

**LINE FINDERS**  
**OPERATION TESTS**  
**USING TEST SET SD-90210-01 (J34704A) OR SD-90416-01 (J94704A)**  
**STEP-BY-STEP SYSTEMS**

**1. GENERAL**

**1.01** This section describes a method of testing the operating features of 50-, 100-, and 200-point 3- and 4-wire line finders, using test set SD-90210-01 or SD-90416-01. It also covers tests on line finders with the test jack mounted on the switch.

**1.02** This section is reissued to add cord code information to Part 2, Apparatus, to clarify the cord description, and to add a new Test D. Since this reissue covers a general revision, the arrows ordinarily used to indicate changes have been omitted.

**1.03** The tests covered are:

**A. Line Finder Operation Test—Coin and Noncoin:** This test checks the operating features of the line finder and the continuity and polarity of the trunk to the selector or trunk circuit beyond, and includes a test of wiper cords on an optional basis.

**B. Line Finder Operation—B, C, and F Relay Test—Coin and Noncoin:** This test checks the operating features of the line finder and the continuity and polarity of the trunk to the selector or trunk circuit beyond. It also checks the line finder B and F relays for nonoperate requirements and the C relay for hold and release requirements.

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

**D. 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 Test B. This test is necessary due to the test line appearing on the tenth level of these line finders and this level being 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** Test sets SD-90210-01 and SD-90416-01 are suitable for testing the older type line finder with the test jack in a jack panel. SD-90416-01 is also suitable for testing the new type line finders with the test jack on the switch. SD-90210-01 is suitable for testing the newer type line finders with the test jack on the switch only, if furnished with "B" option (SD-90210-01, Issue 10-D or later). This option can be recognized by the sleeve of the LF jack being wired to the ring of the BAT G jack.

**1.05** Tests A and B are made from the test line jacks provided for each group of 50-, 100-, or 200-point lines. In the case of 50- or 100-point finders, the "T", "R", and "S" leads of bank terminals 10 are permanently wired to A jack; in the case of 4-wire line finders, the fourth lead, "A" or "TR", of bank terminal 10 is permanently wired to B jack on the line finder frame. In the case of 200-point line finders, the "T", "R", and "S" leads of 3-wire line finders or the "T", "R", "S", and "A" or "TR" leads of 4-wire line finders of bank terminals 10 and 110 are permanently wired to B and A jacks, respectively, on the line finder frame.

**1.06** In Tests A and B, connections to the test line A and B jacks should be reversed on each alternating test cycle, unless otherwise specified, in order to make a complete test of line finder B and F relays. When testing a line finder in connection with a specified case of

trouble, test first with the connection one way and then the other.

**1.07** Tests A and B assume that the test set is arranged for grounding the tip and ring terminals of the B jack for making a partial test for crosses between wipers on 200-point line finders or for grounding the fourth lead, "A" or "TR", for testing class-of-service indication, identification, or restriction on 4-wire line finders.

**1.08** Test B assumes that the test set has the BF NO key and is arranged for connecting to the marked and mate line sleeve bank terminals using a cord equipped with a 620A tool. This test requires the use of the test set C jack and a spare or nonbusy line circuit on the same level and bank as the test line terminals. When Test B is specified, it is not necessary to perform Test A on the same testing cycle.

**1.09** If the newer type line finders with the test jack located on the switch are added to an existing shelf containing older line finders where the test jacks are mounted in a jack panel, it is assumed that both old and new line finders will be tested from the jack panel.

**1.10** Test C is made from the monitor jack or the test jack (monitor springs) of the line finders.

**1.11** 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.

**1.12** Caution should be exercised when making these tests so as not to affect normal traffic adversely.

**1.13** *Lettered Steps:* A letter a, b, c, etc, added to a step number in Part 3 or 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 condition are designated by the

same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

**2. APPARATUS**

**Tests A, B, and D**

**2.01** Line finder test set, J94704A (SD-90416-01) or J34704A (SD-90210-01).

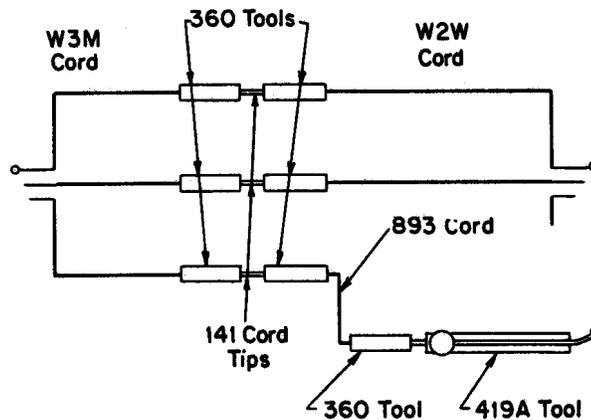
**2.02** Head telephone set (associated with test set) or 1011G handset, equipped with a 2W39A cord assembly, consisting of a W2CL cord, a 471A jack, and a 240A plug.

