CIRCUIT DESCRIPTION

CD-65757-01
ISSUE 6D
APPENDIX 3D
DWG ISSUE 17D

PBX SYSTEMS
NO. 756A
CORDLESS POSITION CIRCUIT

CHANGES

D. Description of Changes

D.1 The rating of this circuit is changed from Mfr Disc. to A&M Only.

D.2 App Fig. 1, 3, 5, 6, 7, 8, 9, 10, and 14 are rated Mfr Disc.

D.3 Circuit Note 104 is reissued and Note 118 is added.

D.4 This change allows App Fig. 13 to be rerated as A&M Only to provide apparatus for indication of camp-on.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 3223-WVS-FKB

CIRCUIT DESCRIPTION

CD-65757-01
ISSUE 6D
APPENDIX 2D
DWG ISSUE 16D

PBX SYSTEMS
NO. 756A
CORDLESS POSITION CIRCUIT

CHANGES

D. Description of Changes

D.1 The 3C and 4B telephone consoles are replaced by the 22- and 32-type consoles, respectively.

D.2 Circuit Notes 102 and 104 are revised to reflect issue 16D.

D.3 Circuit Note 117 is added.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 3223-WVS-FLS

CIRCUIT DESCRIPTION

CD-65757-01
ISSUE 6D
APPENDIX 1D
DWG ISSUE 15D

PBX SYSTEMS
NO. 756A
CORDLESS POSITION CIRCUIT

CHANGES

D. Description of Changes

D.1 The rating of this circuit is changed from AT&TCo Standard to Mfr Disc.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 3224-WVS-RVL

PBX SYSTEMS
NO. 756A
CORDLESS POSITION CIRCUIT

TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit provides relay circuits and control and signaling apparatus which enable an attendant to operate the PBX.

2. GENERAL DESCRIPTION OF OPERATION

A. Equipment Provided

2.01 The equipment used by the attendant to operate the PBX consists of cordless position circuit equipment and one or two

telephone consoles, a key telephone set, or a combination of one or two telephone consoles and a key telephone set. The telephone console or the key telephone set provides the necessary apparatus such as a handset for talking, a dial, keys for connections to trunks or lines, lamps for supervision, an audible signal, and keys for attendant functions such as holding and dial back. The telephone console may also be provided with pushbutton keys for direct station selection. The cordless position circuit also provides the relay equipment necessary to complete the attendant functions.

B. General Functions

2.02 The operating and supervisory equipment of the control apparatus units which may be used is shown in Table A.

TABLE A - 3- AND 4-TYPE TELEPHONE CONSOLES

CONTROL OR SIGNAL	FUNCTION OR USE
PICKUP KEY	Provides access to trunks and lines for the purpose of answering incoming calls, originating outgoing calls, and completing calls to either the central office or to the PBX.
HOLD KEY	Provides for the holding of a trunk.
DIAL BACK KEY	Used in completing calls from a PBX station via the attendant to the central office while the station remains off-hook and in verification of a busy station.
RELEASE KEY	Functions only as a mechanical means to release an operated pickup key.
AUDIBLE SIGNAL CUTOFF KEY	Used to silence the audible signal.
NIGHT SERVICE KEY	Arranges the central office trunks so that night connections may be established.
LOUDNESS CONTROL	A mechanical device to control the loudness of the audible signal.
TRUNK AND STATION LAMPS	Provided as supervisory signals.
DIAL	Used to actuate the PBX switching equipment on calls into the PBX, central office, and tie trunks.
DIRECT STATION SELECTION PUSH-BUTTON KEYS (4-TYPE ONLY)	Used to actuate PBX switching equipment on a call into a PBX only.
JACKS A AND B	Provided as a means to switch attendant functions from one console position to the other or to a key telephone set.
ALARM LAMP	Provided to alert the attendant that there is some malfunction within the PBX or as an indication that established night connections have been disconnected due to a power failure.
REGISTERS BUSY LAMP (4-TYPE ONLY)	Green lamp indicates an all-registers-busy condition.

SECTION II - DETAILED DESCRIPTION

1. DESCRIPTION AND USE OF CORDLESS POSITION CIRCUIT AND KEY TELEPHONE SET

A. Cordless Position Circuit

1.01 The cordless position circuit consists of inductor A (battery feed for stations), inductors TB1 and TB2 (battery feed for two 3A or 4A telephone consoles), and relays BZ, BZ1, FB, H, HA, NT, and SP. Relays CS, DS, SPA, and SS and tone generator IT are provided for the indication of a camped-on call to the busy line feature.

1.02 The 3-type telephone console consists of:

(a) Local battery telephone circuit with a transistor amplifier.

