

STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
30, 60, 120 IPM INTERRUPTER
AND INTERRUPTER ALARM CIRCUITCHANGESD. Description of Changes

- D.1 Precise tone lead designations are added to Figs. 7, 13, 14, 15 and note 117.
- D.2 The title of Fig. 7 is changed to show that it is no longer used to filter 60 and 120 IPM busy tone without flash.
- D.3 The title of Fig. 9 is changed to include the fact that it will also be a tone alarm circuit.
- D.4 Additional connecting circuits are added to tables B and K.
- D.5 Keysheet and maintenance BSP information is added to the Supporting Information table.
- D.6 A "120 IPM BT" Lamp designation is added to Fig. 5B.

F. Changes in CD Sections

F.1 In Section II - 1.05 - Change the 4th sentence to read: "Also, Fig. 14 converts continuous low tone from the power ringing circuit into 30 IPM interrupted low tone."

F.2 In Section II - 1.07 - Change the second sentence to read: "The 1MF (A) capacitor prevents any steady voltage condition from reaching the tone supply."

F.3 In Section III - 4. CONNECTING CIRCUITS
Change: D. Switch Trouble Alarm Circuits
(b) For Connector Shelves and PBX Trunks - SD-32045-01.
U. Local Test Desk rather than U. Local Test Desk No. 14.

Add: A. Alarm Circuits
(c) Misc. Tone and Tone Alarm Circuit - SD-31521-01.

U. Local Test Desk
(f) 60 and 120 IPM flashing circuit - SD-1C401-01.*

V. Miscellaneous Circuits
(q) Centralized Repair Service Trunk Circuit - SD-99374-01.
(r) Auxiliary Line Circuit - SD-99484-01.
(s) Ringing and Tone Power Plant - SD-81866-01.*

*Typical

BELL TELEPHONE LABORATORIES, INCORPORATED

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STEP BY STEP SYSTEMS
NO. 1 OR 350A
30, 60, AND 120 IPM INTERRUPTER
AND INTERRUPTER ALARM CIRCUITS

CHANGES

A. Changed and Added Functions

- A.1 Provision is made to remove LTL-30 IPM tone from this circuit.

D. Description of Changes

- D.1 Provision is made to remove LTL-30 IPM tone and replace it with LTL-120 IPM tone already in this circuit.
- D.2 Fig. 13 and 14 and option J are rated Mfr Disc. as well as other references to 30 IPM in other figures.
- D.3 Connection to Intertoll Dial ROTS is added to Table K.
- D.4 Circuit Note 113 is changed to show reference to Fig. 13 and 14 and option J.
- D.5 Connection of E lead from Fig. 11 formerly read "to Fig. 11."
- D.6 The quantity of the 120 IPM interrupter lead in Table B to the auxiliary traffic circuit between toll selector multiple and intercepting trunk for delaying cut-through is changed from one lead per office to one lead per five circuits.
- D.7 Connecting information is added for the Large and Small MJ Mobile Radio Telephone System.

F. Changes in CD Sections

- F.1 Under 4. CONNECTING CIRCUITS, add:

V. Miscellaneous Circuits

- (n) MJ Mobile Radio Telephone System - Duplicate Switching and Test Access Circuit - SD-2R001-01.
- (o) MJ Mobile Radio Telephone System - Common Pulse Circuit - SD-2R013-01.
- (p) Small MJ Mobile Radio Telephone System - Line Circuit - SD-2R049-01.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 2363-NPS-RJJ

