STEP BY STEP SYSTEMS
NO 1, 350A, 355A OR 356A
SELECTOR-CIRCUIT
REVERTING CALL
8 PARTY SEMI-SELECTIVE RINGING
AND/OR 4 PARTY SELECTIVE OR
SEMI-SELECTIVE RINGING
ARRANGED FOR 2 DIGIT OPERATION

CHANGES

B. Changes in Apparatus

Superseded	Superseded By
A and D Resistors 63L-Fig. 1, R Option	H Resistor KS-8512,L4A, 249 Ohms-Fig. 1, Q Option

D. Description of Changes

D.1 Option R is designated and rated Mfr. Disc. Option Q is added.

F. Changes in CD Section

F.1 Under 4. CONNECTING CIRCUITS: Add:
4.9 AUXILIARY TRUNK CIRCUIT-SD-32535-01

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5225-LCB
WECo DEPT 5152-EAA-WEA

STEP BY STEP SYSTEMS
NO. 1, 350A, 355A, OR 356A
SELECTOR-CIRCUIT
REVERTING CALL
8 PARTY SEMI-SELECTIVE RINGING
AND/OR 4 PARTY SELECTIVE OR
SEMI-SELECTIVE RINGING
ARRANGED FOR 2 DIGIT OPERATION

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The rating of this circuit for 356A offices is changes to A&M Only since it is expected that there will be no further demand for new 356A dial offices.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT. 2336-JPD-RCD-MR

Printed in U.S.A.

STEP BY STEP SYSTEMS
NO. 1, 350A, 355A, OR 356A
SELECTOR CIRCUIT
REVERTING CALL
8 PARTY SEMI-SELECTIVE RINGING
AND/OR 4 PARTY SELECTIVE OR
SEMI-SELECTIVE RINGING
ARRANGED FOR 2 DIGIT OPERATION

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The use of "T" option is rated Mfr. Disc. and is superseded by "S" option to interchange the wiring to contacts 1 and 2 of the VON springs of the 197J switch so that the release magnet is connected to the No. 1 spring and ground on the No. 2 spring in order to obtain increased contact life.

D.2 Options "T" and "S" are added to Note 103 and the Options Used table.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT. 2315-IMF-RCD-EO

STEP-BY-STEP SYSTEMS
NO. 1, 350A, 355A, OR 356A
SELECTOR CIRCUIT
REVERTING CALL
8 PARTY SEMI-SELECTIVE RINGING
AND/OR 4 PARTY SELECTIVE OR
SEMI-SELECTIVE RINGING
ARRANGED FOR 2 DIGIT OPERATION

CHANGES

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

C.1 The requirements for the (L) 221CA relay are changed:

	From	To
Resid.	S-4	7-11
0 Test	7.2	9.8
0 readj.	6.8	9.3
No Test	5.7	7.3
No readj.	6.1	7.7

All other headings, no change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT.2353-JPD-EWO-DV

STEP BY STEP SYSTEMS
NO. 1, 350A, 355A, OR 356A
SELECTOR CIRCUIT
REVERTING CALL
8 PARTY SEMI-SELECTIVE RINGING
AND/OR 4 PARTY SELECTIVE OR
SEMI-SELECTIVE RINGING
ARRANGED FOR 2 DIGIT OPERATION

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 "S" option was removed, and the designation was removed from "J" option. Note 104 and last line of Note 103 were removed.

D.2 The replacement note formerly read "Replacing SD-31330-01 except for additions in offices with 60-75V. Trip Battery".

D.3 The last four lines of the title formerly read:

"For 8 Party Semi-Selective Ringing and/or 4 Party Selective Ringing Requiring dialing of 2 digits into Reverting Call Selector".

D.4 In Note 201, Sheet 012, in first line Fig. "5" was formerly "2".

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 2313-OCH-RLL-PS

STEP-BY-STEP SYSTEMS NO. 1, 350A, 355A, OR 356A SELECTOR CIRCUIT REVERTING CALL FOR 8 PARTY SEMI-SELECTIVE RINGING AND/OR 4 PARTY SELECTIVE RINGING REQUIRING DIALING OF 2 DIGITS INTO REVERTING CALL SELECTOR

CHANGES

A. CHANGED OR ADDED FUNCTIONS

A.1 Provides for use in Nos. 1, 350A, and 355A offices.

