

LINE FINDERS—WITHOUT CONTROL CIRCUIT
OPERATION TESTS
USING 2-PARTY MESSAGE RATE TYPE TEST SET SD-31456-01 (J34715A)
AND AUXILIARY TEST SET SD-32173-01 (J34726)
STEP-BY-STEP SYSTEMS

1. GENERAL

PAGE

1.01 This section describes a method of testing the operating features of 50-, 100-, and 200-point 3- and 4-wire line finders in step-by-step offices. It also covers line finder tests in community dial offices in which the line finders are of the newer type with the test jack mounted on the switch. It also describes the use of an auxiliary test set in conjunction with the regular test set.

1.02 This section is reissued to add a notification to perform tests during periods of light traffic to minimize interference with normal traffic. This reissue does not effect the Equipment Test List.

1.03 The tests covered are:

PAGE

A. Line Finder Operation Test—Coin and Noncoin: This test checks the operating features of line finders and the continuity and polarity of the trunks to the selector or trunk circuit beyond. **6**

B. Line Finder Operation and Registration Test—100- and 200-Point Line Finders Used for 2-Party Message Rate Service: This test checks the operating features of line finders and the continuity and polarity of trunks to the message register trunk circuit beyond. It also checks the A or TR leads for continuity to the message register trunk circuit, and for freedom from crosses and grounds. It further checks that the S and A or TR leads are not reversed. **8**

C. Make Busy from Circuit Beyond: This test checks the sleeve circuit through line finders, in the normal position, to the line finder D relay. **9**

D. Line Finder Operation—B, C, and F Relay Test—Coin and Noncoin Line Finders Arranged for Maximum Sleeve Potential 2.4 Volts Negative: This test checks the operating features of line finders, and the continuity and polarity of trunks to the selector or trunk circuit beyond. It also checks line finder B and F relays for nonoperate requirements, and C relays for hold and release requirements. **9**

E. Line Finder Operation—B, C, and F Relay Test—Coin and Noncoin Line Finders Arranged for Maximum Sleeve Potential of 4.3 Volts or 7 Volts Negative: This test checks the operating features of line finders, and the continuity and polarity of trunks to the selector or trunk circuit beyond. It also checks the line finder B and F relays for nonoperate requirements and C relays for hold and release requirements. This test is intended for use in offices where the line finders are equipped with a simplex battery network on the C relay to increase the maximum allowable sleeve potential to 7 volts negative. **13**

F. Test of E Relay of Line Finders in Position 2, 12, or 22: This test checks the operation of the E relay of line finders in position 2, 12, or 22 on a marginal basis, and is intended as a

supplement to Tests A, B, D, and E. This test is necessary because the test line appears on the tenth level of these line finders, a level permanently connected to solid ground. Therefore, some level other than the tenth level is used for applying the resistance ground to the commutator segment for marginally checking the E relay on these finders.

1.04 To minimize interference with normal traffic, these tests should be performed during periods of light traffic. Upon immediate completion of the tests, the test set keys should be restored to normal, and the test cords should be removed from the equipment under test.

1.05 If line finders with the test jack located on the switch are added to an existing shelf containing line finders with the test jack mounted in a jack panel, it is assumed that both line finders will be tested from the jack panel.

1.06 Tests A, B, D, E, and F can be conducted with or without the remote-control feature of the test set, and both methods are covered. Test D assumes that if the remote-control method is used, the test set is modified to provide for remote-control operation inconnection with the C relay release test.

1.07 Tests D and E require a spare or nonbusy line circuit, which will be called the marked line, on the same level and bank as the test line terminal.

- (a) In the case of 200-point line finders, the mate line is also required; for example, the mate line is 15 if 115 is used as the marked line, or vice versa.
- (b) Tests D and E require a test cord equipped with 620A tool to connect the marked and mate line sleeve bank terminals to the line finder test set.
- (c) Test E requires a test cord equipped with 620A tool to connect the marked and mate line sleeve bank terminals to the auxiliary test set.

1.08 If Test B, D, or E is made, it is not necessary to make Test A on the same testing cycle.

1.09 Test E is covered in two parts and either part may be used depending upon test equipment available. The first part is using the auxiliary test set SD-32173-01 and test set SD-31456-01; the second part covers the use of test set SD-31456-01 modified to test line finders arranged for maximum sleeve potential of 4.3 volts of 7 volts negative.

1.10 In Tests A, D, and E, reference is made to dialing a succeeding switch to remove dial tone. If this switch is of the digit absorbing or blocking type, dial the particular digit(s) which will be effective in removing the tone.

