

10

STEP-BY-STEP SYSTEMS  
NO. 355A  
200 POINT LINE FINDER CIRCUIT  
3 WIRE

CHANGES

D. DESCRIPTION OF CHANGES

D.1 Cross-connection Fig. 51 is modified to show connections for noncommon control TOUCH-TONE and common control equipment.

F. CHANGES IN DESCRIPTION OF OPERATION

F.1 Under 4. CONNECTING CIRCUITS, add:

4.10 Converter Trunk - TOUCH TONE Calling - SD-32326-01.

4.11 Register Trunk & Link - SD-32353-01 (Trunk Portion).

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 2363-GO-RJJ Jr

CIRCUIT DESCRIPTION

CD-32000-01  
Issue 2-D  
Appendix 5-D  
Dwg. Issue 9-D

STEP-BY-STEP SYSTEMS  
NO. 355A  
200 POINT LINE FINDER CIRCUIT  
3 WIRE

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Circuit rated A&M Only.

4. CONNECTING CIRCUITS

4.1 Line Finder Control Circuit -  
SD-31922-01.

4.2 Line Circuit - SD-31777-01.

4.3 Prepay Coin Trunk - SD-31761-01.

4.4 Selector Circuits - SD-31735-01,  
SD-31836-01 and SD-31964-01.

4.5 Postpay Coin Trunk - SD-31732-01.

4.6 Selector Repeater Circuit - SD-31914-01.

4.7 Multi-Party Line Coin Circuit -  
SD-31895-01.

4.8 35E97 First Selector - SD-30902-01,  
SD-30910-01, H-58447, H-58467,  
H-58589, H-58671, H-58449, H-58505 and  
H-58679.

4.9 35E97 Coin Trunk - SD-30926-01,  
H-61278 and H-61344.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT. 2336-AH-RCD-KM

CIRCUIT DESCRIPTION

CD-32000-01  
Issue 2-D  
Appendix 4-B  
Dwg. Issue 8-B

STEP-BY-STEP SYSTEMS  
NO. 355A  
200 POINT LINE FINDER CIRCUIT  
3 WIRE

CHANGES

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER  
THAN THOSE APPLYING TO ADDED OR REMOVED  
APPARATUS

C.1 To provide for a new adjustment of the  
(E) relay, the present adjustment is  
rated Mfr. Disc., ADJ. A and the new adjust-  
ment is added, ADJ. B.

All other headings no change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT. 2315-IMF-RCD-AS

STEP BY STEP SYSTEMS  
NO. 355-A  
200 POINT LINE FINDER CIRCUIT  
3 WIRE

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Item 12 is added in Table A, and  
Fig. 13 is added, to provide class  
of service tone and restriction equiva-  
lent to that now in use in 35-E-97  
offices in the same areas where this  
circuit is to be used.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3310-OCH-RLL-KM

TO BE USED AS A GUIDE ONLY  
DO NOT REPRODUCE THIS INFORMATION

STEP-BY-STEP SYSTEMS  
NO. 355A  
200 POINT LINE FINDER CIRCUIT  
3 WIRE

CHANGES

B. CHANGES IN APPARATUS

B.1 Added

Bank  
42E, 43EA, 52EA "G" Option

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 "G" option to provide 42E, 42EA  
and 52EA Banks added to Fig. 1.

D.2 Ckt. note 102 is changed to  
show the added option and  
rating. The options used table is  
changed accordingly.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-MLR-FJS-XS

STEP-BY-STEP SYSTEMS  
NO. 355-A  
200 POINT LINE FINDER CIRCUIT  
3 WIRE

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The last sentence of Note 103 read "The normal post springs shall be adjusted to operate on levels indicated in the table".

D.2 The headings of columns 4 and 5 of Table "A" were formerly "Enable post-pay coin trunk" and "Operated" respectively.

D.3 In Column 3, Table "A", "Not denied" was formerly "ALL".

D.4 The first foot-note of Table "A" was formerly "When "A" tone to Operator is Steady, "B" tone is interrupted, and Vice Versa" and Foot-note c referred to "C.B.Trks." instead of "post-pay coin trks", and did not end with the words "to function".

D.5 The object of these changes is to clarify the notes which apply to the use and adjustment of the normal post springs.

D.6 Figure 12 has been rated "Mfr. Disc."

