STEP BY STEP SYSTEMS
35-E-97
LOCAL CONNECTOR CIRCUIT
ONE RING
GENERATOR CONNECTED TO
GROUND OR TO BATTERY

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit is used for additions in the 35-E-97 dial offices for making the final connection to a called line.

SECTION II - DETAILED DESCRIPTION

1. SEIZURE

1.01 When this circuit is seized by a selector, battery through resistor A causes the preceding selector, if of the battery searching-type, to cut through, and a loop is extended across the incoming T and R leads, causing the A relay to operate. A operated in turn operates B, which, when operated, returns ground to the sleeve lead S, grounds RM-ST lead to start the source of ringing supply, prepares the circuit for operating the stepping magnets, and prepares certain holding circuits which are described later.

2. VERTICAL STEPPING

2.01 The first set of impulses received by this circuit for pulsing, release and reoperate A to step the shaft in a vertical direction. When A releases for the first time, C operates in series with the vertical magnet. B and C are slow to release and remain operated during the pulsing of a digit. As soon as the shaft is moved from the normal position on the first vertical step, the VON springs operate to open the operating circuit for C, which holds through its make contact. The operated VON springs also partially prepare the release magnet circuit. As soon as the first set of pulses has been transmitted, A remains operated and C releases, thereby preparing the circuit for rotary stepping.

3. ROTARY STEPPING

3.01 The next set of impulses received by this circuit will again cause A to release and reoperate as previously described. A in so functioning will operate the rotary magnet and step the shaft in a horizontal direction in response to the number of pulses received. B again remains operated as during vertical stepping described in 2.01. During the rotary stepping, E operates in multiple with the rotary magnet and, in a manner similar to C, remains operated during the series of pulses to close the circuit for testing the called line.

4. BUSY TEST

4.01 If the called line is busy, ground will be connected to the S lead. This will cause G to operate before E releases and to lock through its make contacts to ground at B. G, when operated, opens the circuit for E and the rotary magnet, and returns busy tone to the calling end of the line.

4.02 With option M, busy tone is connected through contacts of the G relay to the ring of the line connected to the calling party. With option K, busy tone is connected through contacts of the G relay to the ring of the line connected to the calling party or operator. The busy flash is connected through other contacts of the G relay to F lead to preceding selector toward the calling operator. If the called line is idle, battery will be connected to the sleeve lead, and the switch will cut through to the line upon the release of E.

5. LINE SEIZURE

5.01 When the called line is seized, K will operate through its 125-ohm winding upon the release of E. The circuit for K is controlled from ground at B, which also acts as a guarding potential on the S wiper until K operates and connects direct ground to the sleeve of the subscriber line. The circuit through the 125-ohm winding of K serves only to operate contacts 1 and 2 of the relay, which closes a local circuit through its secondary winding to fully operate the relay. This circuit is maintained until the release of the switch. The operation of K also closes the tip and ring wipers through to the ringing leads on relay F for automatically ringing the called subscriber.

5.02 The battery to the secondary winding of K is supplied through the rotary magnet to prevent the operation of the relay if a pulse is transmitted to the rotary magnet by any irregular operation at the calling station after springs 1B and 2B have made and before springs 3T and 4T have broken. If K were permitted to operate under such conditions, it might result in the calling party cutting in on a busy connection. With option ZA, the original operate path of the rotary magnet and E relay is opened to prevent rotary overstepping after the units digit is dialed.

6. RINGING THE CALLED STATION

6.01 Ringing is now impressed on the called line through the back contacts and the

P winding of F for generator connected to battery, or through resistor B for generator connected to ground. This ringing will continue until the called subscriber answers, whereupon F will operate to close contacts 1 and 2 due to the current through its P winding. The S winding is then energized and fully operates the relay, which remains operated until the switch releases. The operation of F removes ground from the RM-ST lead and connects the talking lead through to D, which supplies talking battery to the called station. The called and calling stations are now connected for talking purposes through the 2-mf capacitors connected to the tip and ring leads. Under this condition, relay D operates to reverse the battery to the calling end for the purpose of supervision or for registered service and other functions described below.

7. CALLING SUBSCRIBER LAST TO DISCONNECT

7.01 D releases when the called subscriber disconnects. When the calling subscriber disconnects, relay A releases, releasing relay B. Relay B released releases relays F and K.

7.02 With option ZC, if the calling subscriber fails to replace his receiver on the hook after the called party disconnects, releasing relay D, the connector is released after an interval of 12 to 30 seconds. Ground over lead AUT. DISC., through R resistor, make on F, break on D, VON springs, RLS magnet to battery, operates the RLS magnet to its first step to release B. B released permits the preceding switches to restore, opening the loop to release A. B also releases F and K. The release of A and K fully operates the RLS magnet, returning the connector to normal.