**2.03** Three patching cords, P3E cord, 6 feet long, each equipped with two 310 plugs (3P7A cord).

*Note:* Two required for 4-wire 200-point line finders; three required for 50- or 100-point 3-wire line finders.

**2.04** Patching cord, P3K cord, 12 feet long, equipped with two 310 plugs (3P15B cord) used in connecting battery to test set when battery and ground jack are available.

**2.05** 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) used in place of two P3E cords in making connections to test lines of 200-point 4-wire line finders.



**Fig. 1**

**2.06** Testing cord, W2M cord, 9 feet long, equipped with a 310 plug tip and sleeve connections and two 59 cord tips (2W12A cord) and two 108 cord tips, used to supply battery and ground to test set when 35-type fuse (not to exceed 5 amperes) and frame ground, or battery and ground block are used.

**2.07** 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 used where the test jack is located on the switch.

#### Test B

**2.08** 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.

#### Test C

**2.09** 477A (or 375A) (make busy) tool.

#### Test D

**2.10** Test cord assembly, shown in Fig. 1, consisting of the following: one W3M cord, 6 feet long, equipped with a 310 plug and one each of 360A, 360B, and 360C tools (3W4A cord); a W2W cord, 6 feet long, equipped with a 310 plug and 360B and 360C tools (2W17A cord); 893 cord, 6 feet long, with 360A tool at each end (1W13B cord); 419A tool; and three 141 cord tips (for use where test jack is not located on line finder).

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

### 3. PREPARATION

STEP	ACTION	VERIFICATION
<b>Tests A and B</b>		
1	<p>Connect BAT G jack to 48V battery supply jack.</p> <p><i>Note 1:</i> To avoid possible grounding of battery supply lead, connect to test set first and, when disconnecting, remove from test set last.</p> <p><i>Note 2:</i> When using W2M cord, connect red (sleeve) conductor to frame ground, white (tip) conductor to battery.</p>	
2	<p>Connect head telephone set to TEL jacks or handset to HS jack of test set.</p> <p><i>Note 1:</i> When using handset with test set SD-90210-01 (J34704A), operate TRS key or, if using with test set SD-90416-01 (J94704A), operate HS key. Also, arrange to keep MON switch of handset operated during tests, and use the handset dial instead of test set dial in making tests.</p>	

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<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
	<i>Note 2:</i> When using head telephone set with either test set, TRS key should be left in normal position except when talking over test line.	
3a	If test set SD-90210-01 is used — Operate SD key and leave operated during tests.	
4b	If test jack is not located on line finder (using either test set) — Connect 310 plug of P3E cord to test set LF jack.	
5c	If test jack is located on line finder (using test set SD-90416-01 only) — Connect 310 plug of P3AA cord to test set LF jack.	

**Test A**

***For 50- or 100-Point 3-Wire Line Finders***

- 6 Connect test set A jack to test line A jack using P3E cord.

***For 50- or 100-Point 4-Wire Line Finders and for 200-Point 3-Wire Line Finders***

- 7 Connect test set A, B jacks to test line A, B jacks, respectively, using P3E cords (see 1.06).

***For 200-Point 4-Wire Line Finders***

- 8 Connect red-shell, black-shell plugs of P6B cord to test set A, B jacks, respectively; connect 240B plugs of red, black cords to test line A, B jacks, respectively (see 1.06).

**Test B**

***For 50- and 100-Point 3-Wire Line Finders***

- 9 Connect test set A jack to test line A jack, using P3E cord.