(b) Jacks for use with either a handset or a head telephone set.

(c) Rotary or TOUCH-TONE® dial.

(d) Audible signal with cutoff key and loudness control.

(e) Night service key.

(f) One plug-in right key and trunk lamp unit with three trunk pickup keys.

(g) One hold key.

(h) One dial back and one release key.

(i) One right plug-in station lamp unit with three station lamps.

(j) One center plug-in key and trunk lamp unit with six pickup keys.

(k) One center plug-in station lamp unit with six station lamps.

(l) One optional left plug-in key and trunk lamp unit with six trunk or line pickup keys (the T and R leads of each key is extended to the cross-connection box for connection to line circuits).

(m) One optional left plug-in station lamp unit with six station lamps.

1.03 The 4-type telephone console has the same items as the 3-type with the addition of 70 combination direct station selection keys and busy lamps and an all-registers-busy lamp.

B. Key Telephone Set

1.04 A standard key telephone set may be used if pickup of five or fewer trunks is required. The set is modified to use the sixth key as a hold key. Externally mounted keys are required for night service and dial back functions. The fifth key is arranged for connection to either a trunk or line circuit. The exclusion key is used as an audible signal cutoff key.

C. Operation with Two Telephone Consoles and One Key Telephone Set

1.05 In general practice, two telephone consoles and one key telephone set are connected to one PBX through the cordless position circuit. The operating grounds for relay AC or ACA in the trunk circuits, relay POS1 or POS2 in the dial pulse register circuit (the position relays POS1 and POS2 in turn provide ground for the operation of relays H, HA, and NT and the audible signal), and the TT and TR leads are chained through jacks A and B.

1.06 If the attendant at the first console has the plug of the handset or headset in jacks A and B, the succeeding console and 6-button key telephone set are inoperative and cannot establish connections to a trunk; however, they have access to lines.

1.07 When the plug is removed from jacks A and B, the operating grounds and the talking leads are extended toward the second console or key telephone set. Regardless of which attendant unit is controlling, the supervisory lamps L, SL, and TL will light at all locations.

2. OPERATION WITH ATTENDANT TRUNK

A. Incoming Call to Console

2.01 When a PBX station dials 0, when a restricted PBX station dials 9, or when a PBX station line is in a permanent signal condition, the marker upon a signal from the register completes a connection from the station line to an attendant trunk.

2.02 The attendant trunk (FS5) functions to supply 120-ipm battery over lead SL to flash the SL lamp associated with the trunk, connects ringing current to lead BZ to operate the audible signal (through capacitor BZ, audible signal to ground at relay POS1 or POS2), and connects 120-ipm battery over lead TL to flash lamp TL on permanent signals or intercepted calls.

2.03 In response to the flashing lamps and audible signal, the attendant operates the associated pickup key. The pickup key operated (FS1) connects ground from relays SP and NT normal, through jack A springs operated, over lead ACA to operate relay AC in the attendant trunk.

2.04 Relay AC operated connects the attendant telephone circuit to the trunk over leads TT and TR, through the normal contacts of relays SP and FB, the 100-ohm tip and ring resistors, and the make contacts of jacks A and B.

2.05 The attendant trunk supplies talking battery for the PBX station and the attendant telephone circuit for the 3C or 4B telephone console. The attendant telephone circuit for the 3A or 4A telephone console is supplied talking battery from inductor TB over leads AT and BT.

2.06 Relay AC operated operates relay ON in the trunk circuit which opens lead BZ to silence the audible signal and transfers lamp SL from 120 ipm (fast flash) to battery, resulting in a steady lamp indication. On permanent signals or intercepted calls relay TN releases to extinguish lamp TL.

B. Incoming Call to Key Telephone Set

2.07 When a 6-button key telephone set is used, the attendant trunk functions as described in 2.01 to light the line lamp and sound the audible signal. The path for the audible signal is lead BZ, the ringer and exclusion key of key telephone set, and contacts of jack B normal or options around jack B to ground.

2.08 With option B. when the attendant function is transferred to the 6-button key telephone set, relays BZ and BZ1 operate. These relays operated open the individual BZ leads from each attendant trunk, ringdown tie trunk, and central office trunk. Only those BZ leads which are strapped around the relay contacts will cause the common ringer to operate.

2.09 The attendant operates a pickup key associated with the flashing lamp and removes the handset from the switchhook. Relay AC in the attendant trunk is operated over lead ACA, the operated pickup key and switchhook of the key telephone set, lead ACG, jack A normal, through the cord switchboard BCO key operated or through the options around the jacks and cord switchboard, and through relays SP and NT normal to ground.

