102800

CIRCUIT DESCRIPTION
SWITCHING SYSTEMS DEVELOPMENT DEPARTMENT

CD-21715-01
Issue 3-D
Appendix 2-D
Dwg, Issue 10-D

PANEL SYSTEM
SUBSCRIBER LINE CIRCUITS
WITH GROUND ON CUTOFF RELAY

CHANGES

B. CHANGES IN APPARATUS

	Superseded	Superseded By
B.1	D92439 relay	R6028 relay

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The "Mfr. Disc." D92439 relay is superseded by the R6028 relay.

D.2 Note 114 is added.

D.3 Connecting information to "aux. line ckt." is added to the "T", "R" and "S" leads of Fig. 1 and cross-connection Fig. 1-K.

4. CONNECTING CIRCUITS

When this circuit is listed on a key sheet, the connecting information thereon is to be followed.

4.1 Trip circuit, SD-21713-01.

4.2 Final circuit, ES-239664.

4.3 Line finder and district, ES-21030-01.

4.4 Message register connector circuit, SD-21417-01.

4.5 Stop hunt and line overflow circuit, SD-20701-01.

4.6 Auxiliary line circuit, SD-96139-01.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT.-2353-JPD-EWD-PM

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PANEL SYSTEM
SUBSCRIBER LINE CIRCUITS
WITH GROUND ON CUT OFF RELAY

CHANGES

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

C.1 In Figs. 1, 2 and 10, an adjustment is added on the E901 (L) relay for coin first coin lines (when converted from dial tone first).

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Circuit Note 113 is added and reference to this note is made in note 107 and in Figs. 1, 2 and 10.

D.2 The title of Fig. 10 previously read: "Line Circuit for Flat Rate Lines."

D.3 Working limits are added for the (L) E901 relay for use when coin service is changed from dial tone first to coin first:

Max. Ext. Ckt. Loop	1500 ohms*
Max. Earth Potential	±12 V.
Min. Line Ins. Res.	10,000 ohms

*The Ext. Ckt. Loop shall not include more than 6 miles of cable.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-MCK-AJB-KQ

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PANEL SYSTEMS
SUBSCRIBER LINE CIRCUITS
WITH GROUND ON CUT-OFF RELAY

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 Optional arrangement added, for use with individual lines or last trunk of terminal hunting group when stop hunt circuit is required. With this arrangement, normal potential is maintained on the sleeve terminal when the circuit becomes busy even when more than one final selector tests it.

B. CHANGES IN APPARATUS

B.1 Added

E1187 (CO) relay} Fig. 10
E901 (L) relay }

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Fig. 10 is added, to provide line circuit for individual lines or last trunk of a terminal hunting group when stop hunt circuit is required. Fig. 10 is the same as Fig. 1, for flat rate lines, except for addition of lead "CO" at S winding of (CO) relay and disconnection of lead from S winding of (CO) relay to "S" lead of line finder and district circuit. The "S" and "CO" leads are shown connected to the stop hunt circuit.

D.2 Circuit Note 112 is added to cover the addition of Fig. 10 and reference to Fig. 10 is added in notes 101, 103 and 105.

D.3 "Options Used" table is added.

All other headings under "Changes", no change.

1. PURPOSE OF CIRCUIT

1.1 To cause a line finder to seize this circuit when a call is originated.

2. WORKING LIMITS

2.1 Max. subscribers loop resistance, 1500 ohms for IMR and flat rate lines, and for 2 party and coin lines with maximum earth potential of +20 or -14 volts.

2.2 Max. subscribers loop resistance 1300 ohms for 2 party and coin lines with max. earth potential of + or -20 volts.

2.3 Max. external circuit resistance to ground for prepayment coin lines, 1480 ohms with max. earth potential of + or -20 volts, or 1900 ohms with max. earth potential of +20 or -14 volts.

2.4 Max. external circuit resistance to ground for trunks from PBX selector mult., 1000 ohms.

2.5 Minimum insulation resistance, 10,000 ohms.

3. FUNCTIONS

3.1 To start line finder hunting for line when a call is originated.

3.2 To operate line relay when a coin is deposited at manual prepayment coin box station.

3.3 To cause line finder to stop on line finder terminals of this line.

3.4 To operate the cut-off relay and disconnect line relay from the line when the line finder seizes the line.

3.5 To operate the cut-off relay and disconnect line relay from the line on calls from the final.

3.6 Message register operation.

3.7 To provide means for number checking.

3.8 When 2 party lines are arranged for remote control zone registration or non-zone overtime, the operation of a polar relay operates either of the 2 registers, depending on the polarity of the charging current furnished by the district.

3.9 A cover switch is provided on the polar relay, to prevent false operation of subscribers' registers when testing or adjusting this relay.

3.10 When arranged to connect to stop hunt circuit, maintains normal potential on the sleeve terminal even when tested by more than one final selector.

4. CONNECTING CIRCUITS

When this circuit is listed on a key sheet, the connecting information thereon is to be followed.