STEP BY STEP SYSTEMS
 NO. 1 OR 350A
 30, 60, AND 120 IPM INTERRUPTER
 AND INTERRUPTER ALARM CIRCUITS

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<u>SECTION I - GENERAL DESCRIPTION</u>	
<u>1. PURPOSE OF CIRCUIT</u>	
1.01 This circuit provides 30 ipm, 60 ipm. and 120 ipm for the various circuits in an office.	
<u>SECTION II - DETAILED DESCRIPTION</u>	
<u>1. DESCRIPTION OF OPERATION</u>	
TRANSFER KEY CIRCUIT - FIG. 1 OR 12	
1.01 With the transfer key A in the normal position, relays A and B are con- nected to the 120- and 60-ipm brushes through resistors C and D (Fig. 1 only). These relays follow the 120- and 60-ipm interruptions and in turn send ground pulses of the same frequency over the A	

and B leads to the relays of Fig. 2 or 10. Resistors A, B, C, C1, D, E, and D1 and capacitors A, A1, B, B1, C, and D of Fig. 1 or the corresponding networks of Fig. 12 or 13 provide contact protection to the relay and interrupter contacts. The operation of transfer key A connects the A1 and B1 relays in place of the A and B relays in case of trouble or as required by the routines prevailing in the office.

A. Fig. 13

1.02 With transfer key D in the normal position, relay T is connected to the 30-ipm lead through resistor E. This relay follows the 30-ipm interruptions and in turn sends ground pulses of 0.3-second duration over the C leads to the relays of Fig. 10. Tone of the same frequency is sent out on leads L1-30 ipm. The operations of transfer key D connects the T1 relay in place of the T relay in case of trouble or as required by routines prevailing in the office.

INTERRUPTER CIRCUIT

B. Fig. 2

1.03 The keys and relays of Fig. 2 are furnished as required to provide the necessary 60- and 120-ipm leads to the various circuits in the office. When used for 120 ipm, the A lead from Fig. 1 is connected through the B key to relay C or D. The connection to the B lead is used for figures supplying 60 ipm. With the associated B key normal, the A or B lead is connected to the C relay causing it to follow the interruptions supplied by the relays of Fig. 1. This causes ground to be connected to each of the 10 leads which are carried through the key contacts to the circuits requiring interruptions. When the C relay releases, the leads from the circuits, except those listed in Tables C and F or designated 60C, 60D, 120C, or 120D, are connected through the back contacts of the C relay to the D lamps of Fig. 3 to provide for sounding an alarm in case of a grounded lead. When the B and C keys are operated, the leads are transferred from the associated C relay to the D relay, which will then operate in the same manner as described for the C relay.

C. Fig. 10

1.04 The keys and relays of Fig. 10 are furnished as required to provide the necessary 30-, 60-, and 120-ipm leads to the various circuits in the office. When used for 120-ipm supply, the A lead from Fig. 1 or 12 is connected through the B key to relays C and C1 or D and D1. The connection to the B lead is used for figures supplying 60 ipm. With the associated B key normal, the A or B lead is connected to the C and C1 relays, causing them to follow the interruptions supplied by the

relays of Fig. 1 or 12. This causes ground to be connected to each of the 12 leads which are carried through the key contacts to the circuits requiring interruptions. When the C and C1 relays release, the leads from the circuits, except those listed in Table C and F or designated 60C, 60D, 120C, or 120D, are connected through the back contacts of the relay to the D lamps of Fig. 11, to provide for sounding an alarm in case of a grounded lead. When the B and C keys are operated, the leads are transferred from the associated C and C1 relays to the D and D1 relays, which will then operate in the same manner as described for the C and C1 relays.

D. Fig. 14

1.05 When 30 ipm BR1 is not provided, Fig. 14 is used in conjunction with Fig. 10. Fig. 14 converts 120 ipm into 30 ipm. The 120 ipm is obtained from Fig. 10, for 120 ipm on lead 120A. Also Fig. 14 converts continuous tone L1 from the power ringing circuit into interrupted tone L1-30 ipm. The operation of transfer key E connects the W, W1, Z, and Z1 relays instead of R, R1, S, and S1 relays in case of trouble or as required by the routines prevailing in the office. This circuit operates when the connecting circuit grounds the D lead and shorts A and B.