2.10 Relay AC operated in the attendant trunk connects the key telephone set to the trunk over leads TT and TR, contacts of relays SP and FB, and options Q and S or the normal springs of jacks A and B. The trunk supplies talking battery to the PBX line and the key telephone set.

2.11 Relay AC operated operates relay ON in the trunk which opens lead BZ to silence the audible signal and transfers the line lamp from 120 ipm (fast flash) to a steady lamp indication.

C. PBX Call from Console Via Attendant Trunk

2.12 If the attendant desires to originate a call over the attendant trunk, the attendant operates a pickup key associated with the trunk (dark lamp). The pickup key operated connects ground from relays SP and NT normal, through the contacts of jack A operated, and over lead ACA to operate relay AC in the trunk circuit.

2.13 Relay AC functions to connect the attendant telephone set to the trunk and operates relay OUT which connects battery to lead SL causing lamp SL to light. The attendant hears dial tone and may dial the desired line or trunk code.

D. PBX Call from Key Telephone Set Via Attendant Trunk

2.14 If the attendant desires to originate a call over the attendant trunk, the attendant operates a pickup key associated with the trunk (dark lamp) and removes the handset from the switchhook. Relay AC in the attendant trunk operates to connect the key telephone set to the trunk and operates relay OUT which connects battery to lead SL causing the L lamp to light. The attendant hears dial tone and may dial the desired line or trunk code.

E. Attendant Hold Key Operation

2.15 When the hold key is operated in the console in connection with an attendant trunk, relay H operates over lead H, through the hold key operated, to ground at relay POS1 or POS2. When a hold key of a key telephone set is operated (sixth pickup key modified for holding), relay H operates over lead H, through the pickup key operated, and through the springs of jack B normal or the option around the B jack to ground.

2.16 Relay H operated connects ground to lead HD through contacts of relay AC operated to operate relay HD in the trunk. Relay HD operated causes the attendant trunk to function to hold a connection after the attendant releases the pickup key and disconnects from the trunk. Relay HD also connects slow flash (30-ipm battery) to lead SL which flashes lamp SL or L at 30 ipm as a hold identification.

F. Attendant Re-Enters Held Trunk

2.17 If the attendant trunk has been held and the attendant wishes to reconnect the console or the key telephone set to this trunk, the pickup key associated with the trunk (slow flashing lamp) is operated.

2.18 Relay AC in the attendant trunk operates. Relay AC operated releases relay HD in the trunk and connects the attendant telephone set over leads TT and TR to the trunk. If after re-entering a held trunk it is desired to hold the trunk again, the hold key must be operated.

3. OPERATION WITH LINE PICKUP

A. Connection to Console or Key Telephone Set

3.01 If the attendant is provided with a regular line circuit, the tip and ring of this line is connected to one of the six pickup keys in the left key unit or to the

fifth pickup key (option V) in the key telephone set. (These keys have the tip and ring brought out separately and are not multipled to the common TT and TR leads.) A separate audible signal must be provided and connected externally. No lamp signals are provided.

B. Line Pickup Operation

3.02 On an incoming call, the audible signal sounds as an indication to the attendant. The attendant operates the pickup key in the console or operates the pickup key and removes the handset from the switchhook on the key telephone set. The ringing will be tripped and a talking path established.

3.03 To originate a call, the attendant operates the pickup key associated with the line and removes the handset from the switchhook if a key telephone set is used. This operation connects the attendant to the line.

4. OPERATION WITH CENTRAL OFFICE TRUNK

A. Incoming Call to Console

4.01 On an incoming call from the central office to the central office trunk circuit, if the connection to the trunk is made during the silent interval in the central office the trunk circuit functions to connect battery to leads TL and L which lights lamp TL in the console and lamp L in the key telephone set.

4.02 At the end of a silent interval and at the start of the ringing interval the trunk circuit functions to change battery on leads TL and L to 120 ipm which causes lamps TL and L to flash.

4.03 If the connection in the central office is made during the ringing interval at the central office the trunk functions to flash lamps TL and L. The trunk also functions to connect continuous ringing current controlled by relay R1 in the trunk circuit to lead BZ which operates the ringer through the audible signal key to ground at relay POS1 or POS2.

4.04 The attendant answers by operating the pickup key associated with the trunk. Relay ACA in the trunk circuit operates over lead ACA, the pickup key operated, and springs of jack A operated to ground. Relay ACA operated connects the attendant telephone circuit to the central office trunk over leads TT and TR, through contacts of relays SP and FB normal, and the made contacts of jacks A and B to trip the ringing on the trunk.