1.11 Action and verification will be required at the calling and called positions during most of these tests.

1.12 *Lettered Steps:* A letter a, b, c, etc, added to a step number in Parts 3 and 4 of this section indicates an action which may or may not be required, depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same conditions are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

1.13 The test equipment specified in this section is designed to apply proper marginal tests (simulated critical circuit conditions) when the circuit under test and the test equipment have an applied voltage of 48.5 to 50. In those offices where power plants are normally operated at more than 50 volts, the battery voltage should be reduced and maintained within the required limits while the tests are being made.

2. APPARATUS

2.01 The apparatus required for each test is shown in Table A. The details for each item are covered in the paragraphs indicated by the number in parentheses.

2.02 Line finder test set, J34715A (SD-31456-01).

2.03 40B (or 40A) (remote control) test set.

TABLE A

APPARATUS	NO. REQD FOR TESTS					
	A	B	C	D	E	F
Test Set (2.02)	1	1		1	1	1
Test Set (2.03)	1	1		1	1	1
Head Telephone Set (2.04)	1	1		1	1	1
Test Set (2.05)					†	
Patching Cord (2.06)	1	1		1	1	1
Testing Cord (2.07)	1	1		1	1	1
Patching Cords (2.08)	*	*		*	*	
Patching Cord (2.09)	1	1		1	1	
Patching Cord (2.10)	1	1		1	1	
Make-Busy Tool (2.11)			1			
Testing Cord (2.12)				1		
Testing Cord (2.13)					1	
Testing Cord (2.14)					1	
Special Cord (2.15)						1
Testing Cord (2.16)						1

* As required, see 2.08 and Table B.

† Refer to 1.09.

2.04 Head telephone set (associated with line finder test set).

2.05 Auxiliary test set, J34726 (SD-32173-01).

2.06 Patching cord, P3K cord, 12 feet long, equipped with 310 plugs (3P15B cord), for use where battery supply jack is used to supply battery and ground to test set.

2.07 Testing cord, W2M cord, 9 feet long, equipped with one 310 plug (tip and sleeve connections) and two 59 cord tips (2W12A cord), for use where battery and ground block, or spare fuse (not to exceed 5 amperes) and frame ground is used to supply battery and ground to test set.

2.08 Patching cord, P3E cord, 10 feet long, equipped with 310 plugs (3P6F cord).

TABLE B
P3E CORDS REQUIRED FOR TESTING VARIOUS
TYPES OF LINE FINDERS

TEST JACK LOCATION	50- OR 100-POINT LINE FINDERS		200-POINT LINE FINDERS	
	3-WIRE	4-WIRE	3-WIRE	4-WIRE
Not on line finder	2	3	3	1
On line finder	1	2	2	-

2.09 Patching cord, P6B cord, 11 feet long, equipped with a 310 red shell plug, a 310 black shell plug, and two 240B plugs (6P6A cord), for use with 200-point 4-wire line finders.

2.10 Patching cord, P3AA cord, 10 feet long, equipped with a 310 plug and a 240A plug (3P30A cord). The 240A plug is modified by removing the red lead from terminal 3 and transferring the black lead from terminal 1 to terminal 3, for use where the test jack is located on line finders.

2.11 477A (make-busy) tool.

2.12 Testing cord, W3AJ cord, 12 feet long, equipped with a 310 black-shell plug and a 620A tool (3W13B cord). A modified Frankel clip attached to cord is provided to clip on bank rod when the 620A tool is inserted into the bank.

2.13 Testing cord, W1H cord, 10 feet long, equipped with a 347B (or 47B) plug and one 360A tool (1W8A cord). A KS-6278 clip, equipped with a 108 or 141 cord tip is required for attachment to the 360 tool.

2.14 Testing cord, W3AJ cord, 12 feet long, equipped with a 310 red-shell plug and a 620A tool (3W13A cord). A modified Frankel clip attached to cord is provided to clip on bank rod when the 620A tool is inserted into the bank.

2.15 Test cord assembly, Fig. 1 consisting of the following: one W3M cord, 6 feet long, equipped with a 310 plug and three 360 tools (3W4A cord); a W2W cord, 6 feet long, equipped with a 310 plug and two 360 tools (2W17A cord);

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an 893 cord, 6 feet long, with a 360 tool at each end (1W13B cord); and a 419A tool and three 141 cord tips, for use where the test jack is not located on line finder.

