

INCOMING SELECTOR CIRCUITS
FROM PANEL LOCAL, OFFICE TANDEM AND PANEL SENDER TANDEM OFFICES
MANUAL BRUSH CONTINUITY TEST USING TEST SET ES-20150-01 OR ES-239844
GROUND CUTOFF RELAY PANEL OFFICES

1. GENERAL

1.01 This section describes methods of making brush continuity tests of incoming selectors and repeating incoming selectors from machine switching offices at the incoming frames in ground cutoff relay panel offices. These tests are made by means of the manually operated office, incoming and final selector test set (wagon type) per ES-20150-01 or ES-239844. The tests described are as follows:

- A. Brush Continuity Test Using IBC Key.
- B. Brush Continuity Test to Busy Line.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 The tests are intended for use in testing on a routine basis the brushes of those incoming circuits which are not tested by an incoming selector test frame or by the manual test line test. They may also be used to supplement the test frame and manual test line tests and to check trouble conditions.

1.04 The tests are made at the incoming selector frames and the test set is connected to the proper jacks by means of patching cords.

1.05 Test A is intended for use where the test set is equipped with an IBC key. During this test the final selector is sent to telltale on tens selection. Test B is for use where the IBC key is not provided or for testing a brush associated with a bank

of vacant incoming multiple terminals. In this test a busy final terminal is used.

1.06 The trunk hunting feature of incoming circuits may be checked during either of these tests, if desired, by making the first choice final circuits busy.

1.07 Any incoming circuit on which a failure is encountered when making a brush continuity test, should be left busy until the trouble has been cleared.

2. APPARATUS

- 2.01. Office, Incoming and Final Selector Test Set per ES-20150-01 or ES-239844.
- 2.02 Two P3E Cords equipped with No. 110 Plugs.
- 2.03 Operator's Telephone Set.
- 2.04 No. 32A Test Set.
- 2.05 No. 184 Plugs, as required.

3. PREPARATION

Tests A and B

3.01 Before starting the test on two-wire incoming selector circuits, arrange to have the trunks which are associated with the circuits to be tested, made busy at the originating office. The number of trunks to be made busy at one time should depend on the size of the trunk group and the volume of traffic at the time of testing. However, at no time should an entire trunk group be made busy.

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3.02 When testing three-wire incoming circuits equipped with separate test and make busy jacks, make the circuits to be tested busy by inserting No. 184 plugs into the MB jacks.

Note: Do not insert a make busy plug into the MB jack of a circuit which is off normal.

3.03 With all test set keys except the numerical keys normal, connect jack B-GRD of the test set to jack A on the incoming frame jack panel.

Note: To avoid possible grounding of the battery supply leads, connect the cord to the test set first and when disconnecting remove the cord from the test set last.

3.04 Operate the 2WI (two-wire incoming) key to test two-wire and repeating incoming circuits from panel local or panel tandem offices.

3.05 When using the test set per ES-20150-01 to test two-wire incomings having A relays arranged to operate on 48 volt battery, operate the SL-48V (or A) key for a maximum external circuit loop of 6350 ohms or the LL-48V (or B) key for a loop of 7540 ohms. With these keys normal the test set is arranged for testing 24 volt A relays.

3.06 Operate the 3WI (three-wire incoming) key to test three-wire incomings from panel offices.

3.07 Operate the TEL (telephone set) key and connect an operator's telephone set to the TEL jacks of the test set.

Note: When using test set per ES-239844, the TEL key should not be operated until after selections have been completed.

3.08 If it is desired to check the trunk hunting feature of the incoming circuits during these tests, make the first choice final circuits busy by inserting No. 184 plugs into the TMB (or MB) jacks at the final frame.

3.09 All covers of relays in the incoming circuit should be in place during the period the test of the circuit is in progress.

Test B

3.10 Operate the TRA (or TRB) key at the final selector test frame to make the final selector test line terminals busy. If the final selector test frame is in use, it will be necessary to stop the frame during the interval this test is in progress.

3.11 If the operation of the TRA key does not make these test terminals busy, arrange the final selector test frame so as to make them busy. The numbers 1099, 3099, 5099, 7099 and 9099 may then be used for the test, except that it may not be necessary to test the incoming brush that has been checked by the manual test line test.

Note: These test terminals are reached over incoming groups located about the center of each incoming frame bank and are selected to detect possible overstepping or understepping of the selectors. In the case of a partially equipped incoming bank which does not provide access to one of these test terminals, terminal No. 99 of the highest equipped final choice of the bank, should be used as the test terminal. If the entire bank consists of vacant incoming multiple terminals, the test number for that bank should be used, the call being routed to the intercepting operator.