FILTER CIRCUITS

E. Fig. 7

1.06 This filter is provided to reduce clicks which might be received from busy flashes in connectors or selectors on toll connections. The A coil retards the build-up of current through the repeating coil of the toll transmission selector, and together with the E capacitor and E resistor reduces the surge when the ground is removed from the interrupter lead. When required, low tone is superimposed on the ground interruptions by the F capacitor and X option for line busy flash, or Q option for paths busy flash.

F. Fig. 15

1.07 Fig. 15 is provided for circuits requiring 120-ipm busy tone without flash. The LMFA capacitor prevents any steady voltage condition from reaching the L1 120-4pm BR2 tone supply. The 149R inductor prevents tone from reaching the office battery supply.

ALARM FOR GROUNDED LEAD

1.08 As described in 1.03 through 1.05, interrupter leads, except those associated with the circuits listed in Tables C and F, or designated 60C, 60D, 120C, or 120D, are connected to the D lamps of Fig. 3 or 11 when the interrupter

relays release. Should a trouble ground occur on one of these leads, a connection will be established every time the relay releases, through the D lamp and associated resistor when Fig. 11 is used and through the low resistor E relay of Fig. 4 or 8. The operation of this relay causes the F relay to operate and in turn, the G relay of Fig. 5 and 9 to operate. The G relay operated operates the H relay of Fig. 5A or 5B, causing an intermittent alarm to be given. With Fig. 5B the H relay operated also lights the (30 IPM NC) or (60 IPM BF) or (120 IPM BF) lamp. The lamp of Fig. 3 or 11 will be lighted on each release of the interrupter relay, thus indicating the lead on which the ground has occurred.

1.09 Since it is possible for a short spurt of ringing current to be sent back over the interrupter lead from a busy toll transmission selector, the alarm equipment is arranged so that no alarm will be sounded under this condition. The E relay is polarized so that it will operate on only one half of the ringing cycle while the slow-operate characteristics of the F relay prevent a short operation of the E relay from sounding an alarm.

1.10 The G relay is made slow-release to insure operation of the single stroke bell of the audible alarm circuit. This is necessary since the E, F, G, and H relays can be operated only when an interrupter relay is released during the open period of the interrupter while the bell of the audible alarm circuit can be energized only during the closed period. The G and H relays remain operated long enough to insure that the bell will be sounded.

1.11 The low resistance of the E relay provides a path to battery for ringing current or other disturbances on one of the leads associated with that relay and thus prevents interference with other leads which are connected to the same relay.

ALARM CIRCUIT FOR OPEN OR GROUNDED INTERRUPTER BRUSH - FIG. 6

G. Normal Operation

1.12 Fig. 6 is used to bring in an audible and visual alarm whenever a 30-, 60-, or 120-ipm interrupter lead or brush becomes grounded or open or whenever the A, B, or C leads of Fig. 1, 12, or 13 become grounded or open. Whenever correct ground pulses are being received from the 30-, 60-, or 120-ipm brushes and leads A, B, or C, Fig. 6 functions as follows: the PU relay operates from battery from the common timing circuit. The PU relay operated locks under control of the PC relay, connects battery to the PA and PB relays and connects the AL relay of Fig. 6A or 6B to the A7 or A1 lead of the common timing circuit. Ground will not be

connected to the A7 or A1 lead of the common timing circuit for at least 18 seconds after battery is connected to the PU7 or PU1 lead; therefore, the AL relay does not operate at this time. When ground is connected to the G and H leads, the PA and PB relays will operate. The PA and PB relays, operated, operate the PC relay and supply ground to hold the PU relay operated. At the end of the 30-, 60-, or 120-ipm pulse, ground is removed from the G and H leads, releasing the PA and PB relays. The PA and PB relays, released, remove the holding ground for the PU relay, releasing this relay, which releases the PC relay. Since battery may be held on the PU7 or PU1 lead for approximately 6 seconds, the above cycle of operation will continue until battery is removed from the PU7 or PU1 lead. After battery is disconnected from the PU7 or PU1 lead, it is not again connected for approximately 24 seconds. During this interval the PU relay will not operate.

