

LINE FINDERS WITH CONTROL CIRCUIT OPERATION TEST USING DIAL HAND TEST SET STEP-BY-STEP SYSTEMS

1. GENERAL

1.01 This section describes methods of testing the operating features of 3-wire and 4-wire line finders and associated control circuits and the line lockout feature of the associated selectors and selector repeaters.

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 covered are:

- (A) Line Finder Stepping, Line Finder Control and Group Transfer Tests
- (B) Line Finder Line Selection Test
- (C) Line Lockout and Selector Switch Time-Out Release Test
- (D) Line Lockout and Selector Repeater Switch Time-Out Release Test

1.04 Test (D) is used to determine that the line lockout and selector switch time-out release features are functioning on permanent lines, when the line finders are associated with selector repeaters in so far as releasing the selector repeater and line finder are concerned. A test of the feature for releasing the trunk to the main office is covered in Sections 226-330-502 and 225-300-500.

2. APPARATUS

Test (A)

2.01 No. 477A (or No. 375A) Make-Busy Tools, as required.

2.02 Toothpick.

Test (B)

2.03 One No. 38B Lamp Socket (test lamp) equipped with a 2Y (48-volt) Lamp and a No. 63AK (600-ohm) Resistance connected in parallel with the 2Y Lamp for use on 4-wire line finders where the fourth lead is used for message register operation.

Note: The connection between the 2Y Lamp and No. 63AK Resistance must be made locally.

2.04 One No. 893 Cord equipped with two No. 360 Tools (1W13B Cord) and two KS-6278 Clips for use on 4-wire line finders where the fourth lead is used for class of service indication.

Tests (B), (C), and (D)

2.05 No. 1011G Hand Set (Dial Hand Test Set) equipped with a W2CL Cord, one No. 471A Jack and a No. 240A Plug (2W39A Cord) or an equivalent dial hand test set.

Test (C)

2.06 One W2AS Cord equipped with a No. 310 Plug and a No. 522A Key (2W22A Cord), for use when wiring is provided to reduce time of lockout feature.

3. METHOD

(A) Line Finder Stepping, Line Finder Control and Group Transfer Tests

3.01 This test checks the operational functions of the line finder and the control circuit or control circuits in the case of mate operation.

3.02 Observe that the make-busy key of all line finders and the BY keys of the group A and B control circuits are in the normal position.

3.03 Insert No. 477A (or No. 375A) tools into the monitor jacks of the idle odd numbered line finders in group A (or B).

Caution: Do not insert the tool into the monitor jack of any line finder that is off normal. If the line finder starts to operate as the tool is inserted, immediately remove the tool.

3.04 Operate the TST key associated with the group A control circuit. Observe that a line finder starts, operates smoothly and at a uniform rate of speed to the tenth level, rotates to the eleventh position and stops. The rotary selector of the control

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circuit should advance and allot the next idle line finder and the finder just tested should release in approximately 1/2 second.

Note 1: The operation of the TST key places a resistance ground on all commutator bank terminals as a marginal release test of the SP relay in the control circuit under test during vertical stepping. This will result in slower vertical action than is normally experienced in service. If the action is not positive, smooth and at a uniform rate of speed, however, the indication is that the SP relay is failing to meet the release requirement.

Note 2: Any abnormal delay in the release of the line finder, after the control selector advances, usually indicates a "sticky" B relay in the selector or in the line finder, where provided.

3.05 Observe that the next allotted finder starts, operates smoothly and at a uniform rate of speed to the tenth level, rotates to the eleventh position and stops. The rotary selector of the control circuit should again advance and allot the next idle finder and the previously tested finder should release in approximately 1/2 second (see Notes 1 and 2 in 3.04). Keep the TST key in the operated position until all of the finders except those made busy in 3.03 have been tested. Observe that the ones made busy do not operate.

3.06 When all idle finders in the group have been tested, restore the TST key. Remove the make-busy tools from the odd numbered finders and insert them into the monitor jacks of the idle even numbered finders. (See Caution in 3.03.) Again operate the TST key and proceed as in 3.05 until all finders in the group have been tested. The CB lamp may light but should be disregarded.

3.07 Remove the make-busy tools and restore the TST key. The CB lamp, if lighted, should be extinguished.

3.08 Select an idle line finder in the group under test which is at least the second next in sequence to be allotted. Remove the cover and, using a toothpick, block open the normally made contacts of the eleventh rotary step springs.