2.16 Testing cord, W3M cord, 15 feet long, equipped with a 310 plug, three 360 tools (3W4B cord), and two 419A tools. Connect a 419A tool to the 360A (sleeve) tool and the other 419A tool to the 360B (ring) tool, for use where the test jack is located on the line finder.

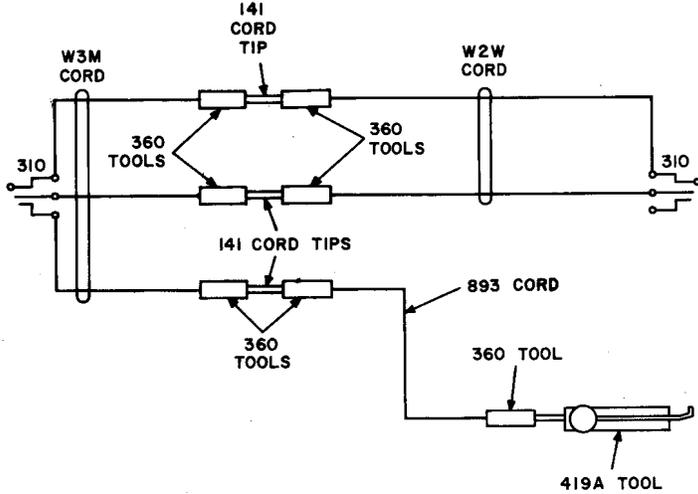


Fig. 1—Test Cord Assembly

3. PREPARATION

Tests A, B, D, E, and F

STEP	ACTION	VERIFICATION
1	Connect BAT G jack to 48-volt battery supply.	
	<i>Note 1:</i> To avoid possible grounding of battery supply lead, connect cord to test set first and, when disconnecting, remove from test set last.	
	<i>Note 2:</i> When using W2M cord, connect red (sleeve) conductor to frame ground, white (tip) conductor to battery supply.	
2	Connect head telephone set to test set TEL jacks.	
	<i>Note:</i> Leave TRS key in normal position except when necessary to talk.	
3a	If remote control is used— Connect 40B (or 40A) test set gray, black, and red plugs to test set jacks G, BL, and R, respectively.	

STEP	ACTION	VERIFICATION
Tests A, B, D, and E		
For 50- or 100-Point 3-Wire Line Finders		
4	Using P3E cord, connect test set A jack to test line jack A.	
For 50- or 100-Point 4-Wire Line Finders		
5	Using P3E cord, connect A and B jacks to test line jacks A and B, respectively.	
For 200-Point 3-Wire Line Finders		
6	Using P3E cord, connect A and B jacks to test line jacks A and B, respectively.	
	<i>Note:</i> In Tests A, B, and E, for 200-point 3-wire line finders, the connections to test line jacks A and B shall be reversed on each alternate testing cycle, unless otherwise specified, in order to make a complete test of the line finder B and F relays.	
For 200-Point 4-Wire Line Finders		
7	Using P6B cord, connect red and black shell plugs to test set A and B jacks, respectively; connect 240B plugs of red and black cords to test line jacks A and B, respectively.	
	<i>Note:</i> In Tests A, B, and E, for 200-point 4-wire line finders, the connections to test line jacks A and B shall be reversed on each alternate testing cycle, unless otherwise specified, in order to make a complete test of the line finder B and F relays.	
8b	If test jack is not located on line finder— Using P3E cord, connect plug to LF jack.	
9c	If test jack is located on line finder— Using P3AA cord, connect plug to LF jack.	
Tests A, D, E, and F		
10	Operate LP key.	
11a	If remote control is used— Operate RC and RP keys for line finders in noncoin line groups, or operate RC and CL keys for line finders in coin line groups.	

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STEP	ACTION	VERIFICATION
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Test B

- | | | |
|-----|--|--|
| 12a | If remote control is used—
Operate RC and TP keys. | |
| 13 | Operate 2 PTY key. | |
| 14 | Turn L-S key, if provided, to L position for 1400- or 1500-ohm range trunks or to S position for trunks with less range. | |

Test D

- | | | |
|----|--|--|
| 15 | Using W3AJ cord, insert 310 black shell plug into PL jack. | |
|----|--|--|

Test F

- | | | |
|-----|---|--|
| 16b | If test jack <i>is not</i> located on line finder—
Using 6-foot W3M cord, connect plug into test jack. (See Fig. 1.) | |
| 17c | If test jack is located on line finder—
Using 15-foot W3M cord, connect plug into LF jack. | |