3.12 If it is not convenient to use the test line terminals, certain final terminals can be made busy for this test. For this purpose an unassigned terminal in each group of 2000 lines may be selected and made busy. The permanently made busy final terminal may be used as one of these test terminals.

4. METHOD

A. Brush Continuity Test Using IBC Key

4.01 Connect jack TST of the test set to the T (or TMB) jack of the incoming circuit to be tested.

Note: To avoid releasing a service connection, do not connect to a T jack of the cutoff type or to a TMB jack if the associated selector is off normal.

4.02 With the L NO, L HLD, L REL and LGT keys normal, if provided, operate the compensating resistance keys so that the resistance furnished by the test set added to that wired in the incoming circuit, if provided, will give the total compensating resistance listed below. No capacity should be introduced in the circuit by the test set.

RESISTANCE OF L RELAY	TOTAL COMPENSATING RESISTANCE REQUIRED FOR TEST
1000 ohms	1500 ohms
1200 ohms	1000 ohms
500 ohms (206- and 280-type in repeating incomings)	900 ohms

Note: In those cases where the test set is not arranged to provide the exact amount of resistance required, the next lowest value which it is possible to obtain should be used.

4.03 Operate the IBC (incoming brush continuity) key.

4.04 Depress keys in the TH and H rows of numerical keys that will cause the incoming circuit to make the required brush and group selections for tripping the brush under test and for directing the incoming selector to a working group of trunks. Any operated key in the T and U rows of numerical keys is ineffective during this test.

Note 1: If the entire incoming bank consists of vacant incoming multiple terminals, restore the IBC key to normal and make test (B) on the brush.

Note 2: One brush on a selector rod is checked during the manual test line test.

4.05 Momentarily operate the ST (start) key to start the test. The TST lamp lights as an indication that the test is in progress.

4.06 Marginal test may be made when testing repeating incomings by operating the L NO, L HLD or L REL keys. If the repeating incoming has been modified by the use of a 280-type L relay, the LGT shall also be operated and all compensating resistance strapped out at the incoming selector circuit. All resistance and capacity keys in the test set shall be normal. When testing repeating incomings with the L NO key operated, a nonoperate test of the L relay is applied, the incoming will remain in position 1 if the L relay is within requirements and the shunt is properly connected around its primary winding. The L NO key is restored to normal to permit the test to proceed. The L REL key will apply a test to check the ability of the L relay to release quickly enough to avoid overstepping. The purpose of the test provided by the L HLD key is to check the ability of the incoming L relay to hold during final selections over a trunk which imposes the worst circuit surge conditions on this relay.

4.07 Observe that the proper incoming brush is tripped and that the proper incoming group is selected. Also, during the test, note any irregular operations such as sluggish up-drive, slipping sequence switch drive disc, etc.

4.08 After incoming selections have been completed final brush selection is made, the No. 1 brush being selected, and then the test set functions to drive the final selector to telltale on tens selection.

Note: If the trunk hunting feature is being checked, the steady lighting of the OF (overflow) lamp indicates that the incoming failed to trunk hunt and has selected one of the final circuits made busy. The OF lamp also lights if the incoming selector goes to overflow due to all trunks being busy or to understepping on group selection.

4.09 The BC-OK (brush continuity OK) lamp lights as an indication of a satisfactory test. The incoming advances to the ringing position but ringing is immediately tripped by the busy-back condition in the final circuit.

The incoming then advances to the talking position. Observe that busy-back tone is heard in the telephone set receiver, as a further indication of a satisfactory test.

Note 1: If the final selector circuit is not arranged to return busy-back tone on telltale conditions, the incoming remains in the ringing position and busy-back tone is not heard.

Note 2: When using test set per ES-239844, operate the TEL key to observe the busy-back tone and then restore the key to normal.

4.10 Momentarily operate the DISC key. The incoming and final circuits and the test set restore to normal. The BC-OK and TST lamps are extinguished.

Note: The BY lamp lights during the return to normal of a three-wire incoming circuit.

4.11 To make a test on another brush of the same selector, proceed in accordance with 4.04 to 4.10, using a different brush selection or brush and group selection.

Repeat Test

4.12 To repeat the test, momentarily operate the ST key after the test set has restored to normal. After the test has been completed, momentarily operate the DISC key to restore the test set and associated circuits to normal.

