PBX SYSTEMS
NO. 756A
TWO WAY TRUNK CICRUIT
TO CENTRAL OFFICE

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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This trunk circuit provides the supervisory, control and transmission features required for originating and terminating calls in either direction between PBX and central office switching systems.

2. GENERAL METHOD OF OPERATION

A. General Functions

2.01 When the trunk is seized from the central office, the attendant is alerted by a flashing visual signal and an audible signal that an incoming call is awaiting answer.

2.02 After answering the call and determining what line is desired, the attendant steers into the PBX and dials the line number.

2.03 The attendant may remain on the line to announce the incoming call or may release immediately after receiving ringing induction.

2.04 If the called line is engaged, the central office trunk camps on the connection until the called line becomes idle; then it automatically cuts through and rings the line.

2.05 If the called line is already camped on and a second incoming central office trunk tries to establish connection to it, the trunk circuit returns a camp-on stop visual and audible indication to the attendant who then disconnects the initiated call and notifies the calling party of the busy line condition.

2.06 When a line within the PBX originates a call to the central office, the central office trunk circuit acts as a screening device either to allow or to deny toll calls.

2.07 As soon as a toll-denied line connects to a toll circuit, the central office trunk circuit disconnects the line from the toll connection and diverts it to busy tone.

2.08 A restricted line wanting an outgoing central office connection has to dial the attendant trunk code rather than the central office code.

2.09 After receiving the required information, the attendant places a hold on the attendant trunk circuit and calls the desired number over a central office trunk.

2.10 When the called party answers, the attendant holds the central office connection and steers into the PBX for local dial tone by operating the hold key.

2.11 When local dial tone is heard, the dial-back key is operated; then the attendant dials the calling restricted line number.

2.12 Under this condition, the central office trunk circuit cuts through to the line and causes the line connection held by the attendant trunk to be released.

2.13 Night service connections are established by the attendant between any idle central office trunk circuit and any PBX station.

2.14 Incoming calls can be answered from any PBX station when the PBX is provided with an auxiliary position circuit as a special service circuit and the attendant places the PBX on remote trunk answer operation. The central office trunk functions in a manner similar to that which occurs when the attendant answers and completes an incoming trunk call.

B. Options Applying to the Attendant

2.15 Optional features are provided to permit or prevent the attendant from entering the trunk circuit:

(a) Lockout or nonlockout.

(b) Restriction or without restriction.

2.16 Nonlockout option permits the attendant to re-enter, at any time, any connection which the attendant has previously established.

2.17 Lockout prevents re-entering an attendant-established connection. However, the attendant may re-enter the trunk circuit on a recall, camp-on, or camp-on-busy condition.

2.18 With restriction, the attendant is prevented from gaining access to the trunk in order to originate a call. The attendant, however, is not prevented from gaining access to the trunk on an incoming call.

2.19 When an attendant re-enters the trunk circuit (after having completed a connection) on a recall or with nonlockout, the condition of re-entry is determined by the secrecy option.

2.20 The secrecy option splits the connection between the central office and the PBX. The attendant is able to talk to the PBX line but the central office is prevented from hearing the conversation between the attendant and the PBX line.

C. Incoming Call to Idle Line

2.21 An incoming call from the central office alerts the attendant with a 120-ipm flashing visual signal on the trunk lamp and an audible signal. The call is answered by operating the pickup key associated with the incoming trunk signal.

2.22 When the trunk is answered, the trunk lamp lights steadily, the ringer is silenced and the attendant is connected to the central office connection.

2.23 After obtaining the number of the line wanted, the attendant operates the hold key. This changes the trunk lamp indication to a 30-ipm visual signal and steers the attendant into the PBX for local dial tone.

2.24 When the attendant completes dialing, if the called line is idle, the trunk lamp changes to a steady signal and the station lamp starts flashing at 30 ipm, indicating that the called line is being rung.

2.25 The attendant hears ringing induction and operates the release key to release the pickup key, which disconnects her from the connection. When the called line answers, the station lamp changes to a steady visual signal and the central office cuts through to the line.

D. Camp-On

2.26 If the called line is busy, the central office trunk will camp on it (provided the line is not already camped on or the PBX is not on remote trunk answer operation), transmit a 60-ipm visual signal to the station lamp and transmit busy tone to the attendant.

2.27 The attendant then releases the pickup key which removes the tone and connects the called line to the central office. At this time, the attendant may re-enter the trunk by operating the pickup key to notify the calling party of the camp-on condition.

2.28 At calling party request, the attendant may discharge the connection by operating the hold key and then releasing the pickup key or may establish a new connection by operating the hold key twice in succession to steer into the PBX for dial tone.

2.29 If the calling party wishes to remain camped on, the attendant simply releases. When a camped-on line becomes idle, the trunk cuts through and starts ringing, changing the station lamp signal from 60 ipm to 30 ipm. The answering station trips the ringing and changes the station lamp to a steady signal.

E. Camp-On Busy

2.30 If the called line is already camped on, the central office trunk circuit returns a 120-ipm station lamp signal and busy tone interrupted at 120 ipm to the attendant.

2.31 The attendant then operates the hold key to discharge the connection. This action steers her back to the central office trunk and she announces the camp-on busy condition to the calling party. The attendant either disconnects or establishes a connection to another line (initiated by reoperating the hold key) at calling party request.