A.2 Prevents reverting calls from 2 party message rate trunks.

A.3 Insures tripping when there is a trouble ground on the tip.

B. CHANGES IN APPARATUS

B.1 Added

221 CA relay, Fig. 3
U1393 relay, Fig. 4
R429 relay, Fig. 5

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Connecting information for alarm and ringing interrupter circuits in No. 1, 350A and 355A offices is added.

D.2 Fig. 5 is added, with "V" option. "W" option was formerly part of Fig. 1.

D.3 "X" option and Figs. 3 and 4 are added to insure tripping against a trouble ground on the tip.

D.4 Notes 102 and 103 are revised for record of the above changes.

D.5 The replacement note is added and reference to NO. 1, 350A and 355A offices is added in the title.

D.6 The jack terminals are designated "T" option, standard, and "S" option for additions to shelves where the bank wiring is furnished on a shelf basis.

D.7 Code designations are added for leads to the ringing interrupter and alarm circuit and the interrupter relay circuit.

D.8 Fig. 52 and Note 201 are added.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is designed to enable one party on an eight party semi-selective ringing line or on a 4 party selective ringing line to call any other party on the same line.

1.2 This circuit may also be used by repair men to ring the bell of the station on these lines for test purposes.

2. WORKING LIMITS

Type of Dial	45V. Min. Pulsing from Sub. 2, 4 or 5	45V. Min. Pulsing from Sub. 6	45V. Min. Pulsing from Sub. 7	48V. Min. Pulsing from Sub. 2, 4 or 5	48V. Min. Pulsing from Sub. 6	48V. Min. Pulsing from Sub. 7
Max. Ext. Ckt. Loop*	750ω	1200ω	1100ω	850ω	1500ω	1400ω
Max. Ext. Ckt. Loop**	850ω	1400ω	1300ω	1000ω	1500ω	1500ω
Max. Ext. Ckt. Loop***	1000ω	1400ω	1400ω	1115ω	1500ω	1500ω
Min. Ins. Res.		15000ω			15000ω	

*When using 1000ω loop - Leak B in pulsing test set
**When using 1200ω loop - Leak A in pulsing test set
***When using 1400ω loop - Leak A in pulsing test set

TRIPPING RANGE

TYPE OF RINGING AND DISTRICT	RINGING INTERVAL VOLTAGE NO. 1	NO.350A	NO.355A	NO.356A	SILENT INTERVAL VOLTAGE	MAX. EXT. CKT. LOOP FOR TRIPPING ADJ."A"	ADJ."B"
Superimposed Tube, ±5 V.E.P.	84.88 AC & 45-52 DC	-	80-90(1) AC & 45-52 DC	80-90(1) AC & 45-52 DC	45-52	1030ω	1400ω
			65-90 AC & 37-40 DC	-	48-52	1115ω	1500ω
	(2)	(2)			45-52	-	1400ω
					48-52	-	1500ω

(1) 75-90 During Power Failure

(2) 72-88, 80-88, or 84-88 AC & 37-40 DC; or 64-80, 72-80, or 76-80 AC & 42-46 DC.

3. FUNCTIONS

3.01 To hold the preceding selectors when seized and guard against seizure by other selectors.

3.02 To respond to dial pulses and select any one of 100 sets of terminals.

3.03 To hold when the calling station hangs up after dialing a reverting call terminal.

3.04 To provide for means to start power ringing circuit.

3.05 To ring back over the calling line with the proper ringing for signaling both the calling and the called stations, as determined by the terminals selected, after the calling station hangs up.

3.06 To trip the ringing when either of the stations remove their receiver during either the silent or the ringing interval.

3.07 To provide means for stopping the power ringing circuit when ringing is not required.

3.08 To bring in a permanent signal if this circuit is seized and the party calling fails to hang up the receiver or if the line becomes permanently short circuited or grounded before the subscriber first hangs up.

3.09 To restore to normal when the calling party hangs up when the bank terminals selected are not used for reverting calls.