3.09 Insert a No. 477A (or 375A) tool between the Nos. 1 and 2 springs of the test line jack associated with the group under test.

Remove and reinsert the tool until the blocked line finder is selected by the control circuit. Observe that the blocked line finder does not hunt.

(a) If testing line finders having two control circuits for mate operation, observe that after a short interval, a line finder associated with the group B control circuit selects the test line and that the T0 lamp associated with group A lights to indicate a group transfer.

(b) If testing line finders having one control circuit, observe that, after a short interval, the next idle finder in the group selects the test line. The T0 lamp (if provided) may light momentarily when the control circuit advances.

3.10 Remove the tool from the test line jack. Remove the toothpick from the eleventh rotary step springs and replace the cover.

3.11 If testing 200-point line finders having two control circuits for mate operation, proceed as in 3.12 to 3.15. If testing 100-point line finders having two control circuits for mate operation (test line to group B not provided) proceed as in 3.78 to 3.84.

3.12 Operate the TST key associated with the group A control circuit just long enough to observe that one or two of the line finders in group B start hunting. The T0 lamp associated with group A should remain lighted.

3.13 Momentarily operate the BY key of the group A control circuit. Observe that the T0 lamp is extinguished. Again operate the TST key associated with group A. Observe that the line finders in group A, starting with the next idle finder in sequence after the one previously blocked, start hunting.

3.14 Restore the TST key. Observe that the line finders stop hunting.

3.15 Proceed as in 3.03 to 3.14 to test the line finders and control circuit associated with group B.

(B) Line Finder Line Selection Test

3.16 This test checks that the line finder selects a subscriber line that is originating a call. In the case of 4-wire line finders it also checks the continuity of the fourth (A) lead when it is used for class of service indication, identification or restriction and also when it is used to operate a message register.

3.17 If testing in prepay coin line finder groups, strap the Nos. 3 and 4 springs of the No. 240A plug of the hand test set.

3.18 Check that the make-busy keys of all line finders in the group to be tested are in the normal position.

3.19 Insert the plug of the dial hand test set into the test jack (T) of the test line circuit associated with group (A) (usually line circuit 50).

(a) If testing 4-wire line finders where the fourth (A) lead is used for class of service indication, identification or restriction, connect ground to the A lead bank terminal of the test line circuit at the line finder bank terminal strip.

(b) If testing 4-wire line finders where the fourth (A) lead is used to operate a message register, connect ground through the No. 38B test lamp to the A lead bank terminal of the test line circuit at the line finder bank terminal strip.

3.20 Operate the switch of the dial hand test set to the TALK position and observe that a line finder in group A starts, operates smoothly and stops on the test line terminals. Note that dial tone is heard.

3.21 3-Wire Finders: Dial a digit () leading to a second selector and note that dial tone is removed.

3.22 4-Wire Finders: Proceed as in (a) or (b).

or restriction, dial a code () which

(a) If the fourth lead is used for class of service indication, identification or restriction, dial a code () which will direct the selector or selectors to a level or trunk which will simulate the service condition. Check that the proper indication is received. In some cases it may be necessary to check with the operator as the indication is not always received by the tester.

(b) If the fourth lead is used to operate a message register, dial a connector multiple test line terminal () or an office telephone terminated in a battery reversing connector group. When the connector multiple test line or office telephone is reached and ringing is tripped, observe that within 2 to 5-1/2 seconds the test lamp lights.

3.23 Operate the switch of the dial hand test set to the MON position and note that the line finder releases and that the test lamp (if provided) is extinguished.

Note: If testing line finders in prepay coin groups, remove the plug from the test line jack in order to release the line finder and reinsert the plug before proceeding with 3.24.

3.24 Again operate the switch of the dial hand test set to the TALK position and observe that the next non-busy line finder in group A starts, operates smoothly and stops on the test line terminal. Note that dial tone is heard.

3.25 Proceed as in 3.21 to 3.24 until all of the finders in group A have been tested to the group A test line.

3.26 If testing 200-point line finders having two control circuits for mate operation, proceed as in 3.27 to 3.32. If testing 100-point line finders having two control circuits for mate operation (test line to group B not provided) proceed as in 3.27 only. Then remove all test connections. If testing line finders having one control circuit, disconnect from the test line jack and disconnect the test cord or lamp from the A lead terminal of the test line, if used.