D.7 In Note 106 "Figure 12" was formerly shown for test lines.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-OCH-FJS-AK

STEP-BY-STEP SYSTEMS  
NO. 355A  
200 POINT LINE FINDER CIRCUIT  
3 WIRE

CHANGES

B. CHANGES IN APPARATUS

B.1	Superseded	Superseded By	Added
	L.F. Bank 24-A Option P	L.F. Bank 52-DA Option H	
	L.F. Bank 25-A Option P	L.F. Bank 42-DA Option H	
	L.F. Bank 22-A Option P	L.F. Bank 42-D Option H	Fig. 12 357A Jack

C. CHANGES IN CIRCUIT REQUIREMENTS  
OTHER THAN THOSE APPLYING TO ADDED  
OR REMOVED APPARATUS

C.1 Soak values are changed to F.S.  
These were previously shown as  
50MA for relay B, 110MA for "P" windings  
relays E and F and 30MA for "S" windings  
relays E and F.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Figure 12, Options J and K and  
Note 106 have been added to make  
provision for the use of this circuit  
in 35E97 dial offices.

D.2 The present codes 22-A, 25-A and  
24-A, for the finder banks are  
being rated MFR DISC for use in this  
circuit and are superseded by codes  
42-D, 42-DA and 52-DA, respectively,  
through the use of added options H  
and P.

D.3 Circuit note 107 is added to show  
added options and ratings.

D.4 The Options Used Table is added.

All other headings under "Changes"  
not change.

1. PURPOSE OF CIRCUIT

1.1 This circuit, with its associated  
control circuit, provides means by  
which a calling subscriber's line is  
found and connected either directly, or  
through a trunk, to a first selector or  
selector-repeater.

2. WORKING LIMITS

2.1 Maximum external resistance in  
sleeve lead through selectors to  
holding ground, 10 ohms.

3. FUNCTIONS

- 3.01 To step vertically under control  
of the control circuit to the  
level on which calling line appears.
- 3.02 To step rotary under control of  
the control circuit to the termi-  
nals of the calling line.
- 3.03 To seize a first selector by  
grounding the ring, except when  
used with prepay coin lines. (355A)
- 3.04 To ground the sleeve when used  
with prepay coin lines to hold  
(E) or (F) relay. (355A)
- 3.05 To connect the calling line to  
the selector.
- 3.06 To prevent two calling lines from  
being connected to the same  
selector.
- 3.07 To hold under control of the suc-  
ceeding circuits.
- 3.08 To connect the line circuit sleeve  
to the selector sleeve.
- 3.09 To operate the release magnet when  
ground is removed from the selec-  
tor sleeve and the selector furnishes  
ground on the "RLS" lead 355A or to  
operate the release magnet when ground  
is removed from the selector sleeve and  
ground is furnished thru the (B) relay  
contacts and "K" wiring. (35E97)
- 3.10 To hunt under control of the  
control circuit to the zero  
level and the eleventh rotary step if  
the line relay releases before the  
finder reaches the level on which it  
appears.
- 3.11 To rotate to the eleventh rotary  
step if the line relay releases  
before the line is reached on rotary  
stepping.

3.12 To connect the "INT" lead to the  
"LF" lead as a signal to the  
control circuit that the line has been  
found or the eleventh rotary step has  
been reached.

3.13 To place busy ground on the "H"  
lead while the finder is busy or  
while there is ground on the selector  
sleeve if the finder is normal, or when  
the finder is removed from the frame.

3.14 To open the "AB" lead while the finder is off-normal or removed from the frame.

3.15 To open the "AB" lead and place busy ground on the "H" lead to make the finder busy if the (MB) key is operated.

3.16 To provide means for monitoring on a connection.

3.17 To provide means for giving two class of service indications by means of normal post springs.

3.18 To provide ground from the normal post springs to a post-pay coin trunk circuit when coin lines are segregated on certain levels.

3.19 To provide ground from normal post springs to the first selector when access to specified selector levels is to be denied to lines on specified line finder levels.

3.20 To split the connection between the upper and lower sleeve wipers while the finder is returning to normal.

3.21 By means of normal post springs, to arrange an associated prepay coin trunk for use with long line circuits segregated on separated levels.