4. METHOD

STEP	ACTION	VERIFICATION
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A. Line Finder Operation Test—Coin and Noncoin

Flat-Rate or Coin Line Groups

- | | | |
|-----|---|--|
| 12 | At line finder under test—
Using P3E or P3AA cord, connect plug to test jack. | |
| 13a | If remote control is used—
With line finder normal—
Momentarily depress ST (No. 1) key. | ST lamp lighted.
Line finder operates smoothly, stops on test terminal
Dial tone heard.
REV lamp not lighted. |
| 14d | If test set control is used—
With line finder normal—
Operate RP key for noncoin line groups, or operate CL key for coin line groups. | ST lamp lighted.
Line finder operates smoothly, stops on test terminal
Dial tone heard.
REV lamp not lighted. |

STEP	ACTION	VERIFICATION
3-Wire Line Finders		
15	Dial digit () leading to succeeding switch.	Dial tone removed.
4-Wire Line Finders		
16e	If fourth lead is used to operate message register— Dial digit () leading to succeeding switch.	Dial tone removed.
17f	If fourth lead is used for class-of-service indication, identification, or restriction— Dial code which will direct selector or selectors to proper level which will simulate service condition.	Proper indication received. <i>Note:</i> In some cases, it may be necessary to check with the called position, as the indication is not always received by the tester.
Finders Used for Concentrating Manual Lines		
18a	If remote control is used— With line finder normal— Momentarily depress ST (No. 1) key.	ST lamp lighted. Line finder operates smoothly, stops on test terminal. Ringing induction heard. Call answered.
19d	If test set control is used— Operate RP key.	ST lamp lighted. Line finder operates smoothly, stops on test terminal. Ringing induction heard. Call answered.
20	At switchboard— Disconnect when disconnect signal is received.	
All Finders		
21a	If remote control is used— Momentarily depress RLS (No. 3) key.	ST lamp extinguished. Line finder releases.
22d	If test set control is used— Release RP or CL key.	ST lamp extinguished. Line finder releases.
23	Remove P3E or P3AA cord from line finder test jack.	
24	Unless other tests are to be made, remove remaining cord, restore all keys.	

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STEP	ACTION	VERIFICATION
B. Line Finder Operation and Registration Test—100- and 200-Point Line Finders Used for 2-Party Message Rate Service		
15	At line finder under test— Using P3E or P3AA cord, connect plug to test jack.	
16a	If remote control is used— With line finder normal— Momentarily depress ST (No. 1) key.	ST lamp lighted. Line finder operates smoothly, stops on test terminal Dial tone heard. REV lamp not lighted. TR lamp lighted. <i>Note:</i> Where the line finders are associated with older type trunks which do not make the party identification test until after the called party answers, the TR lamp may not light or may light only momentarily.
17d	If test set control is used— With line finder normal— Operate TP key.	ST lamp lighted. Line finder operates smoothly, stops on test terminal Dial tone heard. REV lamp not lighted. TR lamp lighted. <i>Note:</i> Where the line finders are associated with older type trunks which do not make the party identification test until after the called party answers, the TR lamp may not light or may light only momentarily.
18	Dial connector multiple test line in reverse battery connector group.	Test line seized. Ringing tripped. REV lamp lighted during test line closures. TR lamp, if previously lighted, remains lighted. TR lamp, if not previously lighted, lights. <i>Note:</i> If tripping does not occur during first or second ringing interval, remain on the connection for a short time, and if a subscriber or operator answers, operate TRS key and advise that a test is being made.
19a	If remote control is used— After relatively long lighted interval (about 5 seconds) of REV lamp— Momentarily depress RLS (No. 3) key.	ST and REV lamps extinguished. TMR lamp lighted momentarily. TR lamp remains lighted. BY lamp lighted momentarily. Line finder releases. TR lamp extinguished.

STEP	ACTION	VERIFICATION
20d	If test set control is used— After relatively long lighted interval (about 5 seconds) of REV lamp— Restore TP key.	ST and REV lamps extinguished. TMR lamp lighted momentarily. TR lamp remains lighted. BY lamp lighted momentarily. Line finder releases. TR lamp extinguished.
21	Remote P3E or P3AA cord from line finder test jack.	
22	Unless other tests are to be made, remove remaining cords, restore all keys.	

C. Make Busy from Circuit Beyond

- 1 At line finder under test—
Insert 477A tool into monitor jack springs or test jack springs 1, 2 in slow succession two or three times.