3.27 Operate the BY key associated with group A and repeat the procedure as outlined in 3.20 to 3.25 until all of the finders in group B have been tested to the group A test line. Restore the BY key.

Note: If the control circuit wiring is such as to provide a guard lamp for the BY key, note that the TO lamp of control circuit A lights when the BY key is operated and is extinguished when the key is restored.

3.28 Disconnect from the group A test line circuit and insert the plug of the hand test set into the test jack (TI) of the test line circuit associated with group B (usually line circuit 100 or 161). Disconnect the test cord or lamp from the A lead terminal of the group A test line and connect it to the A lead terminal of the group B test line, if used. (See 3.19.)

3.29 Operate the switch of the dial hand test set to the TALK position and observe that a line finder in group B starts, operates smoothly and stops on the test line terminal. Note that dial tone is heard.

3.30 Repeat the procedure as outlined in 3.21 to 3.24 until all of the finders in group B have been tested to the group B test line.

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3.31 Operate the BY key associated with group B and repeat the procedure as outlined in 3.20 to 3.24 until all of the finders in group A have been tested to the group B test line. Restore the BY key.

Note: If the control circuit wiring is such as to provide a guard lamp for the BY key, note that the TO lamp of control circuit B lights when the BY key is operated and is extinguished when the key is restored.

3.32 Disconnect from the test line jack. Disconnect the test cord or test lamp from the A lead terminal of the group B test line.

(C) Line Lockout and Selector Switch Time-Out Release Test

3.33 This test checks the operation of the line lockout and selector switch time-out release features on permanent lines.

3.34 Insert the plug of the dial hand test set into the test jack of the test line circuit associated with group A or B. A test line equipped with a lockout relay (if available) should be used for this test.

Test Line Circuit Equipped with Lockout Relay and Not Provided with Wiring to Reduce Time of Lockout Feature

3.35 Operate the switch of the dial hand test set to the TALK position and note that a line finder selects the test line. When testing prepay coin groups, momentarily short-circuit the Nos. 3 and 4 springs of the No. 240A plug. Note that dial tone is heard. Do not dial or disconnect. At expiration of the timing period, 2 to 8 minutes, observe that the line finder releases. Observe that the test line is not reselected by another finder and that the associated permanent signal lamp (PSA, PSB, or PS) lights. Operate the switch of the dial hand test set to the MON position and note that the permanent signal lamp is extinguished. Repeat this procedure until all of the line finders in the group have been tested and then proceed as in 3.50 and 3.51.

Test Line Circuit Not Equipped with Lockout Relay and Not Provided with Wiring to Reduce Time of Lockout Feature

3.36 Operate the key of the dial hand test set to the TALK position and observe that a line finder selects the test line. When testing in prepay coin groups, momentarily short-circuit the Nos. 3 and 4 springs of

the No. 240A plug. Note that dial tone is heard. Do not dial or disconnect. At the expiration of the timing period, 2 to 8 minutes, observe that the line finder releases and that the next idle line finder selects the test line. Continue to hold the connection until all of the line finders in the group have been tested and then proceed as in 3.50 and 3.51.

Test Line Circuit Equipped with Lockout Relay and Provided with Wiring to Reduce Time of Lockout Feature

3.37 Insert the plug of the W2AS cord into the LO jack mounted on the line finder frame.

3.38 Operate the switch of the dial hand test set to the TALK position, and observe that a line finder selects the test line. When testing in prepay coin groups, momentarily short-circuit the Nos. 3 and 4 springs of the No. 240A plug. Note that dial tone is heard. Do not dial or disconnect.

3.39 After dial tone is heard, wait for approximately 10 seconds and then momentarily operate the 522A key. At the end of a second 10-second interval again momentarily operate the 522A key.

Caution: It is necessary to wait the 10-second interval so as to prevent falsely releasing subscriber connections before the first digit has been dialed.

3.40 Note that the line finder releases and observe that the test line is not reselected by another line finder and that the associated permanent signal lamp (PSA, PSB or PS) lights. Operate the switch of the dial hand test set to the MON position and note that the permanent signal lamp is extinguished.

Note: The line finder may release upon the first operation of the 522A key, depending upon the position of the permanent signal timing circuit at the time the test line is seized; however, it should always release upon the second operation of the key.

