

LINE AND CUTOFF RELAYS
SUBSCRIBER LINES HAVING GROUND ON CUTOFF RELAYS
TESTS USING TEST SET PER SD-21623-011 OR ES-239832
LINE FINDER EQUIPMENT
PANEL OFFICES

1. GENERAL

1.01 This section describes a method of testing line and cutoff relays, in line finder offices having ground on the cutoff relays, by means of the manually operated subscriber line test set (wagon type) per SD-21623-011 or ES-239832. The tests described are as follows:

- (A) Test of Non-Coin Lines.
- (B) Test of Coin Lines.
- (C) Test of Lines Equipped with Stop Hunt Circuit.

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 made at the final frames by directing final selectors, which are arranged for testing subscriber lines, to the final terminals. These test selectors are available for subscriber calls when not in use for testing purposes.

1.04 In offices where different subscriber line relay equipment and adjustments are provided, the testman should be furnished with a chart of the final multiple indicating the location of the various line relay arrangements.

1.05 When a test connection has been established to an idle line, the test should be completed without delay, so as to hold the line busy for a minimum interval of time.

1.06 If a number of lines in consecutive order are to be tested, the test selector may be stepped from line to line by the operation of a non-locking key.

1.07 Any subscriber line which is passed or released, due to a busy condition, should be noted so that it may be tested later.

1.08 The terminal on which the test selector is resting at any time may be determined by referring to the associated bank terminal indicator.

2. APPARATUS

2.01 Subscriber Line Test Set per SD-21623-011 (J24717B) or ES-239832 (J24712B).

2.02 P2J Cord equipped with No. 110 Plugs (battery and ground).

2.03 Three P3E Cords equipped with No. 110 Plugs.

2.04 No. 110 Plug (open circuit) or No. 184 Plug.

2.05 No. 136-B Tool (relay armature blocking tool).

2.06 Operator's Telephone Set.

2.07 Test receiver — No. 716E or No. 528 receiver attached to a W2AB cord equipped with two No. 360A tools (2W21A cord), a KS-6278 tool and a No. 411A tool (for use in checking the presence of battery).

3. PREPARATION

3.01 Observe that the final selector to be used for the test is idle and then make the selector busy by inserting a No. 110 plug (open circuit) into the TMB jack or where a separate MB jack is provided, by using a No. 184 plug.

3.02 Connect jacks BAT-G, C (or TST-1), D (or TST-2) and INT of the test set to jacks A, C, D and E respectively, of the final frame jack panel.

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

3.03 Connect an operator's telephone set to the TEL jacks of the test set.

3.04 Set the NCO and NCOX rheostats, if provided, on their mid-points.

3.05 If the test set is equipped with an OLR (operate line relay rheostat) key and a TGO (tip ground open) key is not provided, operate the AML (adjust milliammeter current for line relay) key and OLR keys. Adjust the OL (operate line relay) rheostat until a current value equal to the operate test requirement of the line relay to be tested, is indicated on the milliammeter.

3.06 Restore the AML and OLR keys to normal.

Note: If the test set is equipped with both an OLR and a TGO key, or if the test set is not equipped with an OLR key, the OL rheostat is adjusted as described in 4.07 to 4.16.

4. METHOD

(A) Test of Non-Coin Lines

4.01 Depress the numerical key corresponding to the number of the final selector brush which has access to the subscriber line to be tested. The operation of the numerical key also functions as a start key and the final selector makes brush selection. The numerical key restores automatically when the final brush has been selected.

4.02 Depress the numerical key corresponding to the tens digit of the line. The final selector makes tens selection and the numerical key is automatically restored.

4.03 Depress the numerical key corresponding to the units digit of the line. The final selector makes units selection. The numerical

key does not restore until the DISC (disconnect) key is operated. This serves as an indication of the line on which testing was started.

4.04 The TST (test) lamp is lighted, if the subscriber line selected is idle, or when it becomes idle.

Note: If the subscriber line selected is busy, the BY (busy) lamp is lighted and the test circuit is not closed through to the line. In this case the final selector should be advanced to the next terminal by operating the STP (stepping) key momentarily.

4.05 There are intervals during the following tests and current adjustments when the line under test is not made busy. If the line is seized by another final selector during an unprotected period, the S or SR lamp is lighted. In this case, immediately operate the DISC or STP key to release the line for the incoming call. The DISC key when used, should be held operated until the final selector starts downward.