Note by sound that D relay operates, releases, with each insertion and removal of tool.

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

D. Line Finder Operation—B, C, and F Relay Test—Coin and Noncoin—Line Finders Arranged for Maximum Sleeve Potential 2.4 Volts Negative

- 16 At line finder under test—
Using P3E or P3AA cord, connect plug to test jack.
- 17 Select idle line finder other than one under test, make busy or select bank with cleaned terminals not equipped with line finder.

For 50- or 100-Point 3-Wire Line Finders and 200-Point Line Finders (B Relay)

- 18 Insert 620A tool into sleeve bank on same level in which test line appears from left side of bank.

Note: Select bank where test line is in same level between 4 and 9, inclusive, to avoid interference between tool and commutator or designation card.

For 50- or 100-Point 4-Wire Line Finders

- 19 Insert 620A tool from right side of bank.

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STEP	ACTION	VERIFICATION
Remote Control		
20	Operate BF NO key, then B key.	
21	Move 620A tool to select an idle line (or pair of lines for 200-point line finders) near middle of bank. (See 1.07.)	
22	Operate, hold RLS (No. 3) key.	50- and 100-Point Line Finder TMR lamp not lighted. Note: If TMR lamp lights, marked line is busy. Move 620A tool until idle line is found. 200-Point Line Finders TMR and RMR lamps not lighted. Note: If TMR lamp lights, marked line is busy. If RMR lamp lights, mate line is busy. In either case, move 620A tool until idle pair of lines is found.
23	Release RLS (No. 3) key.	
24	Depress ST (No. 1) key.	ST lamp lighted. Line finder operates smoothly, stops on terminal to which 620A tool is connected. Note: Failure of line finder to stop indicates that C relay failed to meet hold requirements, or that marked or mate line became busy before being seized by line finder under test. To test that marked and mate lines have not become busy, perform Step 25.
25	Perform this step only when testing whether marked or mate line is busy— Momentarily depress RLS (No. 3) key.	Line finder releases. TMR and RMR lamps not lighted while RLS key is depressed; if either lamp lights repeat Steps 21 through 24.
26d	If testing flat-rate or coin line groups— Momentarily depress GRD (No. 2) key.	Line finder resumes rotary stepping. Stops on test line terminal. REV lamp not lighted. Dial tone heard.
27e	If testing 3-wire line finders— Dial digit () leading to succeeding switch.	Dial tone removed.
28f	If testing 4-wire line finders, and fourth lead is used to operate message register— Dial digit () leading to succeeding switch.	Dial tone removed.

STEP	ACTION	VERIFICATION
29g	If testing 4-wire line finders, and fourth lead is used for class-of-service indication, identification, or restriction— Dial code () which will direct selector or selectors to proper level or trunk which will simulate service condition.	Proper indication received. <i>Note:</i> Where necessary, check with called position, as indication is not always received by tester.
30h	If testing line finders used for concentrating manual lines— Momentarily depress GRD (No. 2) key.	Line finder resumes rotary stepping, stops on test line terminal. REV lamp not lighted. Ringing induction heard in most cases. Call answered.
31h	At switchboard— Disconnect when disconnect signal is received.	
32	Momentarily depress RLS (No. 3) key.	ST lamp extinguished. Line finder releases.
Test Set Control		
33	Move 620A tool to select an idle line near middle of bank (marked and mate lines described in 1.07).	BY lamp not lighted.
34i	If testing 200-point line finders— Remove plug from PL jack, touch tip of plug to sleeve of jack.	BY lamp not lighted. <i>Note:</i> If BY lamp lights, mate line is busy and another pair of lines must be selected.
35	Reinsert plug into PL jack.	
36	With line finder normal— Operate BF NO key, then B key.	
37	Operate RP key for noncoin groups or CL key for coin groups.	ST lamp lighted. Line finder operates smoothly, stops on terminal to which 620A tool is connected. <i>Note:</i> Failure of line finder to stop indicates that C relay failed to meet hold requirements or that marked or mate line became busy before being seized by line finder under test. To test that marked or mate lines have not become busy, perform Step 38.
38	Perform this step only when testing whether marked or mate line is busy— Restore B, BF NO, and RP or CL key.	Line finder releases. <i>Note:</i> If BY lamp lights, the marked line is busy. If it does not light, and 200-point line finders are being tested, remove plug from PL jack and touch tip of plug to sleeve of