3.41 Proceed as in 3.38 to 3.40 until all but one of the line finders have been tested.

3.42 Proceed as in 3.35 on the remaining line finder in order to check that the timing circuit is functioning properly and then proceed as in 3.50 and 3.51.

3.43 Disconnect the cord from the LO jack.

Test Line Circuit Not Equipped with Lockout Relay and Provided with Wiring to Reduce Time of Lockout Feature

3.44 Proceed as in 3.37 and 3.38.

3.45 After dial tone is heard, wait for approximately 10 seconds and then momentarily operate the 522A key. At the end of a second 10-second interval again momentarily operate the 522A key.

Caution: It is necessary to wait the 10-second interval so as to prevent falsely releasing subscriber connections before the first digit has been dialed.

3.46 Note that the line finder releases and the next idle line finder selects the test line.

Note: The line finder may release upon the first operation of the 522A key, depending upon the position of the permanent signal timing circuit when the test line is seized; however, it should always release upon the second operation of the key.

3.47 Proceed as in 3.45 and 3.46 until all but one of the line finders in the group have been tested.

3.48 Operate the switch of the dial hand test set to the MON position.

3.49 Proceed as in 3.36 on the remaining line finder in order to check that the timing circuit is functioning properly. Disconnect the cord from the LO jack.

3.50 If testing line finders having one control circuit, disconnect from the test line jack. If testing line finders having two control circuits, operate the BY key of the control circuit associated with the test line being used and repeat the above procedure until all line finders in the other group have been tested.

Note: If the control circuit wiring is such as to provide a guard lamp for the BY key, note that the TO lamp is lighted.

3.51 Restore the BY key and disconnect from the test line jack.

Note: If the control circuit wiring is such as to provide a guard lamp for the BY key, note that the BY lamp is extinguished.

(D) Line Lockout and Selector Repeater Switch Time-Out Release Test

3.52 This test checks the functioning of the line lockout and selector switch time-out features on permanent lines when the line finders are associated with selector repeaters.

3.53 Insert the plug of the dial hand test set into the test jack of the test line circuit associated with group A or B. When testing in line groups partially equipped with lockout relays a test line equipped with a lockout relay (if available) should be used for this test.

Line Groups with All Lines Equipped with Lockout Relays

3.54 Operate the switch of the dial hand test set to the TALK position and note that a line finder selects the test line. When testing in prepay coin groups, momentarily short-circuit the Nos. 3 and 4 springs of the No. 240A plug. Note that dial tone is heard.

3.55 After an interval of 24 to 56 seconds, note that the line finder releases and observe that the test line is not reselected by another line finder and that the associated permanent signal lamp (PSA, PSB or PS) lights. Operate the switch of the dial hand test set to MON position and note that the permanent signal lamp is extinguished.

3.56 Proceed as in 3.54 and 3.55 until all of the line finders in the group have been tested and then proceed as in 3.76 and 3.77.

Line Groups Partially Equipped with Lockout Relays and Test Line Not Equipped with Lockout Relay and Not Provided with Wiring to Reduce Time of Lockout Feature

3.57 Operate the switch of the dial hand test set to the TALK position and note that a line finder selects the test line. When testing in prepay coin groups, momentarily short-circuit the Nos. 3 and 4 springs of the No. 240A plug. Note that dial tone is heard.

3.58 After an interval of 2-1/2 to 8-1/2 minutes note that the line finder releases and the next idle line finder selects the test line.

3.59 Continue to hold the connection until all of the finders in the group have been tested and then proceed as in 3.76 and 3.77.

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Line Groups Partially Equipped with Lockout Relays and Test Line Equipped with Lockout Relay and Not Provided with Wiring to Reduce Time of Lockout Feature

3.60 Operate the switch of the dial hand test set to the TALK position, and observe that a line finder selects the test line. When testing in prepay coin groups, momentarily short-circuit the Nos. 3 and 4 springs of the No. 240A plug. Note that dial tone is heard.

3.61 After an interval of 2-1/2 to 8-1/2 minutes note that the line finder releases and observe that the test line is not reselected by another line and that the associated permanent signal lamp (PSA, PSB or PS) lights. Operate the switch of the dial hand test set to the MON position and note that the permanent signal lamp is extinguished.

3.62 Proceed as in 3.60 and 3.61 until all of the line finders in the group have been tested and then proceed as in 3.76 and 3.77.