STEP	ACTION	VERIFICATION
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***For 50- or 100-Point 4-Wire Line Finders and for 200-Point 3-Wire Line Finders***

10 Connect test set A, TL jacks to test line A, B jacks, respectively, using P3E cords (see 1.06).

***For 200-Point 4-Wire Line Finders***

11 Connect red-shell, black-shell plugs of P6B cord to test set A, TL jacks, respectively; connect 240B plugs of red, black cords to test line A, B jacks, respectively (see 1.06).

12 Insert 310 plug of W3AJ cord into C jack.

**Test D**

13d If test jack is not located on line finder — Insert plug of 6-foot W3M cord, connected as shown in Fig. 1, into test set LF jack.

14e If test jack is located on line finder — Insert plug of 15-foot W3M cord into test set LF jack.

**4. METHOD**

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

9 Connect free plug of P3E or P3AA cord to line finder test jack.

10f If testing flat-rate line groups — Operate LP key.

Line finder operates smoothly, stops on test line terminals.  
Dial tone heard.  
REV lamp not lighted.

11g If line finders are arranged for concentrating manual lines — Operate LP key.

Line finder operates smoothly, stops on test line terminals.  
Ringing induction heard.  
REV lamp not lighted.  
Operator answers.

*Note:* If operator answers in less than 4 seconds, ringing induction will not be heard.

12g Request operator to disconnect when she receives disconnect signal, and proceed to Step 18.

STEP	ACTION	VERIFICATION
13h	If line finder is associated with coin box trunks requiring coin deposit before dial tone — Operate LP key, operate SW key on test set SD-90416-01 momentarily (with test set SD-90210-01, operate C key momentarily).	Line finder operates smoothly, stops on test line terminals. Dial tone heard. REV lamp not lighted.

***For 3-Wire Line Finders***

14	Dial digit leading to second selector.	Dial tone removed.
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***For 4-Wire Line Finders***

15i	If fourth lead is used to operate message register only — Dial digit ( ) leading to second selector.	Dial tone removed. REV lamp not lighted.  <i>Note:</i> A test of this lead will be made in connection with a test of the message-rate trunk covered in other sections of Division A200.
16j	If fourth lead is used for class-of-service indication, identification, or restriction — Dial code ( ) which will direct selector to proper level or trunk which will simulate service condition.	Proper indication received. REV lamp not lighted.  <i>Note:</i> In some cases, it may be necessary to check with the operator as the indication is not always received by the tester.

***For 3- and 4-Wire Line Finders***

17k	If check for cut outs and noisy cords is to be made — Tap on switch cover lightly, move wiper cords gently.	No clicks or other noises heard in receiver.
18	Restore LP key.	Line finder releases.
19	Remove plug of P3E or P3AA cord from line finder test jack.	
20	Unless other tests are to be made, restore all keys, remove all cords.	

**B. Line Finder Operation — B, C, and F Relay Test — Coin and Noncoin**

13	Connect free plug of P3E or P3AA cord to line finder test jack.
14	Select idle line finder other than one under test and make busy, or select bank with cleaned terminals not equipped with line finder.

STEP	ACTION	VERIFICATION
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***For 50- or 100-Point 3-Wire Line Finders and 200-Point 3- and 4-Wire Line Finders (B relay)***

- |    |   |  |
|----|---|--|
| 15 | Insert 620A tool of W3AJ cord from left side of bank into sleeve bank on same level in which test line appears; select bank where test line is in some 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 and 200-Point Line Finders (B relay)***

- |    |  |  |
|----|--|--|
| 16 | Insert 620A tool of W3AJ cord from left side of bank into sleeve bank on same level in which test line appears; select bank where test line is in some level between 4 and 9, inclusive. |  |
|----|--|--|

***For 3- or 4-Wire Line Finders***

- |    |   |                       |
|----|---|-----------------------|
| 17 | Move tool to select idle line near middle of bank (see 1.05). | BSY lamp not lighted. |
|----|---|-----------------------|

***Note:*** If BSY lamp is lighted, marked line is busy. Move tool to test adjacent terminal.

- |     |   |                            |
|-----|---|----------------------------|
| 18f | If 200-point line finders are being tested — Move tool to select idle pair of lines near middle of bank (see 1.04). | BSY, R+ lamps not lighted. |
|-----|---|----------------------------|

***Note:*** If either lamp lights, it indicates a busy marked line or mate line. Move tool to test adjacent terminal.

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|-----|--|--|
| 19a | If test set SD-90210-01 is used — Operate T, BF NO keys. |  |
|-----|--|--|