H. Grounded Brush Alarm

1.13 If the G or H lead or both of these leads become grounded, the PA or PB relay or both of these relays will remain operated when the PU relay operates. Should the PA relay be operated continuously while the PB relay follows the impulses from the interrupter, the PC relay will operate and lock under control of the PU relay. The PU relay will not release, however, since the PA relay being operated continuously maintains the locking ground for the PU relay. If the PA relay remains operated until a ground impulse is received over the A7 or A1 lead, the AL relay will operate. The AL relay, operated, locks to the ground that is holding the PU relay, disconnects the AL relay from the A7 or A1 lead, connects ground to the 1A or 1B lead to light a pilot lamp, and grounds the AB lead to cause the vibrating alarm bell to function. Ground also is connected to the D lead causing a floor aisle pilot lamp to be lighted. With Fig. 6B, the AL relay operated also lights the (BRUSH 30 IPM), (BRUSH 60 IPM), or (BRUSH 120 IPM) lamp. The alarm will be indicated in a similar manner should the PB relay be operated continuously. If both the PA and PB relays are operated continuously, the ground for holding the PU relay operated is obtained from both the PA and PB relays. The alarm is brought in as described above.

I. Grounded Brush Alarm - 30 IPM. Fig. 14 Option J

1.14 Where Fig. 14 is used, J option is used with Fig. 6 and 6B. Option J provides ground through the D lead when the latter is grounded in the connecting circuit. If the GH lead is grounded, the PA and PB relays operate as described in 1.13 and when the AL relay of Fig. 6B operates, it operates relay L in Fig. 14.

Relay L grounds the D lead and short-circuits leads A and B, thus maintaining the circuit of Fig. 14 operating. Relay L also provides ground to light lamp (BRUSH 30 IPM) of Fig. 6B.

J. Open Lead Alarm

1.15 Should the G or H lead or both of these leads become open, the PA or PB relay or both of these relays will not operate when the PU relay operates. With the PA or PB relay or both of these relays nonoperated, the PC relay will not operate. Under this condition the PU relay will be held operated from ground through the back contact of the PC relay. The PU relay being held operated brings in the alarm as described in 1.13.

K. Open Lead Alarm - 30 IPM, Fig. 14 Option J

1.16 Should the GH lead become open, the operation of the circuit in Fig. 6 will be as described in 1.15 except for the operation of the circuit of Fig. 6B which will be as described in 1.14.

L. Return to Normal from an Alarm Condition

1.17 After the grounded or open condition on the G and H leads has been cleared, the PA and PB relays will operate and release in unison with the pulses from the interrupter. The PA and PB relays, operated, will operate PC. When the PA and PB relays release, the locking ground for the PU and AL relays will be momentarily opened due to the PC relay being locked operated to the PU relay. This momentary opening of the ground will release the PU and AL relays, restoring the circuit to normal, extinguishing the alarm lamps, and silencing the alarm.

M. TST Key

1.18 The TST key is provided to facilitate testing of the alarm circuit. When the TST key is operated, the G and H leads are opened and the alarm circuits will function to indicate an open lead alarm as described in 1.14. To test for the alarm circuit operation under a "grounded alarm" condition, it will be necessary to block the PA and PB relays operated. The circuit will then function as described in 1.13. When the TST key is released, the G and H leads are connected to the interrupter leads and the pilot lamp is extinguished.

N. Test Jack E - Fig. 8

1.19 The E jack of Fig. 8 is used when testing or adjusting the E relay.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None.

