed from the relay rack terminal strip and the connection to the transmission measuring set at the manual office should be removed.

One-Way Direct Dial Trunk Circuits to Step-by-Step Offices

2.51 These circuits are tested at the relay rack terminal strip by the straightaway method.

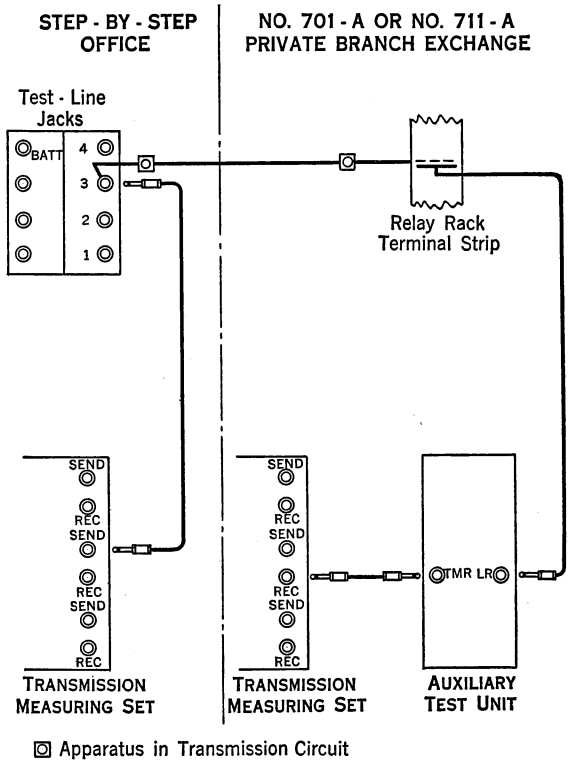

Figure 4

2.52 The circuit is completed for the test from a test line jack at the step-by-step office.

2.53 Figure 4 shows schematically the connections for the test.

Preliminary Connections

2.54 At the P.B.X. provide a regular double-ended patching cord equipped with No. 110 plugs, one patching cord equipped with a No. 110 plug on one end and clips on the other (tip and sleeve) and a special patching cord equipped and connected as indicated below.

110-Type Plug connected to a	**234-Type or Similar Plug**
Tip	No. 1 Terminal
Ring	No. 2 Terminal
Sleeve	No. 3 Terminal
	No. 4 Terminal Open

2.55 At the step-by-step office provide a regular double-ended patching cord equipped with No. 110 plugs.

2.56 At the P.B.X. connect the receiving jack of the transmission measuring set to the TMR jack of the auxiliary test unit using a regular patching cord.

2.57 Connect the B-GRD (48 V) jack of the auxiliary test unit to 48-volt battery and ground (battery on tip and ground on sleeve) using the patching cord equipped with a No. 110 plug on one end and clips on the other.

Note: This battery and ground may be obtained from any source convenient to the location of the testing apparatus.

2.58 Connect the LR jack of the auxiliary test unit to the tip, ring and sleeve terminals of the trunk to be tested at the relay rack terminal strip using the special patching cord of paragraph 2.54.

Testing Procedure

2.59 Operate the following keys of the auxiliary test unit to the positions specified. Keys not mentioned should remain in the normal position.

Key 1 to OPEN	Key 4 to MET
Key 2 to OPEN	Key 12 to SL
Key 3 to MET	

2.60 Insert an attendant's telephone set in the TELEPHONE SET jacks of the auxiliary test unit and operate key 2 of the auxiliary test unit to TEST. Establish communication with the tester at the step-by-step office and arrange for connections of paragraph 2.61.

2.61 At the step-by-step office select a test line associated with a connector group and connect the sending jack of the transmission measuring set to the test line circuit (jack No. 3 of the test line group).

2.62 The tester at the step-by-step office should advise the tester at the P.B.X. when the connections of paragraph 2.61 have been completed.

2.63 At the auxiliary test unit, dial the test line number to which the sending transmission measuring set is connected at the step-by-step office.