Line Groups Partially Equipped with Lockout Relays and Test Line Not Equipped with Lockout Relay and Provided with Wiring to Reduce Time of Lockout Feature

3.63 Insert the plug of the W2AS cord into the L0 jack mounted on the line finder frame.

3.64 Operate the switch of the dial hand test set to the TALK position and observe that a line finder selects the test line. When testing in prepay coin groups, momentarily short-circuit the Nos. 3 and 4 springs of the No. 240A plug. Note that dial tone is heard.

3.65 After an interval of 56 seconds momentarily operate the No. 522A key and after a second interval of 10 seconds again momentarily operate the No. 522A key.

3.66 Note that the line finder releases and the next idle line finder selects the test line.

Note: The line finder may release upon the first operation of the No. 522A key, depending upon the position of the permanent signal timing circuit at the time the test line is seized; however, it should always release upon the second operation of the key.

3.67 Proceed as in 3.65 and 3.66 until all but one of the line finders in the group have been tested.

3.68 Operate the switch of the dial hand test set to the MON position.

3.69 Proceed as in 3.57 and 3.58 on the remaining line finder in order to check that the timing circuit is functioning properly and then proceed as in 3.76 and 3.77. Disconnect the cord from the L0 jack.

Line Groups Partially Equipped with Lockout Relays and Test Line Equipped with Lockout Relay and Provided with Wiring to Reduce Time of Lockout Feature

3.70 Insert the plug of the W2AS cord into the L0 jack mounted on the line finder frame.

3.71 Operate the key of the dial hand test set to the TALK position and observe that a line finder selects the test line. When testing in prepay coin groups, momentarily short-circuit the Nos. 3 and 4 springs of the No. 240A plug. Note that dial tone is heard.

3.72 After an interval of 56 seconds momentarily operate the No. 522A key and after a second interval of 10 seconds, again momentarily operate the No. 522A key.

3.73 Note that the line finder releases and observe that the test line is not reselected by another line finder and that the associated permanent signal lamp (PSA, PSB or PS) lights. Operate the switch of the dial hand test set to the MON position and note that the permanent signal lamp is extinguished.

Note: The line finder may release upon the first operation of the No. 522A key, depending upon the position of the permanent signal timing circuit at the time the test line is seized; however, it should always release upon the second operation of the key.

3.74 Proceed as in 3.71 to 3.73 until all but one of the line finders in the group have been tested.

3.75 Proceed as in 3.60 and 3.61 on the remaining line finder in order to check that the timing circuit is functioning properly. Disconnect the cord from the L0 jack.

3.76 If testing line finders having one control circuit, disconnect from the test line jack. If testing line finders having two control circuits, operate the BY key of the control circuit associated with the test line circuit being used, and repeat the above procedure until all line finders in the other group have been tested.

Note: If the control circuit wiring is such as to provide a guard lamp for the BY key, note that the TO lamp is lighted.

3.77 Restore the BY key and disconnect from the test line jack.

Note: If the control circuit wiring is such as to provide a guard lamp for the BY key, note that the BY lamp is extinguished.

3.78 Select a normal line finder in group B which is at least the second next in sequence to be allotted. Remove the cover, and using a toothpick, block open the normally made contacts of the eleventh rotary step springs.

3.79 Insert a No. 477A (or 375A) tool between the Nos. 1 and 2 springs of the test line jack associated with group A. Remove and reinsert the tool until the blocked line finder is selected by the control circuit. Observe the following:

- (a) The blocked line finder does not hunt.
- (b) After a short interval, the next idle line finder in group A in sequence after the one previously blocked, selects the test line.

(c) The TO lamp of group B lights.

(d) The TO lamp of group A is extinguished.

3.80 Remove the tool from the test line jack. Remove the toothpick from the eleventh rotary step springs and replace the cover.

3.81 Operate the TST key associated with group B and observe that the line finders in group A start hunting. Restore the TST key. The TO lamp associated with group B should remain lighted.

3.82 Momentarily operate the BY key associated with group B and observe that the TO lamp is extinguished. Again operate the TST key associated with group B. Observe that the line finders in group B, starting with the next idle finder in sequence after the one previously blocked, start hunting.

3.83 Restore the TST key. Observe that the line finders stop hunting.

3.84 Proceed as in 3.03 to 3.07 to test the line finders and control circuits associated with group B.

4. REPORTS

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