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STEP-BY-STEP SYSTEMS
NO. 1, 350A OR 355A
LOCAL CONNECTOR CIRCUIT
ONE RING

9

CHANGES

B. Changes in Apparatus

B.1 Added

Z Resistor Option ZJ KS20289L6C 2000

D. Description of Changes

D.1 Resistor Z is added across the RON contacts to permit the operation of relay E on the disconnect of the connector. This will prevent the reoperation of relay K, if line lock out type line circuits are equipped.

F. Changes in Description of Operation

F.1 Add a fourth Paragraph under 9 as follows:

With Option ZJ the "RON" contact is bridged with a 2000 ohm resistor to permit relay E to operate on connector release.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-GFC
WECO DEPT-2311- RWH WEA

Printed in U.S.A.

STEP-BY-STEP SYSTEMS
NO. 1, 350A OR 355A
LOCAL CONNECTOR CIRCUIT
ONE RING

CHANGES

B. Changes in Apparatus

B.1 Added
C Network, Consisting of: 1-542D Capacitor and 1-KS13490 L2 Resistor, 150 Ohms, ZF Option, Figure 1

B Network, 186A, ZG Option, Figure 1

T and R Capacitor, 580A, Option ZI, Figure 1

A Capacitor, 542U, Option Z1, Figure 1

C. Changes in Circuit Requirements Other Than Those Caused by Changes in Apparatus

C.1 The spring layout BSP figure for the A relays (options M, Z and Y) is changed from 11 to 726. The BSP figures are the same except that 726 contains information on the newer silver/palladium contact material.

D. Description of Changes

D.1 Figure 1 is revised to show the addition of contact protection networks, (B) consisting of: 1-542D capacitor and 1-KS13490 L2 resistor, 150 ohms and (C) 186A. The new (B) and (C) networks are designated ZF and ZG option respectively and are rated Standard. The 179A and 179B networks, option W, are to be used only K option is specified.

D.2 A new T and R capacitor and a new A capacitor are added to Fig. 1. The old capacitor is designated option ZH and is to be used only when K option is required. The new capacitors are designated ZI option and are rated Standard.

D.3 Note 104 is revised to include options ZF, ZG, ZH and ZI.

D.4 Note 112 is added to explain the difference between options W, ZF and ZG.

D.5 A Supporting Information Table is added.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5225-LCB
WECo DEPT 5152-RTO-WEA

STEP-BY-STEP SYSTEMS
NO.1, 350A, OR 355A
LOCAL CONNECTOR CIRCUIT
ONE RING

CHANGES

D. Description of Changes

D.1 Option Q, return of busy flash to operator, is rated Mfr Disc.

D.2 Note 111 is rated Mfr Disc.

D.3 Note 110 is revised to clarify the use of options K and M.

D.4 This circuit is rated A&M Only for use in 350A offices.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 2363-$\frac{KG}{MKD}$-RJJ, Jr.

STEP-BY-STEP SYSTEMS
NO. 1, 350A OR 355A
LOCAL CONNECTOR CIRCUIT
ONE RING

CHANGES

B. Changes in Apparatus

B.1

SUPERSEDED	SUPERSEDED BY
197GR Switch, F Option	197HS Switch, ZE Option

C. Changes in Circuit Requirements Other Than Those Caused by Changes in Apparatus

C.1 A nonoperate current flow requirement of 115 ma for test and readjust is specified for the double dog of the switch.

C.2 On Page 1, Test Note 8 is deleted. It formerly read: Double dog shall not operate.

C.3 On Page 1, Test Note 9 formerly read: (RLS) springs 1-2 shall break.

D. Description of Changes

D.1 Option ZB 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 ZA option which is rated Mfr Disc.

D.2 Option ZD is added to supply battery to the secondary winding of relay K directly rather than through the rotary magnet. The former wiring shown as option ZC is rated Mfr Disc.

D.3 The 197GR switch F option is replaced by the 197HS switch, ZE option to provide RON springs.

D.4 Equipment Note 203 was formerly shown as Note 202. A new Equipment Note 202 is added. Note 203 is changed. Note 204 is added.

F. Changes in Description of Operation

F.1 In the first sentence of the second paragraph under 9, after "of relay K" add the following: with ZC option.

F.2 Add a third paragraph under 9 as follows: With ZB option, the original operating path for the rotary magnet and E relay is opened to prevent rotary overstepping after the units digit has been dialed.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 2363- MKD-RJJ,Jr.

STEP-BY-STEP SYSTEMS
NO. 1, 350A OR 355A
LOCAL CONNECTOR CIRCUIT
ONE RING

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 Provision is made to automatically release the connector and switch train within a predetermined time when the called party disconnects but the calling party fails to disconnect.