Note: It will be necessary for the tester at the step-by-step office to trip the ringing.

2.64 Measure the transmission loss.

One-Way Direct Dial Trunk Circuits to Panel Offices

2.65 Trunk circuits to panel offices should be tested in the same manner as those to step-by-step offices, the methods for which are outlined in paragraphs 2.51 to 2.64 inclusive, except that the sending transmission measuring set should be connected at the I.D.F. to a spare final multiple circuit from which the intercepting line has been removed, instead of being connected to a test line.

Combination Trunk Circuits

2.66 These circuits may be tested from the relay rack terminal strip in the same manner as the direct dial central office trunk circuits the methods for which are given in paragraphs 2.23 to 2.65 inclusive, or they may be tested from the P.B.X. switchboard following the methods outlined in paragraphs 2.40 to 2.66 inclusive of Section K27.45.

(D) Tie Line Circuits

Two-Way Repeating Tie Line Circuits with Average Range to a Connecting Dial P.B.X.

2.67 The circuits may be tested by either the loop or straightaway methods. The loop method can be used only if there are three or more circuits in the group. Where the group consists of less than three circuits, the tests are made by the straightaway method.

Loop Method

2.68 Under this method the circuits are tested at the relay rack terminal strip of the No. 701-A or No. 711-A P.B.X. during a period of light traffic load.

2.69 The loop is established at the connecting dial P.B.X. between the terminal strip and a vacant connector terminal by means of a looping cord equipped with No. 234 or similar plugs.

2.70 The circuits are completed to the transmission measuring set at the No. 701-A or No. 711-A P.B.X. relay rack terminal strip.

2.71 Figure 5 shows schematically the connections for the test.

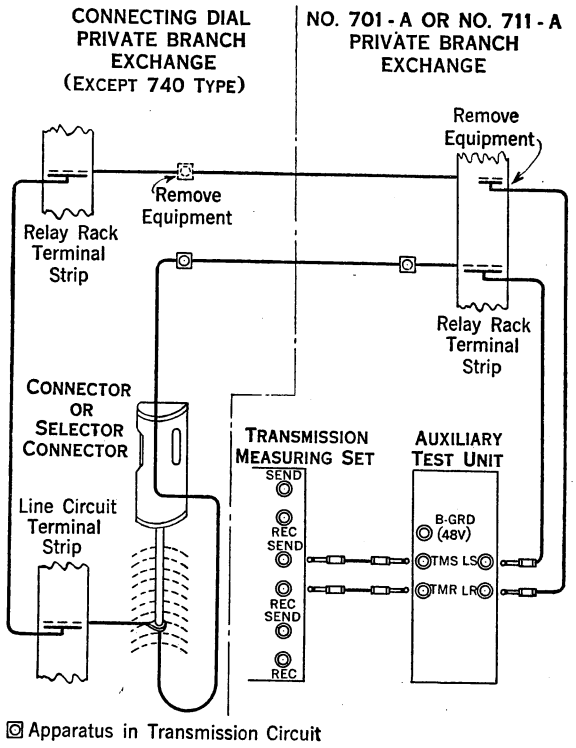

Figure 5

Preliminary Connections

2.72 At the No. 701-A or No. 711-A P.B.X. provide two regular double-ended patching cords equipped with No. 110 plugs, one patching cord equipped with a No. 110 plug on one end and clips on the other and two special patching cords equipped and connected as indicated below.

110-Type Plug connected to a	**234-Type or Similar Plug**
Tip	No. 1 Terminal
Ring	No. 2 Terminal
Sleeve	No. 3 Terminal
	No. 4 Terminal Open

2.73 Connect the TMS and TMR jacks of the auxiliary test unit, respectively, to the sending and receiving jacks of the transmission measuring set, using two regular patching cords.

2.74 Connect the B-GRD (48 V) jack of the auxiliary test unit to 48 volt battery and ground (battery on tip and ground on sleeve) using the patching cord equipped with a No. 110 plug on one end and clips on the other.