4.05 As soon as the ringing is tripped, relay R1 in the trunk releases to silence the audible signal and transfers the flashing lamps from 120-ipm battery (fast flash) to a steady lamp indication.

B. Incoming Call to Key Telephone Set

4.06 On an incoming call from the central office to the central office trunk, the trunk circuit functions to flash lamp L as described in 4.01. The trunk circuit also connects continuous ringing controlled by relay R1 in the trunk to lead BZ which operates the audible signal in the key telephone set through the exclusion key and the normal springs of jack B or through the option which shunts jack B.

4.07 The attendant answers by operating the pickup key associated with the flashing lamp L and removing the handset from the switchhook. Relay ACA in the trunk operates over lead ACA, through the pickup key and switchhook operated, and through the normal springs of jack A or through the options which shunt jack A to ground.

4.08 Relay ACA operated connects the attendant to the trunk over leads TT and TR, through the normal contacts or relays SP and FB, and through the normal springs of jacks A and B or the option that shunts jacks A and B to trip the ringing.

4.09 As soon as the ringing is tripped, relay R1 in the trunk releases to silence the audible signal and transfers lamp L from 120 ipm (fast flash) to a steady lamp indication.

C. Trunk Holding by Console

4.10 The hold key functions as both a holding and a steering key when it is used with a central office trunk. If the incoming call requests connection to a line within the PBX, the attendant operates the nonlocking hold key and in turn operates relay H over lead H, through the hold key, and to ground at relay POS1 or POS2.

4.11 Relay H follows the action of the hold key and operates relay HD in the trunk. Relay HD operated transfers the TL or L lamp from a steady lamp indication to 30 ipm (slow flash) as a holding signal.

4.12 The operation of relay H and relays HD and ACA in the trunk cause relay SP to operate. Relay SP operated:

(a) Places a holding short across the trunk side of the circuit (leads TT and TR).

(b) Leaves the attendant telephone circuit across the line side of the circuit (leads LT and LR).

(c) With the hold key released, ground is connected to leads T and U through the trunk to the marker as a signal for the marker to connect a dial pulse register to the trunk.

D. Trunk Holding by Key Telephone Set

4.13 The holding of an incoming call on a central office trunk at a key telephone set is the same as described in the preceding section except that the hold key in the key telephone set is pickup key No. 6 modified and that relay H operates through the hold key operated, the normal contacts of jack B, or the option that shunts jack B to ground.

E. Completion of Incoming Calls to PBX

4.14 After the attendant has answered an incoming call and has held the trunk, dial tone will be returned by the dial pulse register. The attendant dials the desired PBX line and if the marker finds the called station line idle it transmits a ring start ground to operate relay RS in the central office trunk.

4.15 Relay RS operated prepares the trunk to transmit ringing current to the called station line, operates relay FB, and releases relay HD in the trunk. Relay HD released changes lamps TL and L from 30 ipm (slow flash) to a steady lamp indication and connects 30 ipm to lamps SL and L.

4.16 If the attendant releases from the connection immediately after dialing, ringing induction is returned to the central office when the station line is rung. The operation of the RLS key by the attendant mechanically releases the pickup key which releases relays AC and ACA in the central office trunk.

4.17 The release of relay AC connects the central office trunk side to the line side of the central office trunk, but the holding short across the TT and TR leads due to relay SP operated remains until relay ACA in the trunk releases.

4.18 Relay ACA released releases relay SP and disconnects leads TT, TR, LT, and LR from the attendant telephone circuit. When relay ACA releases, the holding short is removed and the central office hears ringing inductions.

4.19 If the attendant remains on the connection until the station answers, relay RT operates in the central office trunk to release relay RS, also in the central office trunk. Relay RS released changes lamps SL and L from 30 ipm (slow flash) to a steady lamp indication and provides a supplementary holding path for relay FB. Relay FB supplies talking battery for the called station while it is connected to the attendant.

F. Outgoing Call from Console

4.20 The attendant may originate an outgoing call to the central office by operating a pickup key associated with an idle central office trunk (dark SL and TL lamp) provided certain options are wired in the trunk.

4.21 Relay ACA operates from ground through the contacts of relays SP and NT normal, contacts of relay BCO operated if M option is furnished, and the contacts of jack A and the pickup key operated.

4.22 Relays ACA and AC operated in the central office trunk connect the tip and ring of the central office trunk to the attendant telephone circuity via leads TT and TR. The attendant now receives central office dial tone and may dial out. Relays S1 and SR in the central office trunk function to light lamps L and TL steady.