B. CHANGES IN APPARATUS

B.1 Added

1 - KS-8512,L4C Resistor (G option)

B.2

Superseded	Superseded By
197K Switch (J option)	197GR Switch (F option)
221W, G relay (Q option)	221T, G relay (R option)

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The rating of this circuit is changed from A&M Only to AT&TCo Standard for use in No. 1 and 350A Offices.

D.2 Option G is added for use where automatic disconnect on calling party holds is required. Option H shows the former wiring.

D.3 Options Q and J, providing the busy flash signal to operators are rated A&M Only.

D.4 The leads connecting to Misc. Alarm Circuit or Switch Trouble Alarm Circuit were formerly shown connecting to Misc. Alarm Circuit.

D.5 Equipment Note 202 is added.

D.6 Circuit Note 104 is changed to show option R Standard and options Q and J A&M Only. Reference to option F is added in Note 104 and the Options Used table.

D.7 Reference to options G and H is added in Notes 104, 108 and Options Used table.

D.8 In Note 301 the test jack assembly number is changed from P250374 to P252318.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is used in No. 1, 350A or 355A dial offices for making the final connection to a called line.

2. WORKING LIMITS

LIMITS ARE FOR SINGLE OFFICE AREAS. FOR MULTI-OFFICE AREAS, AND FOR OPERATOR PULSING, SEE KEY SHEETS.

	45V. MIN.					48V. MIN.				
	PULSING FROM SUB.			CALLED STA. SUPV.		PULSING FROM SUB.			CALLED STA. SUPV.	
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"
MAX. EXT. CKT. LOOP*	750ω	1200ω	1100ω	1000ω	1400ω	850ω	1500ω	1400ω	1115ω	1500ω
MAX. EXT. CKT. LOOP**	850ω	1400ω	1300ω	1000ω	1400ω	1000ω	1500ω	1500ω	1115ω	1500ω
MAX. EXT. CKT. LOOP***	1000ω	1400ω	1400ω	1000ω	1400ω	1115ω	1500ω	1500ω	1115ω	1500ω
MIN. INS. RES.		15000ω		15000ω			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

2.1 Tripping Ranges

TYPE OF RINGING AND DISTRICT	RINGING INTERVAL VOLTAGE NO. 1	NO. 350A	NO. 355A	SILENT INTERVAL VOLTAGE	CODE OF (F) RELAY	OPTIONS	RATING (1)	MAX. EXT. CKT. LOOP FOR TRIPPING ADJ "A"	ADJ "B"	ADJ "D"	ADJ "E"
AC-DC	84-88 (2) AC & 5-2DC	72-88 OR 84-88 AC & 45-52 DC	80-90 (4) OR 75-110 AC & 45-52 DC	45-52	222T	D,M	STD	1030Ω	-	1400Ω	-
				48-52	222T	D,M	STD	1115Ω	-	1500Ω	-
	-	-	80-90 (4) AC & 45-52 DC	45-52	222T	D,K OR M	STD	-	-	1400Ω	1400Ω
				48-52	222T	D,K OR M	STD	-	-	1500Ω	1500Ω
SUPERIMPOSED TUBE ± 5 V.E.P.	(3)	(3)	65-90 AC & 37-40 DC	45-52	222T	D,M	STD	1030Ω	-	1400Ω	-
				48-52	222T	D,M	STD	1115Ω	-	1500Ω	-
				60-75	222T	D,M	A&M	-	1500Ω	-	-
					222DP	E,M	MD	-	1500Ω	-	-
SUPERIMPOSED; 4 PARTY, INVERTED 42A & TUBE	(3)	(3)	65-90 AC & 37-40 DC	60-75	222DP	E,M	A&M	1040Ω	-	-	-
SUPERIMPOSED; 4 PARTY, 42A, INV. 42A & TUBE	(3)	(3)	65-90 AC & 37-40DC	60-75	222DP	E,M	A&M	900Ω	-	-	-

(1) RATING APPLIES TO TRIPPING RELAY, WIRING, AND TYPE OF DISTRICT.
(2) 72-88 OR 80-88 AC IN OLDER PLANTS
(3) 72-88, 80-88, OR 84-88 AC & 37-40 DC; OR 64-80, OR 76-80 AC & 42-46 DC
(4) 75-90 DURING POWER FAILURE

3. FUNCTIONS

3.01 To return ground on the sleeve lead for holding the switches in their operated position and to prevent the intrusion from selectors hunting for an idle connector.