2. FUNCTIONAL DESIGNATIONS

2.01 None.

3. FUNCTIONS

- 3.01 To provide separate ground leads interrupted at the rate of 30 ipm.
- 3.02 To provide separate ground leads interrupted at the rate of 60 ipm.
- 3.03 To provide separate ground leads interrupted at the rate of 120 ipm.
- 3.04 To provide separate ground leads interrupted at the rate of 30 ipm, 60 ipm, or 120 ipm and arranged with a filter to eliminate objectionable clicks which otherwise would be received on busy flashes.
- 3.05 To provide for superimposed low tone on the ground interruptions supplied through the filter for line busy, and paths busy, when required.
- 3.06 When required, to cause an audible alarm to be sounded and a visual signal to be displayed in case of a trouble ground on any 30-, 60-, or 120-ipm lead.
- 3.07 To provide means for transferring from the regular equipment to spare equipment in case of trouble or as required by the routine prevailing in the particular office.
- 3.08 Arranged to prevent ringing current which may be connected to one of the 30-, 60-, or 120-ipm leads by the operation of the toll cord or the toll board position dial circuit from operating the alarm.
- 3.09 To cause an audible alarm to be sounded and a visual signal to be displayed in case the 30-, 60-, or 120-ipm brush becomes grounded or open.
- 3.10 To provide for 30-ipm tone.
- 3.11 To convert 120 ipm to 30 ipm.
- 3.12 To provide 120-ipm tone.

4. CONNECTING CIRCUITS

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

STEP-BY-STEP CIRCUITS

A. Alarm Circuits

- (a) Interrupter and Alarm Circuit for MR Trunks - SD-31494-01.
- (b) Trunk Distributing and Alarm Circuit - SD-95976-01.

B. AC Power Alarm Circuits

- (a) AC-DC Ringing - SD-31559-01.
- (b) Superimposed Ringing - SD-31560-01.
- (c) AC-DC Ringing, 301C Power Plant - SD-31617-01.
- (d) Superimposed Ringing, 301C Power Plant - SD-31618-01.
- (e) Pre-Pay Coin Trunk Interrupter and Alarm Circuit - SD-30852-01.

C. Ringing Interrupter and Alarm Circuits

- (a) 8-Party TPS - SD-31336-01.
- (b) 10-Party TPS - SD-31298-01.
- (c) 10-Party TPL - SD-31187-01.

D. Switch Trouble Alarm Circuits

- (a) For Selector Shelves - SD-32043-01.
- (b) For Connector Shelves and PBX Trunks - SD-32043-01.
- (c) For Miscellaneous Shelves - SD-32048-01.
- (d) Alarm Checking Terminal Circuit - SD-31835-01.
- (e) Busy-Back Circuit for Toll Switchboard Cords - SD-31090-01.
- (f) Line Load Control Circuit - SD-32108-01.
- (g) Jack Circuit - Miscellaneous Tone - ES-241904-01.

E. Line Circuits

- (a) Test - Incoming Trunks - SD-31636-01, SD-31642-01.
- (b) Test - Local or Toll Train - SD-31932-01.
- (c) Number Checking Trunk and Checking First Selector - SD-31291-01.

F. Selectors

- (a) AB Toll Preceding - SD-31241-01.
- (b) AB Toll Transmission - SD-31646-01.
- (c) Coin Control - SD-31853-01.
- (d) Intertoll - Toll Transmission - SD-31681-01.
- (e) Reverting Call - 4-Party Selective - SD-31556-01.

- (f) Reverting Call - 4-Party Semi-Selective - SD-31647-01.
- (g) Selector Repeater - SD-30872-01.
- (h) Sender - Automatic Ticketing - SD-31955-01.
- (i) Central A Switchboard Intercept Trunk - SD-31513-01.

G. B Switchboard Circuits

- (a) Link Circuit - SD-31155-01.
- (b) Position Circuit - SD-31160-01.
- (c) Switch Trouble Alarm Circuit - SD-31517-01.

H. Test Circuits

- (a) Automatic Ticketing Trunk - SD-31944-01.
- (b) Dial - SD-31138-01.
- (c) Permanent Signaling - SD-31402-01.
- (d) Common Timing Circuit - SD-31310-01, SD-31558-01.