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STEP	ACTION	VERIFICATION
		jack. If BY lamp lights, mate line is busy. In case either line is busy, select another pair of lines, repeating Steps 33 through 37.
39d	If testing flat-rate or coin line groups— Momentarily depress C key.	Line finder resumes rotary stepping, stops on test line terminal. REV lamp not lighted. Dial tone heard.
40e	If testing 3-wire line finders— Dial () digit leading to succeeding switch.	Dial tone removed.
41f	If testing 4-wire line finders, and fourth lead is used to operate message register— Dial () digit leading to succeeding switch.	Dial tone removed.
42g	If testing 4-wire line finders and fourth lead is used for class-of-service indication, identification, or restriction— Dial code () which will direct selector or selectors to proper level or trunk which will simulate service condition.	Proper indication received. <i>Note:</i> Where necessary, check with called position, as indication is not always received by tester.
43h	If testing line finders used for concentrating manual lines— Momentarily depress C key.	Line finder resumes rotary stepping, stops on test line terminal. REV lamp not lighted. Ringing indication heard in most cases. Call answered.
44h	At switchboard— Disconnect when disconnect signal is received.	
45	Restore RP or CL key.	ST lamp extinguished. Line finder releases.

Remote and Test Set Control

- 46i If testing 200-point line finders—
Remove 620A tool from line finder bank, reinsert it from right side of bank (F relay test).
- 47i Reverse cords in test line A and B jacks, repeat Test D.
- 48 Remove P3E or P3AA cord from line finder test jack.
- 49 Remove 620A tool from line finder bank.
- 50 Unless other tests are to be made, remove remaining cords, restore all keys.

STEP	ACTION	VERIFICATION
E. Line Finder Operation—B, C, and F Relay Test—Coin and Noncoin—Line Finders Arranged for Maximum Sleeve Potential of 4.3 Volts or 7 Volts Negative		
12	At auxiliary test set— Using W1H cord, insert plug into B jack, connect clip to 48-volt fuse, or if test is so arranged, insert 141 cord tip into battery pin jack of line finder test set.	
13	Using W3AJ cord, connect 310 red-shell plug into TST jack.	
14	At line finder under test— Using P3E or P3AA cord, connect plug to test jack.	
15	Select an idle line finder, other than one under test, make busy or select bank with cleaned terminals, not equipped with line finder.	
16	Insert 620A tool from right side of bank into sleeve bank on same level in which test line appears.	
17	At auxiliary test set— Operate BY key.	
18	At line finders under test— Move 620A tool to select idle pair of lines near middle of bank. (Marked and mate lines are described in 1.07.)	T or B lamps not lighted. Note: If either lamp lights, select another pair of lines.
19	At auxiliary test set— Restore BY key.	
20	With line finder under test normal— Operate TST key.	
21a	If remote control is used— Momentarily depress ST (No. 1) key.	ST lamp lighted. Line finder operates smoothly, stops on terminal to which 620A tool is connected.
		Note: Failure of line finder to stop indicates that the C relay failed to meet hold requirements, or that the marked or mate line became busy before being seized by the line finder under test. To test that the marked and mate lines have not become busy, proceed as in Step 23a or 25d.

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STEP	ACTION	VERIFICATION
22d	If test set control is used— Operate RP key for noncoin groups, or CL key for coin groups.	ST Lamp lighted. Line finder operates smoothly, stops on terminal to which 620A tool is connected. <i>Note:</i> Failure of line finder to stop indicates that the C relay failed to meet hold requirements, or that the marked or mate line became busy before being seized by the line finder under test. To test that the marked and mate lines have not become busy, proceed as in Step 23a or 25d.
23a	If remote control is used and finder failed to stop in Step 21a— Momentarily depress RLS (No. 3) key.	Line finder releases.
24a	At auxiliary test set— Restore TST key, and operate BY key. <i>Note:</i> If T or B lamp lights, the marked or mate line is busy. In this case, it will be necessary to select another pair of lines as covered in Steps 17 through 21a.	
25d	If test set control is used and finder failed to stop in Step 22d— Restore RP or CL key.	Line finder releases.
26d	Momentarily restore auxiliary test set TST key. <i>Note:</i> If T or B lamp lights, the marked or mate line is busy. In this case, it will be necessary to select another pair of lines as covered in Steps 17 through 20, and 22d.	

Auxiliary Test Set With CH-CR Key

27	At auxiliary test set— Operate CH key.	Line finder does not step. <i>Note:</i> If finder resumes stepping, it indicates C relay failed to hold.
28e	If testing flat-rate or coin line groups— Momentarily operate CR key.	Line finder resumes rotary stepping, stops on test line terminals. REV lamp not lighted. Dial tone heard.
29f	If testing finders used for concentrating manual lines— Momentarily operate CR key.	Line finder resumes rotary stepping, stops on test line terminals. REV lamp not lighted.