Disconnection

4.13 If the same test is to be applied to other circuits on the same side of the incoming frame, disconnect the plug from the T (or TMB) jack and reconnect it to the corresponding jack of the next circuit to be tested. The proper compensating resistance keys should be operated for the circuit to be tested.

Note: Before disconnecting the test set from an incoming circuit, observe that the incoming is normal.

4.14 When testing is completed on the last circuit, restore all operated keys to normal and disconnect all cords. Then remove the No. 184 plugs from the MB jacks, if provided, or arrange to have the busy trunks made available for service at the originating office.

B. Brush Continuity Test to Busy Line

4.15 This test is for the purpose of testing the continuity of brushes of incoming circuits by directing the final selector to a busy line. This test is used where the test set is not equipped with an IBC key for testing brush continuity and also for testing brushes associated with incoming banks consisting entirely of vacant incoming multiple terminals.

4.16 Proceed as described in 4.01 to 4.07 except that keys are depressed in the TH, H, T and U rows of numerical keys to correspond to the number of the busy final terminal used for the test and the IBC key when provided on the test set is not operated.

4.17 Incoming and final selections are made in accordance with the operated numerical keys to select the busy line. After selections have been completed the OF lamp lights momentarily. As the incoming advances the IO-OK lamp lights. The incoming advances to the ringing position but ringing is immediately tripped by the busy-back condition in the final circuit. The incoming then advances to the talking position. The IO-OK (incoming OK) lamp flashes at the busy-back rate as an indication of a satisfactory test. Busy-back tone is heard in the telephone set receiver.

Note 1: When using the number of a final selector test line terminal to test a brush associated with an incoming bank consisting of vacant incoming multiple terminals, the test call is routed to an intercepting operator over a vacant incoming multiple trunk circuit and the IO-OK lamp lights steadily. The advance of the incoming to the ringing position in this case is a sufficient indication of a satisfactory test and the DISC key should be operated immediately to avoid having the operator answer the call.

Note 2: If the trunk hunting feature is being checked, the steady lighting of the OF (overflow) lamp indicates that the incoming failed to trunk hunt and has selected one of the final circuits made busy. The OF lamp also lights if the incoming selector goes to overflow due to all trunks being busy or to understepping on group selection.

Note 3: When using test set per ES-239844, operate the TEL key to observe the busy-back tone and then restore the key to normal.

4.18 Momentarily operate the DISC key. The incoming and final circuits and the test set restore to normal. The IO-OK and TST lamps are extinguished.

Note: The BY lamp lights during the return to normal of a three-wire incoming circuit.

4.19 To make a test on another brush of the same selector, proceed in accordance with 4.16 to 4.18 using the number of the busy final terminal associated with the brush to be tested.

Repeat Test

4.20 To repeat the test, momentarily operate the ST key after the test set has restored to normal. After the test has been completed, momentarily operate the DISC key to restore the test set and associated circuits to normal.

Disconnection

4.21 After this test is completed on the circuit under test, proceed in accordance with 4.13 and 4.14.

5. SPECIAL FEATURES

Trouble Restore

5.01 Momentarily operate the DISC key when it is desired to restore the test set to normal after the test set has blocked on a trouble condition.

Step-by-Step Advance

5.02 The step-by-step control feature permits canceling the automatic advance of the test set in those cases where it is desired to advance the test set by steps during the progress of a test in order to make observations on a particular test.

5.03 Operate the STP (step-by-step) key and then momentarily operate the ST key to start the test. The test set stops after each of certain selections consisting of incoming brush and group selections and final brush and tens selections have been completed.

5.04 To advance the test set under this condition, momentarily operate the ST key. After the desired selections have been checked, restore the STP key to normal and the test set proceeds with the remaining operations of the test.

Remote Control

5.05 This feature provides a convenient means of starting a test, of advancing the test set in steps and of restoring the test set to normal while observing the operation of the incoming circuit.

5.06 With the test set keys required for a particular test in an operated position, insert the plug of a No. 32A test set into the EX-K (extension key) jack of the test set. If it is desired to control the test in steps, operate the STP key.

5.07 To start the test or to advance the test set in steps where the STP key is operated, momentarily depress the WH (white) key of the No. 32A test set. This simulates the operation and release of the ST key of the selector test set.

5.08 To restore the test set to normal on a satisfactory test or if the test set blocks on a trouble condition, momentarily depress the RED key of the No. 32A test set. The operation of this key simulates the operation

and release of the DISC key of the selector test set. To repeat the test after the test set restores to normal, momentarily depress the WH key.

6. REPORTS

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