Note: This battery and ground may be obtained from any source convenient to the location of the testing apparatus.

2.75 Select a tie line to be used as a standard or test trunk.

2.76 Connect the LR jack of the auxiliary test unit to the tie line to be used as standard at the relay rack terminal strip (tip and ring terminals) using one of the special patching cords.

2.77 Connect the LS jack of the auxiliary test unit to the tie line to be tested at the relay rack terminal strip (tip, ring and sleeve terminals) using one of the special patching cords.

2.78 Establish a talking circuit with an assistant tester at the connecting dial P.B.X.

2.79 At the terminal strip of the connecting dial P.B.X. have the tie line equipment disconnected from the conductors of the tie line which is to be used as the standard or test trunk.

2.80 Having the assistant tester connect a vacant connector terminal, from which the "busy" ground or intercepting trunk has been removed, to the tie line conductors to be used as the standard or test trunk, using a looping cord equipped with 234-type or similar plugs.

Testing Procedure

2.81 Operate the following keys of the auxiliary test unit to the positions specified. Keys not mentioned should remain in the normal position.

Key 1 to OPEN
Key 2 to OPEN
Key 3 to MET
Key 4 to MET
Key 12 to SL

2.82 Operate key 1 to TEST and dial the number of the vacant connector terminal at the connecting dial P.B.X. which is connected to the tie line to be used as the standard trunk.

2.83 Operate keys 1 and 2 of the auxiliary test unit to HOLD.

2.84 Measure the transmission loss.

Note: This will be the loss of a repeating tie line circuit and a tie line circuit without equipment at either end.

2.85 Disconnect the tie line by operating key 1 of the auxiliary test unit to OPEN.

2.86 When the testing has been completed, disconnect the repeating tie lines by operating keys 1 and 2 of the auxiliary test unit to OPEN and have the assistant tester remove the looping cord at the connecting dial P.B.X.

2.87 Restore to normal the tie line used as the standard or test trunk and check its operation before returning to service to determine that it is in satisfactory condition.

2.88 To determine the loss of the repeating tie line used as the standard or test trunk it will be necessary to make triangulation measurements using two other tie lines from which the equipment has been removed at both ends and having the assistant tester loop the circuits at the connecting dial P.B.X.

Straightaway Method

2.89 Under this method the circuit is tested at the relay rack terminal strip of the No. 701-A or No. 711-A P.B.X. during a period of light traffic load.

2.90 The circuit is completed for test to the sending transmission measuring set at the connecting dial P.B.X. by means of a spare connector terminal.

2.91 Figure 6 shows schematically the connections for the test.

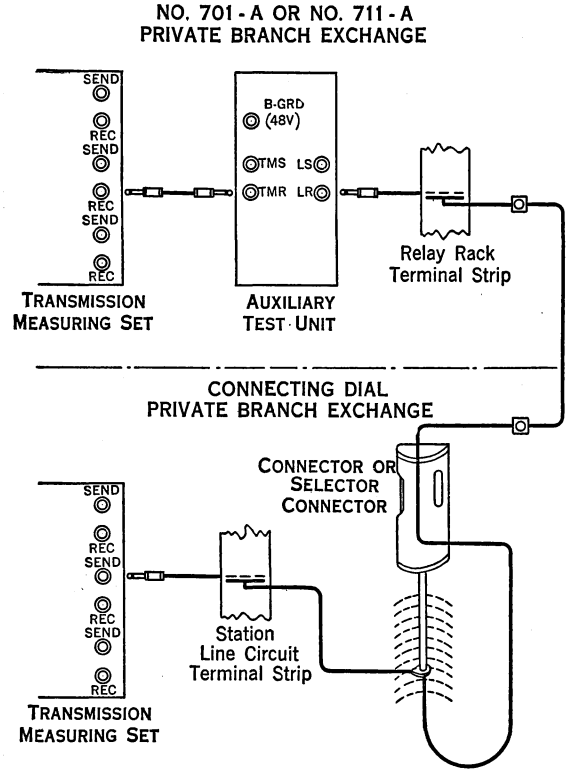

Figure 6

Preliminary Connections

2.92 At the P.B.X. provide a regular double ended patching cord equipped with No. 110 plugs, a patching cord equipped with a No. 110 plug on one end and clips on the other and a special patching cord equipped and connected as indicated below:

110-Type Plug connected to a **234-Type or Similar Plug**	
Tip	No. 1 Terminal
Ring	No. 2 Terminal
Sleeve	No. 3 Terminal
	No. 4 Terminal Open

2.93 At the P.B.X. connect the receiving jack of the transmission measuring set to the TMR jack of the auxiliary test unit using a regular patching cord.

2.94 Connect the LR jack of the auxiliary test unit to the tip, ring and sleeve terminals of the trunk to be tested at the relay rack terminal strip using the special patching cord of paragraph 2.92.

2.95 Connect the B-GRD (48 V) jack of the auxiliary test unit to 48 volt battery and ground (battery on tip and ground on sleeve) using a patching cord equipped with a No. 110 plug on one end and clips on the other.

Note: This battery and ground may be obtained from any source convenient to the location of the testing apparatus.

Testing Procedure

2.96 Operate the following keys of the auxiliary test unit to the positions specified. Keys not mentioned should remain in the normal position.

Key 1 to OPEN
Key 2 to OPEN
Key 3 to MET
Key 4 to MET
Key 12 to SL

2.97 Establish communication with the assistant tester at the connecting dial P.B.X. and arrange for the connections of paragraph 2.98.

2.98 Select a vacant connector terminal at the connecting dial P.B.X., remove the "busy" ground or intercepting trunk and connect this terminal to the sending jack of the transmission measuring set using the special patching cord of paragraph 2.92.

2.99 When this work is completed the tester at the No. 701-A or No. 711-A P.B.X. should be advised and should be given the number of the vacant connector terminal to which the transmission measuring set is connected.

2.100 Operate key 2 of the auxiliary test unit to TEST and dial the number of the vacant connector terminal of paragraph 2.98.

Note: It will be necessary for the assisting tester to trip the ringing following the completion of the dialing.

2.101 Operate keys 1 and 2 of the auxiliary test unit to HOLD.

2.102 Measure the transmission loss.

2.103 Upon completion of the test, the patching cord should be removed from the relay rack terminal strip, the connection to the sending transmission measuring set should be removed, and the "busy" ground or intercepting trunk should be restored to the vacant connector terminal.

Two-Way Repeating Tie Line Circuits with Increased Range to a Connecting Dial P.B.X.

2.104 These circuits are tested in the same manner as those with average range the methods for which are given in paragraphs 2.67 to 2.103, inclusive.

Two-Way Manual One or Two-Way Dialing Tie Line Circuits

2.105 This circuit is tested by the straightaway method from the relay rack terminal strip.

2.106 Connection to the sending transmission measuring set at the connecting attended P.B.X. is made at the switchboard by means of a cord circuit.