Note: If a subscriber on the line under test attempts to originate a call, immediately operate the DISC or STP key to release the line. This condition may be indicated by failure of the tests or by listening on the line.

4.06 With the TST lamp lighted and with no current adjustments required, proceed with the line and cutoff relay tests as described in 4.23 to 4.29 for non-coin lines and in accordance with 4.35 to 4.38 for coin lines. Current adjustments for the various lines should be made in accordance with 4.07 to 4.22 at the start of the line and cutoff relay tests.

Adjusting Rheostats

4.07 If the test set is equipped with an OLR and a TGO key, a non-coin line should be used for making the operate line relay current adjustments for non-coin lines and for coin lines and dial P.B.X. lines having ground disconnected from the tip side of the line at the central office.

Note: When making this adjustment on party lines, a final terminal which is assigned to a station that is rung over the ring side of the line should be selected for this purpose.

- 4.08** Operate the NCO (non-operate cutoff relay) key and then operate the LF (line finder) key. The NCO lamp is lighted.
- 4.09** Operate the OLR and AML keys. Then restore the NCO key and operate the OL key.
- 4.10** Adjust the OL rheostat until a current value equal to the operate test requirement of the line relay, is indicated on the milliammeter.
- 4.11** Restore the AML, OL and OLR keys. The NCO lamp is extinguished, the L (line relay) lamp is lighted and extinguished and the COO (cutoff relay operate) lamp is lighted.
- 4.12** Proceed with the cutoff relay current adjustment described in 4.18 to 4.21.
- 4.13** If the test set is not equipped with an OLR key, block the line relay of the line under test in its non-operated position with a No. 136-B tool.
- 4.14** Operate the AML and OL keys and then operate the LF key. The NCO lamp is lighted.
- 4.15** Adjust the OL rheostat until a current value equal to the operate test requirement of the line relay, is indicated on the milliammeter.
- 4.16** Restore the AML and OL keys and then remove the No. 136-B tool from the line relay. The NCO lamp is extinguished, the L lamp is lighted and extinguished and the COO lamp is lighted.
- 4.17** Proceed with the cutoff relay current adjustment described in 4.18 to 4.21.
- 4.18** Operate the AMCO (adjust milliammeter current for cutoff relay operate) key.
- 4.19** If the PBX (P.B.X. line) lamp is not lighted the line under test is not arranged for terminal hunting. Adjust the OCO (operate cutoff relay) rheostat until a current value equal to the operate test requirements (primary and secondary windings) of the cutoff relay is indicated on the milliammeter.
- 4.20** If the PBX lamp is lighted, this indicates that the line under test is arranged for terminal hunting. Adjust the OCOX (operate cutoff relay P.B.X. line) rheostat until a current value equal to the operate test requirement (primary winding) of the cutoff relay is indicated on the milliammeter.
- 4.21** Restore the AMCO key.
- Note:* After the OL, OCO and OCOX rheostats are adjusted, the rheostat settings may be used for testing several line and cutoff relays of the same types, but the current values should be checked occasionally, to make sure that they have not changed due to voltage variations.
- 4.22** After using a subscriber line for adjusting the rheostats, operate the RLF (repeat line finder) key to make a repeat test of the line and cutoff relays. The RLF key should be held operated until the selector in the test set returns to normal. The release of the key will then advance the test set and the tests described in 4.25 to 4.29 will be made on the line under test.

Test of Line and Cutoff Relays

- 4.23** With the TST lamp lighted operate the LF key.
- 4.24** The PBX lamp should light if the line under test is a first or intermediate line of a terminal hunting group. If the line is not arranged for terminal hunting, the PBX lamp will not be lighted.
- 4.25** The test set proceeds automatically to apply a non-operate test to the cutoff relay. If the cutoff relay does not operate the NCO lamp is lighted to indicate a satisfactory test.

Note: If the NCO lamp does not light, check to determine whether the failure of the test set to advance is due to a trouble condition or to a dial P.B.X. line having ground disconnected from the tip side of the line at the central office. In the latter case operate the TGO key, if provided, otherwise omit further tests on the line and advance the final selector to the next line to be tested as covered in 4.30.

4.26 The test set then advances and applies an operate test to the line relay. If the line relay operates, a sender is selected. The NCO lamp is extinguished and the L lamp is lighted to indicate a satisfactory test.