STEP	ACTION	VERIFICATION
		Ringing induction heard in most cases. Call answered.
30f	At switchboard— Disconnect when disconnect signal is received (proceed to Step 37a).	
Auxiliary Test Set With C Key		
31g	If testing flat-rate or coin line groups— At auxiliary test set— Momentarily operate C key.	Line finder resumes rotary stepping, stops on test line terminals. REV lamps not lighted. Dial tone heard.
32h	If testing finders used for concentrating manual lines— At auxiliary test set— Momentarily operate C key.	Line finder resumes rotary stepping stops on test line terminals. REV lamp not lighted. Ringing induction heard in most cases. Call answered.
33h	At switchboard— Disconnect when disconnect signal is received.	
3-Wire Line Finders		
34	Dial digit () leading to succeeding switch.	Dial tone removed.
4-Wire Line Finders		
35i	If fourth lead is used to operate message register— Dial digit () leading to succeeding switch.	Dial tone removed.
36j	If fourth lead is used for class-of-service indication, identification, or restriction— Dial code () which will direct selector or selectors to proper level or trunk which will simulate service conditions.	Proper indication is received. <i>Note:</i> In some cases it may be necessary to check with the called position, as the indication is not always received by the tester.
3- or 4-Wire Line Finders		
37a	If remote control is used— Momentarily depress RLS (No. 3) key.	ST lamp extinguished. Line finder releases.
38d	If test set control is used— Restore RP or CL key.	ST lamp extinguished. Line finder releases.
39	Restore auxiliary test set TST key. Remove P3E or P3AA cord from line finder test jack.	
40	Remove 620A tool from line finder bank.	

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STEP	ACTION	VERIFICATION
41	At line finder test set— Using W3AJ cord, insert 310 black-shell plug in PL jack.	
43	At line finder under test— Using P3E or P3AA cord, connect plug to test jack.	
44	Select idle line finder other than one under test, make busy or select bank with cleaned terminals not equipped with line finder.	

For 50- or 100-Point 3-Wire Line Finders and 200-Point Line Finders (B Relay)

- 45 Insert 620A tool into sleeve bank on same level in which test line appears from left side of bank.

Note: Select bank where test line is in same level between 4 and 9, inclusive, to avoid interference between tool and commutator or designation card.

For 50- or 100-Point 4-Wire Line Finders

- 46 Insert 620A tool from right side of bank.

Remote Control

- 47 Operate BF NO key, then B key.
- 48 Move 620A tool to select an idle line (or pair of lines for 200-point line finders) near middle of bank. (See 1.07.)
- 49 Operate, hold RLS (No. 3) key.

50- and 100-Point Line Finder
TMR lamp not lighted.

Note: If TMR lamp lights, marked line is busy. Move 620A tool until idle line is found.

200-Point Line Finders
TMR and RMR lamps not lighted.

Note: If TMR lamp lights, marked line is busy. If RMR lamp lights, mate line is busy. In either case, move 620A tool until idle pair of lines is found.

- 50 Release RLS (No. 3) key.

STEP	ACTION	VERIFICATION
51	Depress ST (No. 1) key.	ST lamp lighted. Line finder operates smoothly, stops on terminal to which 620A tool is connected. <i>Note:</i> Failure of line finder to stop indicates that C relay failed to meet hold requirements, or that marked or mate line became busy before being seized by line finder under test. To test that marked and mate lines have not become busy, perform Step 52.
52	Perform this step only when testing whether marked or mate line is busy— Momentarily depress RLS (No. 3) key.	Line finder releases. TMR and RMR lamps not lighted while RLS key is depressed; if either lamp lights, repeat Steps 48 through 51.
53e	If testing flat-rate or coin line groups— Momentarily depress GRD (No. 2) key.	Line finder resumes rotary stepping. Stops on test line terminal. REV lamp not lighted. Dial tone heard.
54k	If testing 3-wire line finders— Dial digit () leading to succeeding switch.	Dial tone removed.
55l	If testing 4-wire line finders, and fourth lead is used to operate message register— Dial digit () leading to succeeding switch.	Dial tone removed.
56m	If testing 4-wire line finders, and fourth lead is used for class-of-service indication, identification, or restriction— Dial code () which will direct selector or selectors to proper level or trunk which will simulate service condition.	Proper indication received. <i>Note:</i> Where necessary, check with called position, as indication is not always received by tester.
57n	If testing line finders used for concentrating manual lines— Momentarily depress GRD (No. 2) key.	Line finder resumes rotary stepping, stops on test line terminal. REV lamp not lighted. Ringing induction heard in most cases. Call answered.
58n	At switchboard— Disconnect when disconnect signal is received.	
59	Momentarily depress RLS (No. 3) key.	ST lamp extinguished. Line finder releases.
Test Set Control		
60	Move 620A tool to select an idle line near middle of bank (marked and mate lines described in 1.07).	BY lamp not lighted.