G. Outgoing Call from Key Telephone Set

4.23 A call may be originated from the key telephone set by operating the pickup key associated with an idle central office trunk (dark L lamp) and removing the handset from the switchhook. The central office trunk functions as described in the preceding section except that the ground for the operation of relay ACA is through jack A normal or options shunting jack A and the contacts of the switchhook of the key telephone set.

H. Recall by Station

4.24 If the PBX line connected to a central office trunk or a station dial transfer trunk recalls the attendant (fast flash 120 ipm on station lamp), the attendant reoperates the trunk pickup key associated with the 120-ipm fast-flashing lamp which reoperates the ACA relay in the trunk to connect the attendant telephone circuit to the LT and LR leads of the trunk toward the PBX.

4.25 When the attendant has received the number of the PBX line to which the call is to be transferred, the hold key is operated grounding lead H to operate relay H.

4.26 Relay H operated:

(a) Grounds lead HD toward the central office trunk to operate relay HD in the central office trunk.

(b) Grounds lead HM toward the central office trunk to supply a supplementary holding ground for relay HM in the central office trunk.

(c) Removes ground from lead H to cause a series of relays to release in the central office trunk which removes holding ground from relay HM in the central office trunk.

4.27 Relay HM is prevented from releasing until the hold key is released because relay H operated also grounds lead HM to hold relay HM in the central office trunk operated.

4.28 When the hold key is released relay HM in the central office trunk releases. Relay HM released causes the established call to disconnect, and leaves the attendant tele-

phone set connected toward the central office.

4.29 The attendant then reoperates the hold key which will reoperate relay H over lead H. Relay H operated grounds lead HD to operate relay HD in the central office trunk. Relay HD in the trunk operated grounds lead SP to operate relay SP in the cordless position circuit.

4.30 Relay SP operated and relay H released (when the hold key is released) provides ground over leads T and U, and with relay ACA operated in the central office trunk gives a signal for the marker to connect a register to this trunk. When the register is attached the attendant hears PBX dial tone and can dial the desired PBX line number.

I. Attendant Re-Enters Held Central Office Trunk

4.31 If the attendant desires to re-enter a central office trunk which has been held, the trunk pickup key associated with the slow-flashing lamp is operated which operates relays AC and ACA in the central office trunk.

4.32 Relay AC operated in the central office trunk removes the hold condition and the attendant telephone circuit is connected to the central office. After re-entering the central office trunk if the attendant desires to again hold the central office trunk the hold key is reoperated to re-establish the hold.

5. POSITION CIRCUIT NORMAL CHECK

5.01 Ground to operate an AC relay in any trunk circuit is supplied over lead ACA through relays SP and NT normal. This path is provided to guard against operation of an AC relay if either the NT or SP relay is operated which would cause a false signal to be sent to the connected trunk. Resistance H is provided to furnish holding ground for AC relays after relay SP or NT has been operated.

6. COMPLETING OUTWARD CALLS FROM RESTRICTED LINES

6.01 If a restricted line desires to place an outward call to the central office and dials either 9 or 0, the call will be routed to the attendant via an attendant trunk circuit.

6.02 The attendant answers this incoming signal as described in a preceding section and having determined both the telephone number desired and the number of the PBX line originating the call puts a hold on the attendant trunk.

6.03 The attendant now seizes an idle central office trunk and dials the central office number. When the party at the central office telephone answers, the attendant asks him to wait. The attendant then puts a hold condition on the central office trunk but does not restore the trunk pickup key. The attendant will now hear PBX dial tone, and before dialing operates the dial back key.

6.04 The dial back key operated operates relay NT with a ground from relay POS1 or POS2 over lead NTG. Relay NT operated locks over lead N to relay MC normal in the central office trunk.

6.05 When dialing is completed, the MC relay in the central office trunk operates and connects relay NT in the position circuit, in series with the NT relay in the marker. Relay NT operated in the marker is an indication that the marker shall disregard the busy condition of the called line and connect to it.

6.06 When the marker connects this central office trunk to the PBX line which is being held on the attendant trunk, the attendant trunk is released or kicked off and returns to normal.

6.07 The connection to the central office trunk remains complete, and the attendant restores the trunk pickup key for the central office trunk.

6.08 For the key telephone set, operation is identical to the above except operating ground for relay NT is through jack B normal or through the option which shunts the jack.

7. NIGHT CONNECTIONS

7.01 If the PBX is arranged for flexible night connections, the operation of the night key to the night service position causes relay NS to release in the alarm, transfer, and test circuit. The attendant now may establish a night connection between any idle central office trunk and any station (idle or busy) by the following sequential procedures:

(a) Operating the pickup key associated with the idle trunk to connect the attendant to the trunk.

(b) Operating the hold key to obtain PBX dial tone.