7.03 The disconnect timing is under control of trunks arranged to trip ringing without charging. If any one of these trunks in the hundreds group to which the connector has access is busy, the timing circuit is disabled.

8. CALLED SUBSCRIBER LAST TO DISCONNECT

8.01 When the calling subscriber disconnects, A and B release. B in turn releases F and K. This releases D by opening the tip and ring leads, and the switch is restored to normal in the manner previously described.

9. SUPERVISORY NO. 1 - OPTION ZB

9.01 If the called station disconnects before the calling station, a path is closed through a back contact of D and front contact of F for operating a supervisory signal.

10. TEST JACK AND MAKE BUSY KEY

10.01 Key MB may be used to busy the switch to incoming calls when it is out of order. Test jack springs 1 and 2 may be used for making local tests on this switch to cause it to function in the same manner as described for an originating call. The make busy feature is also duplicated by the removal of the switch from its jack since the springs are arranged to place ground on the sleeve lead S when the switch is removed from its position.

11. CONTACT PROTECTION

11.01 Network C is used to protect contacts which operate the stepping magnets. Network B is used to protect the contacts which break the ringing current when the F relay operates.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Limits are for single office areas. For multioffice areas and for operator pulsing, see keysheets and Table A.

2. FUNCTIONAL DESIGNATIONS

None

3. FUNCTIONS

3.01 Returns battery on the sleeve while idle to cause the preceding selector, if of the battery searching type, to cut through.

3.02 Returns ground on the sleeve lead for holding the switches in their operated position and prevents the intrusion from selectors hunting for an idle connector.

TABLE A

Type of Dial or Adj	2,4,or 5	6	7	Adj A	Adj B	2,4,or 5	6	7	Adj A	Adj B
	ohms									
Max Ext Ckt Loop*	750	1200	1100	1000	1400	850	1500	1400	1115	150
Max Ext Ckt Loop†	850	1400	1300	1000	1400	1000	1500	1500	1115	1500
Max Ext Ckt Loop‡	1000	1400	1400	1000	1400	1115	1500	1500	1115	1500
Min Ins Res.		15,000		15,000			15,000		15,000	

*When using 1000-ohm loop - leak B in pulsing test set.
†When using 1200-ohm loop - leak A in pulsing test set.
‡When using 1400-ohm loop - leak A in pulsing test set.

3.03 Steps the shaft in a vertical and in a rotary direction in response to impulses received for selection.

3.04 Makes a busy test on the called line.

3.05 Returns a busy tone to the calling end if the line tested is busy, and, with K option, returns busy flash on operator-originated calls if the line tested is busy.

3.06 Places a busy condition on the called line if idle and seized by this circuit.

3.07 Rings the called subscriber and trips the ringing when the called party answers.

3.08 Connects the talking leads through to the called line.

3.09 Releases under control of the calling subscriber.

3.10 Furnishes talking battery to the called and calling ends.

3.11 Gives the calling subscriber audible ringing induction while the called party is being signaled.

3.12 Starts and stops the source of ringing supply.

3.13 Automatically releases the switch train and restores the called line to service within a predetermined time when the called party disconnects but the calling party fails to disconnect.

4. CONNECTING CIRCUITS

4.01 When this circuit is shown on a keysheet, the connecting information thereon is to be followed.

(a) Selector Circuits - H58447 (typical), SD-30902-01 (typical).

(b) Miscellaneous Alarm Circuit (Connectors) - SD-30908-01.

(c) Subscriber Line Circuits - H35710 (typical), SD-31777-01 (typical).

(d) Selector Bank Multiple Circuit - SD-32123-01.

(e) Connector Bank Multiple Circuit - SD-32128-01.

(f) Miscellaneous circuits reached via connector terminals.

(g) Power Shelf Circuit - H62707 (typical).

SECTION IV - REASONS FOR REISSUE

B. Changes in Apparatus

B.1	SUPERSEDED	SUPERSEDED BY
	197K Switch, T Option	197HS Switch, J Option

D. Description of Changes

D.1 Option ZA is added to open the original operating path for the rotary magnet and E relay to prevent rotary overstepping after the units digit has been dialed. The former wiring is shown as H option and rated Mfr Disc.

D.2 The 197K switch is replaced by the 197HS switch to provide RON springs and a break contact on the RLS magnet.

D.3 Reference to options J, ZA, and H is added to Note 104 and the Options Used table.

D.4 Notes 202, 203, and 204 are added.

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