4.27 Check that dial tone is heard in the telephone set receiver during the operate test of the line relay.

4.28 The test set advances to the position for making an operate test of the cutoff relay. If the cutoff relay operates, lamp L is extinguished and lamp COO is lighted, to indicate a satisfactory test.

Note: If the cutoff relay does not operate or if either or both of the tip and ring springs fail to break contact, the COO lamp is not lighted.

4.29 Keys NCO and OL are provided to stop the test set, if desired, in the positions for making the non-operate test of the cutoff relay and the operate test of the line relay, respectively.

Advancing to the Next Line

4.30 If a line directly above the line under test is to be tested, momentarily operate the STP key to advance the final selector to the next final terminal. The tests described in 4.24 to 4.29 are made on the line selected for test.

Note: If the next line to be tested is several terminals removed from the line under test, it may be more convenient to restore all keys to normal and operate and hold the DISC key, until the final selector starts downward and then proceed as described in 4.01 to 4.06.

Repeat Tests

4.31 A repeat test may be made by operating the RLF key and holding it operated until the selector in the test set returns to normal. The release of the key will repeat the tests described in 4.25 to 4.29 on the line under test.

Disconnection

4.32 Restore any operated test set keys and operate the DISC key to restore to normal the test set and final selector used for the test. The DISC key should be held operated until the final selector starts downward.

4.33 After disconnecting the cords at the conclusion of the tests, observe that the test final selector is normal and then remove the No. 110 plug from the TMB jack or the No. 184 plug from the MB jack.

(B) Test of Coin Lines

4.34 Proceed as described in 4.01 to 4.06.

4.35 With the TST lamp lighted the keys to be operated for the different coin lines are as follows:

LINE CIRCUIT

OPERATE KEYS

Using Test Set SD-21623-011

Coin lines equipped with D92439 (R type) relay and with no ground on tip side of line at central office

TGO, LI, LF

Coin lines equipped with E901 relay having special adjustment and with no ground on tip side of line at central office

TGO, L2, LF

Using Test Set SD-21623-011 or ES-239832

Coin lines equipped with E901 relay having regular adjustment and with ground on tip side of line at central office ("dial tone first" operation)

LF

4.36 The PBX lamp should light if the line under test is a first or intermediate line of a terminal hunting group. If the line is not arranged for terminal hunting, the PBX lamp will not be lighted.

4.37 The test set proceeds automatically to apply a non-operate test to the cutoff relay, an operate test to the line relay and an operate test to the cutoff relay as described in 4.25 to 4.29.

4.38 After the COO lamp is lighted proceed as in 4.30 to 4.33.

Note: Adjustment of the cutoff relay operate current can be made, if required, as described in 4.18 to 4.21 when the COO lamp is lighted.

(C) Test of Lines Equipped with Stop Hunt Circuit**Line and Cutoff Relays**

4.39 Proceed as described in 4.01 through 4.05.

4.40 With the TST lamp lighted and with no current adjustments required, proceed with the line and cutoff relay tests as described in 4.23 to 4.29 for non-coin lines and in accordance with 4.35 to 4.38 for coin lines. When required, make current adjustments for these lines in accordance with 4.41 to 4.45 at the start of the line and cutoff relay tests.

Note: For lines equipped with a Stop Hunt Circuit, the current adjustment which is usually applied to the CO relay is applied to the S relay of the Stop Hunt Circuit.

4.41 Adjust the OL rheostat in accordance with 4.07 through 4.11 or 4.13 through 4.16.

4.42 Operate the AMCO key.

4.43 The PBX lamp will not be lighted since the line under test is an individual line or the last line of a PBX. Adjust the OCO rheostat until a current value equal to the operate test requirement (secondary winding) of the S relay is indicated on the milliammeter.

4.44 Restore the AMCO key and proceed as described in 4.22 through 4.31.

4.45 When all subscriber lines have been tested, proceed as described in 4.32 and 4.33.

Stop Hunt Circuit

4.46 Proceed with tests described in 4.47 through 4.49 on each Stop Hunt Circuit associated with the subscriber lines tested in 4.39 through 4.44.

4.47 At the Stop Hunt Circuit, block the S relay operated. Verify the presence of battery at the line sleeve.

4.48 If the DL relay is furnished, block the DL relay operated and note that battery is removed from the line sleeve.

4.49 Remove the blocking tools from the S and DL relays.

5. REPORTS

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