(c) Dialing the number of the desired station.

(d) Operating the release key to disconnect the attendant from the trunk.

The central office trunk will be directly connected to an idle station or will camp on if the station is busy.

7.02 If a power failure occurs after night connections have been established, all

night connections are disconnected and emergency connections are established by the release of relays AT and ATA in the alarm, test, and transfer circuit.

7.03 Relays AT and ATA released transfer lines (STA, 30, 31, and 32) directly to central office trunk conductors and make these lines busy to the PBX switching system.

8. DIRECT STATION SELECTION

A. Busy Lamp Field

8.01 A busy lamp is associated with each station. Whenever a hold magnet associated with a station line is operated, ground is connected via a BL- lead to one side of the busy lamp.

8.02 The other side of all busy lamps within a tens group is strapped common and is connected via a B- lead, through the BC0 relay in the alarm, transfer, and test circuit operated, to one side of a 10-volt ac supply. The other side of the supply is grounded. Therefore, whenever a station hold magnet operates, the associated busy lamp is lighted.

B. All Registers Busy Lamp

8.03 When both of the dial pulse registers are busy, battery through contacts of both of the SR relays light a lamp (ARB) in the attendant 4-type telephone console. This lamp lighted serves as a warning to the attendant that direct station selection is inoperative.

C. Direct Station Selection (Option A)

8.04 When the attendant wishes to complete an incoming trunk call to a station, the pushbutton key associated with the called station is momentarily depressed if the busy lamp is dark. This causes the same functions as if the attendant had operated the hold key, received dial tone, and dialed two digits.

8.05 Ground from contacts of relay POS- via lead SG3 is connected to the contacts of the pushbutton key. With the key depressed this:

(a) Operates relay HA (ground via lead H1, contacts of POS- relay, and lead HA).

(b) Operates relay H (ground via lead H1, contacts of relay POS-, lead HA, and lead H1 via the attendant trunks).

(c) Connects ground to a units U- lead corresponding to the units digit of the key.

(d) Connects ground to a tens T- lead corresponding to the tens digit of the key.

8.06 Relay H operated operates relay HD in the trunk. Relay HD operated transfers the TL or L lamp from a steady lamp indication to 30 ipm (slow flash) as a holding signal.

8.07 The operation of relays H and ACA in the trunk causes relay SP to operate.

8.08 Relay SP operated:

(a) Places a holding short across the trunk side of the circuit (leads TT and TR).

(b) Leaves the attendant telephone circuit across the line side of the circuit (leads LT and LR).

(c) With the H relay released, ground is connected to leads T and U through the trunk to the marker as a signal for the marker to connect a dial pulse register to the trunk.

8.09 Leads T- and U- are extended to the attached register via relays AC and POS- in the register circuit. Ground on these leads results in the operation of register relays TD- and UD-. Relay HA operated operates register relay UD via leads HA1 and HA2 and releases relay H. Register relay UD causes the register to complete to the marker.

8.10 If the marker finds the called station idle it operates the station hold magnet to light the busy lamp and transmits a ring start ground to operate relay RS in the central office trunk.

8.11 Relay RS operated prepares the trunk to transmit ringing current to the called station line, operates relay FB, and releases relay HD in the trunk.

8.12 Relay HD released changes lamps TL and L from 30 ipm (slow flash) to a steady lamp indication and connects 30 ipm to lamps SL and L.

8.13 If the attendant releases from the connection immediately after dialing, ringing induction is returned to the central office when the station line is rung.

8.14 The operation of the RLS key by the attendant mechnically releases the pickup key which releases relays AC and ACA in the central office trunk.

8.15 The release of relay AC connects the central office trunk side to the line side of the central office trunk, but the holding short across the TT and TR leads remains until relay ACA in the trunk releases due to relay SP operated.

8.16 Relay ACA released releases relay SP and disconnects leads TT, TR, LT, and LR from the attendant telephone circuit. When relay ACA releases, the holding short is removed

and the central office hears ringing inductions.

8.17 If the attendant remains on the connection until the station answers, relay RT operates in the central office trunk to release relay RS, also in the central office trunk. Relay RS released changes lamps SL and L from 30 ipm (slow flash) to a steady lamp indication and provides a supplementary holding path for relay FB. Relay FB supplies talking battery for the called station while it is connected to the attendant.

8.18 If the attendant desires to originate a call over an attendant trunk, the attendant operates a pickup key associated with the trunk (dark lamp). The pickup key operated connects ground from relays SP and NT normal, through the contacts of jack A operated, and over lead ACA to operate relay AC in the trunk circuit.