4.1 Trip circuit, SD-21713-01.

4.2 Final circuit, ES-239664.

4.3 Line finder and district, ES-21030-01.

4.4 Message register connector circuit, SD-21417-01.

4.5 Stop hunt and line overflow circuit, SD-20701-01.

DESCRIPTION OF OPERATION

5. MULTIPLE BANK WIRING

5.1 Each line finder frame is equipped with 10 multiple banks of 40 subscribers' lines each. The multiple banks are split and wired so that 20 subscribers' lines are wired to the 1st 20 sets of terminals in front of line finders in group "A" and to the last 20 sets of terminals in front of line finders in group "B". These 20 lines have first choice access thru the start and trip circuits to link circuits associated with group "A" line finders and second choice access to link circuits associated with group "B" line finders in case all group "A" line finders are busy. The other 20 subscribers' lines in the banks are wired to the last 20 sets of terminals in front of line finders in group "A", and to the first 20 sets of terminals in front of line finders in group "B". These 20 lines have first choice access thru the start and trip circuits to link circuits associated with group "B" line finders and second choice access to link circuits associated with group "A" line finders in case all group "B" line finders are busy. This arrangement reduces average line finder hunting time.

6. CALL ORIGINATED

6.1 Figs. 1, 2 and 10

When the receiver is removed from the switchhook at the calling station or a call is originated by an operator at a P.B.X., Fig. 1 or 2 ("M" wiring furnished) or Fig. 10, or when a coin is deposited with receiver removed from the switchhook, Fig. 1 or 2 ("M" wiring omitted), the (L) relay is operated to operate the (A) or (B) relay of the sub-group in the trip circuit for starting a line finder, to connect battery from the trip circuit to the "H" lead, and to disconnect the message register from the "H" lead in the case of a message rate line.

6.2 Figs. 3, 4, 5 and 6

When the receiver is removed from the switchhook at the calling station, the (L) relay is operated causing the circuit to function as described in paragraph 6.1.

7. LINE SEIZED BY A LINE FINDER

7.1 Figs. 1, 2, 3, 4, 5 and 6

When a line finder finds this line, battery on the "H" lead causes the line finder to stop on the line and connect battery to lead "S", operating the (CO) relay. The (CO) relay operated, releases the (L) relay, disconnecting ground from the "A" lead and closing the operating circuit of the message register at the (L) relay.

7.2 Fig. 10

When the line finder connects battery to the "S" lead and into the stop hunt circuit, the stop hunt circuit functions to place a low resistance path in parallel with the potential placed on the sleeve by the line finder to maintain normal potential on the sleeve terminal even when more than one final selector tests it. The stop hunt circuit also connects battery to the "CO" lead, operating the (CO) relay. The (CO) relay operated, releases the (L) relay, disconnecting ground from the "A" lead and closing the operating circuit of the message register at the (L) relay.

8. TERMINATING CALLS

8.1 Figs. 1, 2, 3, 4, 5 and 6

When the line is seized by a final on a terminating call, the (CO) relay operates from battery from the final over the "S" lead. The operation of the (CO) relay cuts off battery and ground from the line for operating the (L) relay. On all but the last line of a P.B.X. group, the 100 ohm winding of the (CO) relay alone is connected to the "S" lead as a condition for P.B.X. hunting. In the case of the last line of a P.B.X. group or an individual line, the 100 ohm winding of the (CO) relay is connected in series with the 1000 ohm winding, to the "S" lead, as a condition for stopping the final selector on the line.

8.2 Fig. 10

When the final selector places battery on the "S" lead and into the stop hunt circuit, the stop hunt circuit functions to place a low resistance path in parallel with the potential placed on the sleeve by the final, to maintain normal potential on the sleeve terminal even when more than one final selector tests it. The stop hunt circuit also connects battery to the "CO" lead, operating the (CO) relay. The operation of the (CO) relay cuts off battery and ground from the line for operating the (L) relay.

9. REGISTERING CALLS

9.1 Figs. 2, 3 and 4

For individual message rate lines per Figure 2, battery over the H lead from the district when in the position for registering the call operates the message register (MR1). For two party message rate lines per Figure 3, "L" wiring, the sleeve circuit remains closed in the district for calls originated by the first party and is opened by the district for calls originated by the second party when the district is in position for registering the call. Thus, message register (MR1) or (MR2) is operated depending upon whether relay (CO) is operated or released at the time that battery is supplied to the H lead by the district. For two party message rate lines per Fig. 3, "N" wiring, or per Fig. 4 the message register connector circuit provides the charging battery over lead M1 or M2 to operate message register (MR1) or (MR2) depending on the party originating the call.

9.2 Figs. 5 or 6, and 7, 8 and 9

When the call has reached the stage when the district applies the charging current on the H lead, the (P) relay is operated in a direction depending on the polarity applied to the "H" lead. When negative polarity is applied to the "H" lead, contacts 3T and 4T of relay (P) are closed, operating the (MR1) register, and when positive polarity is applied, contacts 1T and 2T of relay (P) are closed, operating the (MR2) register. The removal of either potential applied allows the (P) relay to release, in turn releasing the (MR1) or (MR2) register as the case may be.

A cover switch is provided on the (P) relay, which is so arranged that when the cover cap is removed, contacts 1B and 2B are opened, removing battery from springs 2T and 3T, in order to prevent false operation of the registers when the (P) relay is being adjusted or tested.

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DEPT. 3340-JML-AJB-EJ