3.22 The test lines (Figs. 11 and 12) provide access to line circuits to permit originating calls for testing purposes.

#### 4. CONNECTING CIRCUITS

4.1 Line Finder Control Circuit - SD-31922-01.

4.2 Line Circuit - SD-31777-01.

4.3 Prepay Coin Trunk - SD-31761-01.

4.4 Selector Circuits - SD-31735-01, SD-31836-01 and SD-31964-01.

4.5 Postpay Coin Trunk - SD-31732-01.

4.6 Selector Repeater Circuit - SD-31914-01.

4.7 Multi-Party Line Coin Circuit - SD-31895-01.

4.8 35E97 First Selector - ES-460432, ES-460447, H-58447, H-58467, H-58589, H-58671, H-58449, H-58505 and H-58679.

4.9 35E97 Coin Trunk - ES-460550, H-61278 and H-61344

#### DESCRIPTION OF OPERATION

##### 5. OPERATION OF LINE FINDER AND CONTROL CIRCUIT ON A REGULAR CALL

###### 5.1 Call Originated

When a subscriber originates a call, a relay in the line circuit operates connecting ground to the commutator terminal corresponding to the bank level on which the calling line appears. This same ground causes the associated control circuit to function to seize the first selector by ground on the ring over lead "R1 to R10", except with prepay coin trunks. When the line finder is used with prepay coin trunks, this ground operates relay (B) to open the release lead from the selector and to ground the sleeve. The selector returns ground over the sleeve lead.

###### 5.2 Vertical Hunting

Ground through the back contacts of the vertical and rotary magnets over lead "INT" to the control circuit causes the latter to return ground over lead "VM" to step the vertical magnet. The vertical magnet in operating releases a relay of the control circuit, which in turn releases the vertical magnet. This relay then reoperates and the cycle continues until the level on which the calling line appears is reached. The commutator terminal of this level will have direct ground on it. When the commutator wiper moves onto the grounded terminal, the ground will be connected over the "TST" lead to the control circuit which then causes the ground supplied to the control circuit over lead "INT" to control the rotary stepping over lead "RM".

###### 5.3 Line Finder Hunts Rotary

The rotary magnet in operating releases the relay of the control circuit, which in turn releases the rotary magnet. This relay then reoperates, continuing the cycle until the terminal on which the line appears is reached. At this time battery connected to the bank sleeve terminal through a winding of the line relay of the calling line circuit will cause a current to flow through the "P" winding of the (E) relay, if the calling line appears in the lower bank; or through the "P" winding of the (F) relay, if it appears in the upper bank, and over lead "TST" to the winding of the control circuit relay and ground. This current prevents the control circuit relay from releasing, thereby stopping rotary

stepping, and operates the (E) or (F) relay.

#### 5.4 Calling Line Seized

##### 5.4.1 Line in Upper Bank

If the calling line appears in the upper bank, the (F) relay operates enough to close its make first contacts 1T and 2T. It will fully operate on its "S" winding to ground on the selector sleeve.

When the (F) relay fully operates it cuts through the line, "T", "R" and "S" leads to the selector or trunk circuit, opens the circuit through which the (E) relay locks to the sleeve to release it if it has operated because of a waiting call from the corresponding line in the lower bank, opens the circuit through the "P" winding of the (E) relay thus separating the (S) and (Sl) wipers electrically and transfers the "S" winding of the control circuit relay (which is connected to the "INT" lead) from the back contacts of the vertical magnet to the "LF" lead to operate the (LF) relay of the control circuit. The line relay of the line circuit operates fully either in series with the (F) relay or from direct ground on the selector sleeve and releases the start relay of the control circuit.

##### 5.4.2 Line in Lower Bank

If the calling line is in the lower bank, the (E) relay instead of the (F) operates from the battery on the line sleeve terminal. The (E) relay in operating cuts the line through to the selector circuit, opens the circuit through the "P" winding of the (F) relay, and transfers the "S" winding of the (SP) relay of the control circuit from the back contacts of the vertical magnet to the "LF" lead, to operate the (LF) relay of the control circuit. The line relay of the line circuit operates fully either in series with the (E) relay or from direct ground on the sleeve and releases the start relay of the control circuit.

#### 5.5 11th Rotary Step

If a line finder goes to the eleventh rotary step, the eleventh rotary step springs connect the "INT" lead to the "LF" lead to operate the (LF) and hold the (SP) relays of the control circuit. The control circuit functions as on a regular call. When it removes ground from lead "R1 to R10" relay (B), if provided, releases closing the release lead of the line finder and releasing it (355A & 35E97). Otherwise

removing ground from lead "R1 to R10" removes ground from the selector ring and the selector connects ground to the "RLS" lead releasing the line finder (355A).