I. Trunks

- (a) Automatic Ticketing - SD-31949-01.
- (b) Incoming - CX Signaling - SD-31887-01.
- (c) Intercepting - Auxiliary - SD-32084-01.
- (d) KP Outgoing Completing - SD-31654-01.
- (e) Operator 2-Wire Recording Completing Trunk Noncoin and Coin - SD-31678-01, SD-31678-02.
- (f) Recording - Completing Trunk - 2-Wire Coin - SD-31123-01.
- (g) Recording - Completing Trunk CX Signaling - SD-32042-01.
- (h) Special Service Trunk - SD-31375-01.
- (i) Vacant Code - SD-31937-01.
- (j) Auxiliary Trunk Line Number Method of Coin Control - SD-32025-01.

TOLL CIRCUITS

J. Toll Switchboard No. 1

- (a) Tone Jack Circuit - SD-55163-01.
- (b) 3-Wire Recording Completing Trunk - Coin - SD-62496-01.
- (c) Intertoll Dialing - Rotary Out Trunk Switch - SD-55945-01.

- (d) Intertoll Dialing No. Circuit
Signal Trunk Circuit - SD-56439-01.

- (i) Intertoll Dial Timing Circuit -
SD-64587-01.

K. Toll Switchboard No. 1, 3, 3C, Etc

- (a) Overflow Circuit - SD-64129-01,
SD-63847-01.
- (b) Relay Interrupter Circuit - SD-62461-01.
- (c) Ringing Control Circuit - SD-62798-01,
SD-62113-01.

O. Toll Testboard 17B and 18B

- (a) Keypad Circuit - SD-55037-01.
- (b) Timed Ringing Circuit - SD-64614-01.
- (c) Intertoll Dialing - Repeated Dialing
Toll Switching Trunk - SD-64487-01.

L. Toll Switchboard No. 3, 3C, Etc

- (a) Auxiliary Signal and Flashing -
SD-62100-01.
- (b) Busy-Back or Reorder Circuit -
SD-60803-01.
- (c) Discriminating Circuit - Operator's
Control Circuit - SD-64136-01.
- (d) Tone Jack Circuit - SD-62831-01.
- (e) Keypad Circuit - SD-55010-01,
SD-64137-01.
- (f) Reorder Circuit - SD-62687-01.

P. Crossbar Switching

- (a) Link Allotting and Alarm Circuit -
SD-64157-01.
- (b) Position Group Control Circuit -
SD-64155-01.
- (c) First Trouble Tracing Selector
Circuit - SD-68244-01.

702A PBX CIRCUITS

- (a) Audible and Flashing Recall -
SD-66216-01.
- (b) Auxiliary Line - SD-66333-01.
- (c) Interrupter Circuit for Trunk Lamps -
SD-66328-01.

M. Test Circuits

- (a) Position Test Circuit - SD-55056-01,
SD-63971-01.
- (b) Key Pulsing - SD-63853-01.
- (c) DC and MFKP TS No. 1 - SD-56147-01.
- (d) Concentrating Equipment Test Line
Circuit - SD-56274-01.
- (e) Multiple Lamp Test Circuit -
SD-56471-01.

COMMON SYSTEMS

Q. General

- (a) Major Audible Alarm - SD-95454-01.
- (b) Incoming Trunk Register and Connector
Circuit - SD-96501-01.
- (c) Register Check and Connector Control
Circuit - SD-96504-01.

N. Trunks

- (a) Intertoll and Rural - SD-64428-01.
- (b) Automatic Out to Desk - SD-63820-01.
- (c) Outgoing to Temporary Operator Posi-
tion - SD-63478-01.
- (d) Straightforward Switching Trunk -
SD-62510-01.
- (e) Toll Switching - Repeated Dialing -
SD-62022-01.
- (f) Toll Switching Key Pulsing Repeated
Dialing - SD-55901-01.
- (g) 3-Wire Recording Completing - Coin -
SD-62441-01.
- (h) Ringdown Intertoll - SD-62614-01,
SD-62780-01, SD-64823-01.