3.10 To restore to normal when the calling party is a two party message rate line.

3.11 To restore to normal when the calling and the called stations hang up after the ringing is tripped.

3.12 To provide for an alarm if the selector fails to restore to normal.

3.13 To make the circuit busy when switch is removed from the jacks.

3.14 To provide for connections to test circuit.

4. CONNECTING CIRCUITS

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

4.1 Local Selector - SD-31735-01*, SD-31200-01.

4.2 Selector Bank Multiple Circuit - SD-32123-01.

4.3 Power Ringing Circuit - SD-81131-01 and SD-81132-01, SD-80885-01*.

4.4 Ringing Interrupter Alarm Circuit - SD-31336-01.

4.5 Interrupter Relay Circuit - SD-32135-01.

4.6 Misc. Alarm or Switch Trouble Alarm Ckt. (Misc. Shelves) SD-32048-01.

4.7 Alarm Circuit - SD-32145-01.

4.8 Superimposing and Tripping Battery Circuit - SD-81132-01.

*Typical circuit.

DESCRIPTION OF OPERATION

5. SEIZURE

When this circuit is seized by a selector, relay A operates and in turn operates B which grounds the S conductor for the purpose of holding the preceding apparatus and to prevent intrusion by other selectors, prepares the pulsing circuit, and closes a part of the permanent signal circuit.

6. PULSING

When the pulses of the first digit are received from the calling party C operates in series with the vertical magnet and the shaft is stepped up by the vertical magnet which follows the pulses of A. When the selector moves off normal the VON springs function and leave C locked through its own contact. The C relay being slow in releasing remains operated during the pulsing period, at the termination of which C releases. The VON springs transfer the pulsing circuit to the rotary magnet and also party closes the circuit of the release magnet.

The second digit of pulses operates the rotary magnet in series with E and steps the shaft and wipers in a rotary direction. E operates H which locks to a ground at contacts of B. E being slow in releasing remains operated during dialing and a circuit through its winding is provided by its own contacts, after the operation of H. On the completion of the dialing E releases and the circuit remains in this condition until the calling station hangs up the receiver provided a reverting call terminal has been selected.

If the terminals selected are not assigned for reverting calls the H bank terminal is not grounded and when the calling party hangs up relays A and B release closing a circuit for operating the release magnet which restores the switch to normal.

7. RINGING CLOSURE

When the terminals dialed are assigned for reverting calls the H bank terminal is grounded. When the calling party hangs up A releases, opens the circuit to B and closes a circuit which operates C in series with the resistances A and D in parallel and the vertical magnet. This operates C. The vertical magnet may partially operate in series with the parallel res. A and D. C closes a circuit from ground at the bank

terminal H which operates K. K closes various ringing control circuits opens the perm. signal circuit and also closes a circuit for holding B, which is slow in releasing so that it will not release on open circuit during the operating time of relays C and K. The circuit now awaits a ground on the pick up lead PKU before ringing is started to prevent starting the ringing of a two ring code at any time other than at the beginning of the two ring code. At the beginning of each ringing code the PKU lead is grounded and this ground operates Z which locks to a ground at contacts on B through a contact on K. Z closes a circuit from the S wiper to the ringing interrupter relay G, from the T wiper to relay J and, from ground to start power ringing circuit if it is not in operation at this time. When "X" option is provided, (Z) also operates (L) on pick up, as described in paragraph 9.

8. RINGING

The character of the ringing back over the line is determined by the terminals selected. The bank terminals T and R may be connected to ground or terminals T, R and S may or may not be connected to a lead to the interrupter circuit which supplies an intermittent ground. A ground on the S wiper operates relay G which transfers one side of the line from tripping battery to the ringing current. G is therefore the ringing interrupter relay. A ground on the R wiper operates relay D which transfers from negative superimposed ringing to positive superimposed ringing and also reverses the connections to the primary winding of relay F for the purpose of always having a current flow through the primary winding of this relay in a direction to aid the secondary winding when closed. A ground on wiper T operates relay J which reverses the tip and ring of the line. The ringing is controlled by connections to the tip and ring wipers as follows.

1 - R grd.	D relay operated.	Positive current on ring.
2 - T grd.	J relay operated.	Negative current on tip.
3 - T & R grd.	J & D relays operated.	Positive current on tip.
4 - No. grd.	No relays operated.	Negative current on ring.

Lead "Code A" from the power ringing circuit is grounded during the first half.

The Code D, Code E, Code F, Code 1 Grd. and RZ Grd. leads, any of which may be connected to a sleeve terminal, supplies intermittent ground for operating the ringing interrupter relay G to provide the following ringing during the first or the last half of each ringing cycle.