- |     |  |  |
|-----|--|--|
| 20g | If test set SD-90416-01 is used — Operate T, ID, BF NO keys. |  |
|-----|--|--|

STEP	ACTION	VERIFICATION
21	With line finder normal — Operate LK key.	Line finder operates smoothly, stops on terminal to which 620A tool is connected.  <i>Note:</i> Failure to stop indicates C relay failed to meet hold requirement, or that marked or mate line connected to C jack became busy before seizure. To test if busy, restore LK key to release line finder. With test set SD-90416-01, restore T and BF NO keys. Neither lamp should light. With test set SD-90210-01, restore T key and note that R+ lamp does not light. Restore BF NO key and note that BSY lamp does not light. If either lamp lights, choose another terminal repeating Steps 17 and 18f.
<i>For Flat-Rate Groups</i>		
22	Depress C key momentarily.	Line finder resumes stepping, stops on test line terminals. Dial tone heard. REV lamp not lighted.
<i>For Coin Line Groups</i>		
23a	If test set SD-90210-01 is used — Depress C key for about 2 seconds.	Line finder resumes rotary stepping, stops on test line terminals. Dial tone heard. REV lamp not lighted.
24g	If test set SD-90416-01 is used — Depress C key momentarily.	Line finder resumes rotary stepping, stops on test line terminals.
25g	Operate SW key momentarily.	Dial tone heard. REV lamp not lighted.  <i>Note:</i> Dial tone will be heard before depressing SW key if coin trunks are arranged for dial tone before coin deposit.
<i>For Line Finders Arranged for Concentrating Manual Lines</i>		
26	Depress C key momentarily.	Line finder resumes stepping, stops on test line terminals. Ringing induction heard. REV lamp not lighted. Operator answers.  <i>Note:</i> If operator answers in less than 4 seconds, ringing induction will not be heard.

STEP	ACTION	VERIFICATION
27	Request operator to disconnect when she receives disconnect signal, proceed to Step 31.	
<i>For Testing 3-Wire Line Finders</i>		
28	Dial digit leading to second selector.	Dial tone removed.
<i>For Testing 4-Wire Line Finders</i>		
29h	If fourth lead is used to operate message register only — Dial digit ( ) leading to second selector.	Dial tone removed.
<i>Note:</i> A test of this lead will be made in connection with a test of the message-rate trunk.		
30i	If fourth lead is used for class-of-service indication, identification, or restriction — Dial code ( ) which will direct selector to proper level or trunk which will simulate service condition.	Proper indications received.
<i>Note:</i> When necessary, check with the operator, as the indication is not always received by the tester.		
31	Restore LK key.	Line finder releases.
32	Remove plug of P3E or P3AA cord from line finder test jack.	
33f	If 200-point line finders are being tested — Remove 620A tool from line finder bank, reinsert it from right side of bank (test of F relay), repeat tests.	
34	Remove 620A tool from line finder bank.	
35	Unless other tests are to be made, restore all keys, remove all cords.	

STEP	ACTION	VERIFICATION
<b>C. Make Busy From Circuit Beyond</b>		
1	Insert 477A (or 375A) tool into line finder monitor jack or test jack springs 1 and 2, in slow succession, several times.	Note by sound that D relay operates, releases with each insertion and removal of tool.
<i>Caution. Do not insert the tool into the jack of any line finder that is off normal. If the line finder starts to operate at the instant the tool is operated, remove the tool immediately.</i>		
<b>D. Test of E Relay of Line Finders in Position 2, 12, or 22</b>		
15d	If test jack is not located on line finder — Insert plug of W2W cord, connected as shown in Fig. 1, into test jack of line finder under test.	
16d	Connect 419A tool of 893 cord to segment of commutator on some level other than tenth level.	
17e	If test jack is located on line finder — Clip 419A tool connected to black (ring) conductor of 15-foot W3M cord to contact spring No. 3 of line finder test jack.	
18e	Clip 419A tool connected to red (sleeve) conductor of cord to commutator segment on some level other than tenth level.	
19	With line finder normal — Operate LP key.	Line finder steps to level on which 419A tool is connected, cuts in, rotates to eleventh rotary step, then releases.
20	Restore LP key.	
21	Remove 419A tool from commutator.	
22	Remove W2W cord plug or 419A tool from line finder test jack.	
23	Remove all cords from test set.	