#### 5.6 Line Finder Releases

After the (E) or (F) relay of the line finder operates, the line finder is held under control of the sleeve of the selector.

When ground is removed from the selector sleeve, the (E) or (F) relay releases (355A). The release magnet then operates from ground on the "RLS" lead and the switch returns to normal whereupon the release magnet circuit is opened at the (VON) springs (35E97). The release magnet then operates from ground thru "K" wiring and the switch returns to normal whereupon the release magnet circuit is opened at the (VON) springs.

A contact on the release magnet separates the (S) and (Sl) wipers electrically so that the switch in releasing will not momentarily connect the sleeves of line circuits in the upper and lower banks together through the "P" windings of the (E) and (F) relays.

With the line finder normal, the (VON) springs remove ground from the "H" lead so that the line finder will be available to the control circuit.

## 6. ALARMS

6.1 The alarms required for supervision of the line finders are associated with the control circuit.

## 7. NORMAL POST SPRINGS (FIGS. 2 TO 8)

7.1 The normal post springs operate on various levels to perform four functions in various combinations as described in Table "A" of the drawing and Note 106.

### 7.1.1 Tone to Operator - 355A

The normal post springs may connect ground either directly or through a resistance to the "A" lead to the first selector. When a master office trunk is selected, ground through a resistance causes the master office trunk to send steady or interrupted low tone to the operator, while direct ground causes the trunk to send interrupted or steady tone to the operator. (In any one office all master office trunks will send the same kind of tone for a direct ground, and the other tone for a resistance ground). Absence of ground will, of course,

result in no tone being sent. When post-pay coin trunks are used, and the normal post springs supply ground to make the trunk operative, this ground on the "RS" lead may also feed forward to the "A" lead of the first selector to send tone to an operator when a master office trunk is selected. When tone to operator is always required, normal post springs are not required, but Fig. 9 or 10 is used as described in Table A.

#### 7.12 Access Denied to Specified Selector Levels

When access is to be denied to certain selector levels from lines appearing on certain levels of the line finder, the normal post springs are adjusted to connect ground to the "RS" or "EC" lead to the first selector.

#### 7.13 Post Pay Coin Trunk Serving Coin and Non-Coin Lines

When coin and non-coin lines are served from the same line finder, with a Post Pay coin trunk between the line finder and first selector, the normal post springs are adjusted to connect ground to the "RS" or "EC" lead to the coin box trunk, for the levels on which coin lines appear. This causes the trunk to split the connection and send coin tone to the calling subscriber when the called subscriber answers.

#### 7.14 Prepay Coin Trunk - 355A

When prepay coin trunks are provided for use with long line circuit segregated on separate levels, the normal post springs operate on these levels to cause the trunk to operate satisfactorily with the long line circuit.

### 8. MAKE BUSY ARRANGEMENTS

#### 8.1 (MB) Key

When the (MB) key on any line is operated, the "AB" lead is

opened so that the (TR) relay of the control circuit can release if all other finders in the group become busy and ground is placed on the "H" lead to make the finder busy to the control circuit. The connection between the selector "S" lead and the "H" lead is split so that a busy connection will not be held. If a control circuit selector is standing on the terminals of the finder made busy, a relay of the control circuit will operate and cause the line finder selector of the control circuit to step off the terminals of the busy finder.

8.2 If an associated first selector is removed from the frame ground on the selector sleeve will be connected through the line finder to the "H" lead which will busy the line finder. A line finder selector standing on the terminal will be stepped to the next idle line finder. A similar action occurs if the first selector is seized at its test jack or if the "MAKE BUSY" key is operated.

### 9. TEST LINE JACK (FIG. 11) - 355A

9.1 Calls may be originated by plugging a test cord or a short-circuited plug into the (161) or (50) jack. The finders function just as they do on calls from regular subscribers. If it is desired to use the finders in Group B, the busy key of the Group "A" control circuit must be operated. "Y" wiring and apparatus is used with finders for prepay coin lines to ground the tip when the test set is plugged into the jack, thus giving the same indication as a coin deposit.

#### 9.2 Test Line Jack (Fig. 12 - 35E97)

Calls may be originated by plugging a test cord or a short-circuited plug into the (A) or (B) jacks. The finders function just as they do on calls from regular subscribers. If it is desired to use the finders in Group B, the busy key of the "Group A" control circuit must be operated.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3350-JBD-FJS-YI