3.02 To step the shaft in a vertical and in a rotary direction in response to impulses received for selection.

3.03 To make a busy test on the called line.

3.04 To return a busy tone to the calling end if the line tested is busy.

3.05 To return busy flash on operator originated calls if the line tested is busy.

3.06 To place a busy condition on the called line if idle and seized by the circuit.

3.07 To ring the called subscriber and trip the ringing when the called party answers.

3.08 To connect the talking leads through to the called line.

3.09 To release under control of the calling subscriber.

3.10 To furnish talking battery to the called and calling ends.

3.11 To give the calling subscriber audible ringing induction while the called party is being signalled.

3.12 To start and stop the source of ringing supply.

3.13 To automatically disconnect the calling line after a predetermined interval on calling party holds, permitting release of connector and freeing called line.

4. CONNECTING CIRCUITS

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

4.1 Selector Circuit - SD-31735-01*

4.2 Incoming Selector Circuit - SD-30972-01

4.3 Selector Bank Multiple Circuit - SD-32123-01

4.4 Connector Bank Multiple Circuit - SD-32128-01

4.5 Misc. Alarm Circuit or Switch Trouble Alarm Circuit - SD-32045-01

4.6 Power Ringing Circuit - SD-80885-01*

4.7 Relay Interrupter Circuit - SD-31868-01

4.8 Subscriber Line Circuit - SD-31777-01

4.9 Intercepting Trunk Circuit - SD-31337-01

* Typical Circuit

DESCRIPTION OF OPERATION

5. SEIZURE

When this circuit is seized by a selector, 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 the MS lead to start the source of ringing supply, prepares the circuit for operating the stepping magnets, also prepares certain holding circuits which will be described later.

6. VERTICAL STEPPING

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 V.O.N. springs operate to open the operating circuit for (C), which holds through its make contact. The operated V.O.N. 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.

7. ROTARY STEPPING

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 the preceding paragraph. During the rotary stepping (E) operates in multiple with the rotary magnet and similar to (C), remains operated during the series of pulses to close the circuit for testing the called line.

8. BUSY TEST

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 a busy signal to the calling end of the line as determined by options R or Q.

With option R busy tone is connected through contacts of the (G) relay to the ring of the line connected to the calling party.

With option Q busy tone is connected through contacts of the (G) relay to the ring of the line connected to the calling party or operator and the busy flash is connected through other contacts of the (G) relay to the (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).

9. LINE SEIZURE

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's 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.

The battery to the secondary winding of (K) is supplied thru 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 the above conditions it might result in the calling party cutting in on a busy connection.

10. RINGING THE CALLED STATION

Ringing is now impressed on the called line through the back contacts of (F). 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 then being energized, fully operates the relay and it remains operated until the switch releases. The operation of (F) removes ground from the MS lead and connects the talking leads 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 condensers 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 for other functions hereinafter described.

11. CALLING SUBSCRIBER LAST TO DISCONNECT

(D) releases when the called subscriber disconnects. When the calling subscriber replaces the receiver on the switchhook (A) and (B) will release which will in turn allow (K) to release. With these relays in the normal position the release magnet is energized and the switch will release thereby restoring the circuit to normal.

12. CALLED SUBSCRIBER LAST TO DISCONNECT

The release of the connector is entirely under control of the calling subscriber. When the calling subscriber disconnects (A) and (B) release, (B) in turn releasing (F) and (K). This releases (D) by opening the tip and ring leads and the switch is restored to normal in a manner previously described.

13. SUPERVISORY NO. 1, H OPTION

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.

14. AUTOMATIC DISCONNECT OF CALLING LINE ON CALLING PARTY HOLD - G OPTION

If the calling party fails to replace his receiver or hook after the called party disconnects releasing the D relay, the connector is automatically released after an interval of 12 to 30 seconds. Ground over lead AUT. DISC. through resistor R, a make on F, a break on D, VON springs, RLS magnet to battery operates RLS on its first step to release B. B released permits the preceding switches to restore and open the loop to release (A). The release of A fully operates the RLS magnet returning the connector to normal.

15. TEST JACKS

Test jack springs 3 and 4 may be used to busy the switch to incoming calls when it is out of order. The test jack 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 of the test jack is also duplicated by the removal of the switch from its jacks since the springs are arranged to place ground on the sleeve lead "S" when the switch is removed from its position.

16. CONTACT PROTECTION

The contact protection unit or network (C) is used to protect contacts which operate the stepping magnets. Contact protection unit or network (B) is used to protect the contacts which break the ringing current when the (F) relay operates.

17. BALANCE AGAINST INDUCTIVE DISTURBANCE

The relays of option Y are wound so that the inductance of the two windings is as nearly the same as is practicable, and in addition, D is connected so that, when operated, the primary winding of A and the secondary winding of D will both be connected to the ring, thus minimizing any residual unbalance.

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DEPT. 2335-MKD-FBB-LL