8.19 Relay AC functions to connect the attendant telephone console to the trunk and operates relay OUT which connects battery to lead SL causing lamp SL to light. The attendant hears dial tone.

8.20 The called station may be directly selected by momentarily depressing a pushbutton key associated with the station. When the key is depressed ground is connected to units lead U-, tens lead T-, and lead H1 which operates relay HA.

8.21 The ground on the U- and T- leads will operate a units digit UD- and tens digit TD- relay in the register. Relay HA operated causes the register to complete to the marker. The marker will set up the connection between the attendant and station on a junctor basis.

9. OPERATION WITH CORD SWITCHBOARD

9.01 When a cord switchboard is provided for the attendant position equipment, the cordless position circuit functions only with the night attendant key telephone equipment.

9.02 Circuit action for transferring from the day attendant cord switchboard is the same as previously described for transfer from one console to another or from one console to the key telephone set, except that instead of the telephone set jacks in the console providing the transfer, the transfer is accomplished by the battery cutoff relay in the switchboard.

10. INDICATION OF CAMPED-ON CALL TO BUSY LINE

A. Without Direct Station Selection

10.01 The attendant after receiving an indication of a camped-on condition (busy tone), operates the release key dropping the connections. The attendant then reoperates the pickup key associated with the central office trunk which operates trunk relay ACA. Relay ACA operated operates trunk relays AC and IC-.

10.02 Relay IC- operated:

(a) Operates relay CS in the cordless position circuit via lead IC1.

(b) Partially prepares the path to connect the tip and ring of the busy line to the tone generator.

10.03 Relay CS operated:

(a) Completes a locking path for relays IC- and CS.

(b) Prepares an operating path for relay SS.

(c) Connects ground to start tone generator IT.

(d) Operates relay CO.

10.04 Relay CO operated:

(a) Locks operated under control of trunk relay IC-.

(b) Opens the operating paths of the IC- relays of all central office trunks.

10.05 The attendant notifies the central office party of the camped-on condition and releases, mechanically releasing the trunk pickup key. The pickup key released releases trunk relay AC. Trunk relay AC released releases trunk relay ACA and operates relay SS.

10.06 Relay SS operated:

(a) Connects a second ground to tone generator IT.

(b) Applies tone to the tip and ring of the busy line.

(c) Slow releases relay CS.

10.07 Relay CS released removes one ground from tone generator IT and slow release relay SS.

10.08 Relay SS released removes ground from tone generator IT turning it off and opens the tip and ring leads.

B. With Direct Station Selection

10.09 When the attendant console is equipped with a station busy lamp field, the attendant may confirm a desired camp-on condition before connecting the central office party by direct station selection. When the attendant depresses the pushbutton key, relay DS operates in parallel with relays H and HA.

10.10 Relay DS operated:

(a) Prepares an operating path for relay CS.

(b) Locks under control of relay SPA.

(c) Opens the operating path of relay SS.

10.11 In the process of completing a camp-on connection, the marker operates trunk relays BY and IC.

10.12 Relay IC operated performs the same functions as described in 10.02.

10.13 Relay CS operated performs the same functions as described in 10.03.

10.14 Relay CO operated performs the same functions as described in 10.04.

10.15 At the completion of the camp-on connection, the attendant will receive audible and visual indications of camp on. The attendant release of the DSS key will release relay HA.

10.16 Having completed the camp-on connection, the attendant then disconnects from the loop by operating the release key, mechanically releasing the trunk pickup key. The pickup key released releases trunk relay AC. Trunk relay AC released releases trunk relay ACA and operates relay SS.

10.17 Relay SS operated performs the same functions as described in 10.06 except relay SPA released releases relay DS.

11. MISCELLANEOUS

11.01 When this circuit is used the 700-type cordless position or with a 756A PBX that does not have the POS1 or POS2 relays, option G is furnished. The ground normally furnished by the position relay on lead SG3 is replaced by the AP ground through jack B.

11.02 When the attendant operation of a 756A PBX is transferred to a 6-button key telephone set, the common ringer continues to ring on calls over central office and attendant trunks which do not appear on the 6-button key telephone set.

11.03 To prevent this, options are added in the attendant trunk and the central office trunk which separate the buzzer leads of each trunk and connect the leads to contacts of relays provided by this circuit (option B).

11.04 Straps are added across the make and break contacts of each BZ lead associated with a trunk appearance on the 6-button key telephone set. When the operations are transferred, the added relays in the cordless position circuit operate and the buzzer leads not strapped are opened. Only those BZ leads strapped will cause the common ringer to operate.