	First Half	Last Half
Code D	1 ring	1 ring
Code E	2 rings	1 ring
Code F	2 rings	2 rings
Code 1 Grd.	1 ring	silent
R 2 Grd.	2 rings	silent

From the foregoing it will be seen that any required ringing back over the line can be obtained by various combinations of the connections from the ringing interrupter circuit to the multiple bank terminals.

The reverting call numbers are assigned on the basis of the following identifications for each station on the line.

Station 1 - 1 ring negative on ring side of the line.

Station 2 - 1 ring negative on tip side of the line.

Station 3 - 1 ring positive on ring side of the line.

Station 4 - 1 ring positive on tip side of the line.

Station 5 - 2 rings negative on ring side of the line.

Station 6 - 2 rings negative on tip side of the line.

Station 7 - 2 rings positive on ring side of the line.

Station 8 - 2 rings positive on tip side of the line.

For example, assume that a party at station 7 wishes to call station 2 on the same line. The calling party then dials 72. The ringing required for this call is two rings positive on the ring side of the line and one ring negative on the tip side of the line. Lead "Code A" is connected to the ring terminal which operates D and supplies positive ringing current during the first half of the ringing cycle. J is not operated and therefore the ringing current will be supplied to the ring side of the line. Lead "Code B" is connected to the tip terminal which operates J and reverses the ringing to the tip side of the line during the last half of the ringing cycle. D is not operated and therefore negative ringing current is supplied. Lead "Code E" is connected to the sleeve terminal which provides two rings in the first half of the ringing cycle and one ring during the last half.

9. RINGING TRIP

When the called station removes the receiver during the ringing interval F operates through its primary winding sufficiently to close contacts 1 and 2. The relay then fully operates over its secondary winding and locks to a ground at the contacts of B. With X option when the called station removes the receiver, during the silent interval, relay F operates on both windings in series, or if there is a trouble ground on the line, on its secondary winding, except when a + station is calling a + station. To insure tripping under this condition, relay L operating on pick up, releases relay D, and F will then operate. The operation of F allows K to release which in turn allows Z to release. This stops further ringing back over the line and thereby the calling station will know that the called station has answered. If the called station fails to answer the calling station can trip the ringing by removing his receiver after which the circuit will restore to normal when the receiver is hung up.

After the operation of F and the release of K and Z the connection to the power ringing circuit, to the permanent signal circuit, and to the bank wipers are open, the talking circuit is connected to relay A which supplies talking battery to the line. Relay A also holds the connections by holding B operated.

10. RELEASE

When both parties hang up A releases which in turn allows B to release which closes the circuit to energize the release magnet which restores the switch to normal.

11. CONTACT PROTECTION

The contact protection unit C is provided for the purpose of protecting the contacts of the relays which make and break the circuit to the stepping magnets. The contact protection unit B is provided for the purpose of protecting the contacts of relay F when the ringing is tripped. Lamp A is provided to limit the ringing or tripping current if the calling line becomes grounded.

12. PERMANENT OR SUPV. SIGNAL

If relay A remains operated for a predetermined length of time without ringing being tripped a permanent signal is brought in by a ground supplied to the "Perm. Sig." lead.

13. TEST JACK

A test jack is provided for making connection with outine test sets and can also be used for making the circuit busy by short circuiting springs 3 and 4. The circuit is also make busy when the switch is removed from the switch mounting jack because jack spring 9 will then make contact with spring 11.

14. TESTING RINGERS

The maintenance man can use this circuit for testing the ringing of the bells at a station by dialing the code which selects the reverting call selector and then dialing the number, of the station of which the bells are to be tested in accordance with the numbering listed under paragraph 8, two times, that is to ring station 5 dial 55 on the reverting call selector.

15. OPERATION WHEN 2 PARTY MESSAGE RATE STATIONS ATTEMPT TO COMPLETE REVERTING CALLS.

Two party message rate subscribers should request an operator to complete reverting calls, so that a proper charge may be made. If a two party message rate trunk should reach this circuit, relay (M) would operate in series with a high resistance relay in the trunk. When the calling subscriber hangs up to start ringing, K would not operate, and hence A and B would release, restoring this circuit to normal.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3030-OCH-RLL-X2