R. Announcement Desk

- (a) No. 1 Desk Circuit - SD-90253-01.
- (b) No. 1B Desk Circuit - SD-90042-01.
- (c) Answering Time Recorder - SD-96235-01.

S. A Switchboard Circuits

- (a) Audible and Flashing Recall -
SD-90458-01.
- (b) Common Timing and Alarm Circuit -
SD-95052-01.
- (c) Cord Test Circuit - SD-90501-01.
- (d) Incoming Trunk from Panel or SXS -
SD-95569-01.
- (e) Keypad Circuit - SD-90460-01.
- (f) Position Circuit - SD-90457-01.

- (g) Key Monitoring Circuit - SD-96118-01.
- (n) Emergency Ringback Circuit - SD-95083-01.
- (i) Cable Test Desk No. 3 - Auxiliary Signal Circuit - SD-90406-01.

T. Information Desks

- (a) Flashing Circuit - SD-90477-01.
- (b) Desk No. 3 Allotter Circuit - SD-90003-01.
- (c) Desk No. 3 Sequence Storing Circuit - SD-90004-01.
- (d) Desk No. 3 Start Circuit - SD-90006-01.

U. Local Test Desk No. 14

- (a) Telephone and Loudspeaker Circuit - SD-90222-01.
- (b) Auxiliary Signal Circuit - SD-90628-01.
- (c) Howler Circuit - SD-90057-01.
- (d) Line Insulation and Breakdown Circuit - SD-90055-01.
- (e) Primary and Secondary Test Circuit - SD-90497-01.

V. Miscellaneous Circuits

- (a) Key Cabinet No. 20 Chief Operator's Desk - SD-96136-01.
- (b) Operating Room Calling Signal Circuit - SD-96087-01.
- (c) 2B Operator's Training Equipment Interposition Trunk - SD-96242-01.
- (d) 2B Operator's Training Equipment - Signal Cord Circuit - SD-96059-01.
- (e) Permanent Signal Holding Trunk - SD-95474-01.
- (f) Plugging Up Frame Auxiliary Signal Circuit - SD-90594-01.
- (g) Repair Service Desk No. 2 Auxiliary Signal Circuit - SD-90620-01.

- (h) Multiline Service Observing Circuit - PBX - SD-95510-01.*
- (i) Multiline Service Observing Circuit - Speed of Answer - SD-95563-01.
- (j) Test Circuit for 209 FA Relays - SD-90411-01.
- (k) No Such Number Tone Supply Circuit - SD-96357-01.
- (l) Test Line Circuit - One-Way Transmission Testing - SD-96000-01.
- (m) Local Test Cabinet No. 3, Auxiliary Signal and Flashing Circuit - SD-96230-01.

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

- A.1 Fig. 15 is added to provide 120-imp. busy tone without flash.

B. Changes in Apparatus

- B.1 ADDED:
 - 1 - IMF Capacitor designated A - Fig. 15
 - 1 - 149R Inductor designated A - Fig. 15

D. Description of Changes

- D.1 Added Fig. 15 and Table K.
- D.2 Added reference to Fig. 15 to "Fig. and Options Used Table."
- D.3 Revised Notes 117 and 118 to show use of Fig. 15.
- D.4 Added Note 123 to describe use of Fig. 15.
- D.5 Rated Note 122 "A&M Only."
- D.6 Revised title of Fig. 7.
- D.7 Revised Fig. 11 to show connection to Fig. 15.
- D.8 Revised Fig. 8 to show rate of provision when Fig. 15 is used.
- D.9 Added Note 303.
- D.10 Added connecting circuit information to Tables D, E, G, and H.
- D.11 Rate Circuit A&M Only for 350A office.
- D.12 This circuit replaces SD-31207-01 accepted for additions on this reissue.

*Typical Circuit

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DEPT 2363-NPS-RJJ