11.05 When a 556A switchboard with jack appearances of the two-way trunk circuit to the central office is used as an attendant position, lead BZ is connected to the cord buzzer circuit to cause an audible signal on incoming trunk calls.

11.06 When the attendant holds a two-way trunk circuit to the central office and lead W is provided, ground from the hold key causes relay TLA in the trunk circuit to operate.

11.07 Option ZE provides a make contact of the BZ1 relay in the BZ lead to the 6-button key telephone set ringer. This prevents the buzzing of the BZ relay due to ringing current associated with incoming calls to an attendant position.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Voltages: 45 to 52 volts dc.

2. FUNCTIONAL DESIGNATIONS

2.01 The functional designations and meanings of the relays used in the cordless position are listed as follows:

Designation	Meaning
BZ	Buzzer
BZ1	Buzzer Auxiliary
CO	Cutout
CS	Control Signal
DS	Direct Station Selection
FB	Battery Feed
H	Hold
HA	Hold Auxiliary
NT	No Test
SP	Split
SPA	Split Auxiliary

3. FUNCTIONS

3.01 To provide for connecting the attendant telephone to any central office trunk or attendant trunk or line circuit under control of the attendant.

3.02 To provide lamp signals for trunks.

3.03 To provide transmitter battery for the attendant telephone when 3A or 4A telephone consoles are provided.

3.04 To provide an audible signal in conjunction with trunk and line lamp signals.

3.05 To provide for cutting off the audible signal under control of a key.

3.06 To provide a start signal to the marker on outgoing calls to PBX lines or trunks from the attendant position.

3.07 To provide for holding a trunk after the attendant disconnects, if desired.

3.08 To provide talking battery for the attendant on calls to PBX lines or trunks connected to the line end of central office trunks.

3.09 To provide for splitting a central office trunk when required.

3.10 To signal the marker to connect to a line disregarding the busy condition on dial back completion of outward calls to the central office.

3.11 To provide for operation with more than one attendant key telephone unit at different times.

3.12 When used with more than one attendant key telephone unit, to render other key units inoperative except to lines when a particular key unit is attended.

3.13 To provide a visual trouble signal which is common to all alarm conditions for the PBX.

3.14 To provide a visual signal when a power failure has disconnected the flexible night connections.

3.15 To provide for operation of the cordless position circuit with the auxiliary position circuit during remote trunk answer operation of the PBX.

3.16 To provide at only one attendant position (a console or the 6-button key telephone set) a means for placing the PBX on remote trunk answer operation.

3.17 To provide for disabling the 6-button key telephone set when the attendant at the key telephone set position places the PBX on remote trunk answer operation.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon is to be followed. This circuit connects with the following:

(a) Line, Link, and Marker Circuit - SD-65741-01

(b) Dial Pulse Register Circuit - SD-65742-01

(c) Two-Way Central Office Trunk - SD-65752-01

(d) Attendant Trunk Circuit - SD-65753-01

(e) Tie Trunk Circuit - Outgoing Manual and Dial Selected - Incoming Ringdown - SD-65756-01

(f) Alarm, Transfer, and Test Circuit - SD-66796-01

(g) Busy Verification Auxiliary Trunk Circuit - SD-66911-01

(h) Power Supply Circuit - SD-81326-01

(i) Power Supply Circuit - SD-81600-01

(j) No. 556A PBX Cord, Telephone, Dial, Battery, Buzzer, and Ringing Circuits - SD-65658-01 (typical)

(k) Telephone Consoles - 3- and 4-Type Telephone Console Circuit - SD-66907-01

(l) Station Dial Transfer Controller Circuit - SD-66909-01

(m) Auxiliary Position Circuit - SD-66910-01

(n) 608D Cord Switchboard Auxiliary Signal, Fuse Alarm, Battery Cut-Off, and Miscellaneous Circuit - SD-67039-01

5. MANUFACTURING TESTING REQUIREMENTS

5.01 The cordless position circuit shall be capable of performing all the service functions listed herein, and meeting the requirements shown in the Circuit Requirements Tables.

6. TAKING EQUIPMENT OUT OF SERVICE

6.01 No provision is made to take this equipment out of service.

7. ALARM INFORMATION

7.01 An operated fuse supplying the cordless position circuit will result in a major alarm. This alarm is transmitted to the plant service center if alarm sending is provided, by a visual signal at the attendant position, and in the alarm transfer and test circuit. Replacing the operated fuse silences the alarm and extinguishes the lamp.

SECTION IV - REASONS FOR REISSUE

D. Description of Changes

D.1 The code of the H relay in App Fig. 1 is corrected from AF68 to AF63.

D.2 Reference is added for the 402C tone generator.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 3221-WVS-RGP