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STEP	ACTION	VERIFICATION
61p	If testing 200-point line finders— Remove plug from PL jack, touch tip of plug to sleeve of jack.	BY lamp not lighted. <i>Note:</i> If BY lamp lights, mate line is busy and another pair of lines must be selected.
62	Reinsert plug into PL jack.	
63	With line finder normal— Operate BF NO key, then B key.	
64	Operate RRP key for noncoin groups or CL key for coin groups.	ST lamp lighted. Line finder operates smoothly, stops on terminal to which 620A tool is connected. <i>Note:</i> Failure of line finder to stop indicates that C relay failed to meet hold requirements, or that marked or mate line became busy before being seized by line finder under test. To test that marked or mate lines have not become busy, perform Step 65.
65	Perform this step only when testing whether marked or mate line is busy— Restore B, BF NO, and RP or CL keys.	Line finder releases. <i>Note:</i> If BY lamp lights, the marked line is busy. If it does not light and 200-point line finders are being tested, remove plug from PL jack and touch tip of plug to sleeve of jack. If BY lamp lights, mate line is busy. In case either line is busy, select another pair of lines, repeating Steps 60 through 64.
66e	If testing flat-rate or coin line groups— Momentarily depress C key.	Line finder resumes rotary stepping, stops on test line terminal. REV lamp not lighted. Dial tone heard.
67k	If testing 3-wire line finders— Dial () digit leading to succeeding switch.	Dial tone removed.
68l	If testing 4-wire line finders, and fourth lead is used to operate message register— Dial () digit leading to succeeding switch.	Dial tone removed.
69m	If testing 4-wire line finders and fourth lead is used for class-of-service indication, identification, or restriction— Dial code () which will direct selector or selectors to proper level or trunk which will simulate service condition.	Proper indication received. <i>Note:</i> Where necessary, check with called position, as indication is not always received by tester.
70n	If testing line finders used for concentrating manual lines—	Line finder resumes rotary stepping, stops on test line terminal.

STEP	ACTION	VERIFICATION
	Momentarily depress C key.	REV lamp not lighted. Ringing indication heard in most cases. Call answered.
71n	At switchboard— Disconnect when disconnect signal is received.	
72	Restore RP or CL key.	ST lamp extinguished. Line finder releases.
Remote and Test Set Control		
73p	If testing 200-point line finders— Remove 620A tool from line finder bank, reinsert it from right side of bank (F relay test).	
74p	Reverse cords in test line A and B jacks, repeat test.	
75	Remove P3E or P3AA cord from line finder test jack.	
76	Remove 620A tool from line finder bank.	
77	Unless other tests are to be made, remove remaining cords, restore all keys.	
F. Test of E Relay of Line Finders in Position 2, 12, or 22		
18b	If test jack is not located on line finder— Insert plug of W2W cord, Fig. 1, into test jack of line finder under test.	
19b	Connect 419A tool to commutator segment on some level other than tenth level.	
20c	If test jack is located on line finder— Clip 419A tool connected to black (ring) conductor of 15-foot W3M cord to No. 3 contact spring of test jack of line finder under test.	
21c	Clip 419A tool connected to red (sleeve) conductor of 15-foot W3M cord to commutator segment at some level other than tenth level.	
22	Note that line finder is normal.	
23a	If remote control is used— Momentarily depress ST (No. 1) key.	ST lamp lighted. Line finder steps to level on which 419A tool

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STEP	ACTION	VERIFICATION
		is connected, cuts in, rotates to eleventh rotary step, then releases.
24d	If test set control is used— Operate RP key.	ST lamp lighted. Line finder steps to level on which 419A tool is connected, cuts in, rotates to eleventh rotary step, then releases.
25d	Restore RP key.	
26	Remove connections from commutator and line finder test jack.	
27	When tests are completed, remove all remaining cords.	