2.107 Figure 7 shows schematically the connections for the test.

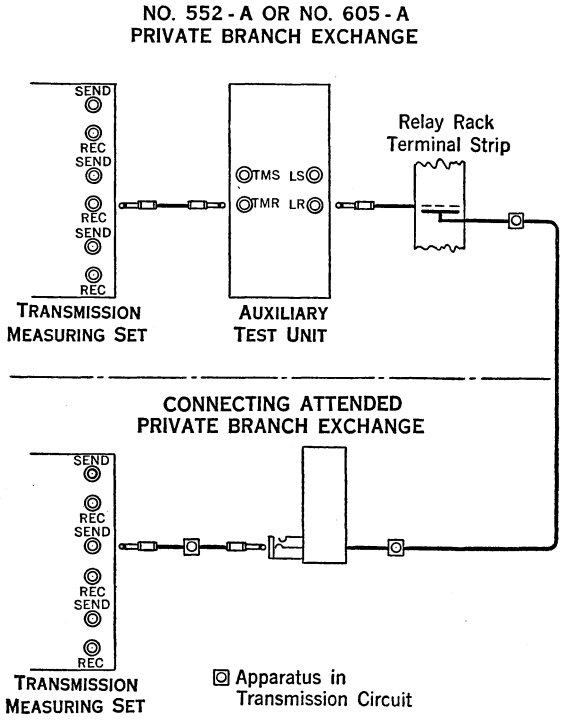

Figure 7

2.108 At the No. 552-A or No. 605-A P.B.X. provide one regular double-ended patching cord equipped with No. 110 plugs, and a special patching cord equipped and connected as indicated below:

110-Type Plug connected to a	**234-Type or Similar Plug**
Tip	No. 1 Terminal
Ring	No. 2 Terminal
Sleeve	No. 3 Terminal
	No. 4 Terminal Open

2.109 Connect the TMR jack of the auxiliary test unit to the receiving jack of the transmission measuring set using the regular double-ended patching cord.

2.110 Operate the following keys of the auxiliary test unit to the positions specified. Keys not mentioned should remain in the normal position.

Key 1 to OPEN
Key 2 to OPEN
Key 3 to MET
Key 4 to MET

2.111 Connect the LR jack of the auxiliary test unit to the tip, ring and sleeve terminals of the tie line to be tested at the relay rack terminal strip using the special patching cord of paragraph 2.108.

2.112 Insert an attendant's telephone set in the TELEPHONE SET jacks of the auxiliary test unit and operate key 2 of the auxiliary test unit to TEST.

2.113 When the attendant at the connecting P.B.X. answers establish communication with the tester and have the sending transmission measuring set connected to the jack of the tie line to be tested. This is done by means of an idle cord pair by inserting the cord normally used to answer on the tie line in the tie line jack and by inserting the other cord of the cord pair in the sending jack of the transmission measuring set.

2.114 Operate keys 1 and 2 of the auxiliary test unit to HOLD.

2.115 Measure the transmission loss.

Note: This is the loss of the tie line circuit and a cord circuit.

One-Way Repeating One-Way Dialing One-Way Manual Tie Line Circuits

2.116 This circuit may be tested as outlined in paragraphs 2.105 to 2.115, inclusive, for the condition involved in an outgoing call from a dial station.

2.117 When the outgoing call is from an attendant a different condition is involved in the tie line circuit. This condition is tested from the P.B.X. switchboard as covered in paragraph 2.84 of Section K27.45.

2.118 In some cases an incoming repeater is incorporated in the circuit to increase the dialing range. No change is required in the testing method when this repeater is used.

(E) Long Trunk or Station Line Circuits

2.119 The long line circuit provides a means for a long P.B.X. station to dial into the P.B.X. or via the P.B.X. into a dial central office.

2.120 It will be necessary to disconnect the long line circuit from the P.B.X. station line in order to make the test. This is accomplished at the distributing frame or at the line relay rack.

2.121 Connect the sending jack of the transmission measuring set to the station line circuit terminals, and the receiving jack of the transmission measuring set to the trunk circuit terminals using patching cords equipped on one end

with No. 110 plugs and on the other with No. 234 or simliar type plugs or clips.

2.122 Measure the transmission loss.

2.123 Reconnect the long line circuit to the P.B.X. station line.

(F) Manual Switchboard Circuits

2.124 The manual switchboard provided with the No. 701-A P.B.X. is the No. 552-A where a non-multiple switchboard is required and the No. 605-A where a multiple switchboard is required.

2.125 The No. 711-A P.B.X. is not provided with a manual switchboard.

2.126 The methods for making transmission tests on the circuits and equipment associated with the No. 552-A or the No. 605-A P.B.X. are given in Section K27.45.