2.32 If a busy line is encountered when the PBX is on remote trunk answer operation, the central office trunk circuit returns busy tone interrupted at 120 ipm to the PBX station that answered the call.

F. Recall

2.33 Having once established a connection, the attendant plays no further role in the call unless recalled. If the called line depresses the switchhook momentarily, the central office trunk transmits a 120-ipm station lamp signal and a steady audible signal to the attendant.

2.34 After answering the recall signal, if the central office party is to be transferred to another line, the attendant operates the hold key which disconnects the original connection. On reoperation of the hold key, the attendant once again is steered back into the PBX for dial tone and the trunk lamp flashes at 30 ipm.

G. Automatic Disconnection

2.35 At the termination of an established call, when both parties disconnect, both trunk and station lamps are extinguished and the trunk circuit is again idle.

H. Dial Back Call

2.36 The attendant is called if a restricted line desires an outgoing central office call or a toll-denied line wishes to reach the toll office. After answering the call, the attendant instructs the calling station to remain off-hook until the connection is established.

2.37 The attendant trunk is then held and an idle central office trunk is selected. The attendant operates the central office trunk pickup key, which causes the trunk lamp to light steadily, and then dials the requested number.

2.38 Having reached the requested number, the attendant operates the hold key which changes the trunk lamp signal to 30 ipm and steers the connection into the PBX for local dial tone.

2.39 The dial back key is operated; then the number of the calling station is dialed. The central office trunk circuit connects to the held calling station, causes the attendant trunk to disconnect and causes the trunk and station lamps to light steadily.

2.40 The attendant announces the established connection to the calling station and then disconnects connecting the central office through to the station line.

I. Outgoing Trunk Call

2.41 The trunk circuit supervises the call to see that only toll-allowed lines are permitted to gain access to toll circuits. If a toll-denied station calls for a toll connection, the central office trunk circuit functions to divert the calling line to local busy tone and the toll trunk is freed.

2.42 Non-restricted (toll-denied or toll-allowed) stations may dial the central office directly without the aid of the attendant. When the central office trunk circuit is seized on such calls, both trunk and calling station lamps light steadily and central office dial tone is transmitted back to the calling line.

J. Power Failure and Night Connection

2.43 When the PBX has four of the permanently wired central office trunks connected to the alarm, transfer, and test circuit the central office cable pairs of these four trunks are connected to four predetermined station line circuits whenever a power failure occurs or they may be connected as night connections by action of the attendant.

2.44 When the PBX has three of the permanently wired central office trunks connected to the alarm, transfer, and test circuit, the attendant may establish a night connection between any idle central office and any station that is idle or busy.

2.45 The attendant operates the night service key to the night service position, operates the pickup key associated with the central office trunk to be night connected and operates the hold key which steers the connection into the PBX.

2.46 Upon receiving dial tone, the station number that is to be connected for night service is dialed and the release key is operated. The trunk will be either connected directly to the station if the station is idle or will camp-on if the station is busy. As soon as the station becomes idle, the trunk is directly connected.

2.47 In the case of a power failure, the night connections established by the attendant are disconnected and the three central office cable pairs of the first three central office trunks are connected to three predetermined stations.

2.48 When the PBX is provided with an auxiliary position circuit (for trunk answering from any station), the attendant should establish any night service connections required before placing the PBX on remote trunk answer operation.

SECTION II - DETAILED DESCRIPTION

1. OPTIONS

A. Options Applying to or Affecting the Central Office Trunk

1.01 Optional wiring and apparatus arrangements to provide certain basic operating features of the trunk are shown in Table A.

Restricted Access

1.02 Central office trunks may be arranged for restricted or unrestricted service by the omission or addition of an option in the dial pulse register.

(a) Restricted central office trunks are denied access to other central office trunks or ringdown tie trunks but are allowed access to dial repeating tie trunks.

(b) Unrestricted central office trunks are permitted access to other central office trunks, ringdown tie trunks or dial repeating tie trunks.

B. Options Applying to the Attendant

1.03 Options related to lockout, secrecy, and restriction are shown in Table B. These options determine the conditions under which the attendant may gain access to the trunk; they may be provided singly or in combination.

Basic Attendant Functions

1.04 Regardless of the option furnished, the attendant may do the following:

(a) Answer incoming calls.

(b) Reconnect to a trunk previously placed on hold.

(c) Reconnect to a trunk any time before the called party answers.

(d) Reconnect in response to a recall signal on any connection previously established.

1.05 In addition, regardless of the options provided, the attendant is denied access to any outgoing trunk (dial 9) connection.

TABLE A

OPTIONS APPLYING TO BASIC OPERATING CONDITIONS

OPTION	FEATURE
T	Provides for wiring certain trunks to certain station line circuits via the alarm, transfer, and test circuit.
V	Provides wiring for trunks not wired to the station line circuit via the alarm, transfer, and test circuit.
S	Arranges relay H to function with central offices having a battery voltage of 40 or more volts.
R	Arranges relay H to function with central offices having a battery voltage of 39 or less volts. (With 39 or less volts, relay H bridged across the trunk with both windings will not get enough current to operate.)
J	Arranges the trunk for two-way assigned service (allows the trunk to be seized by the marker).
K	Arranges the trunk for unassigned or one-way incoming service (prevents the trunk from being seized by the marker).
F	Arranges the trunk in conjunction with T option for a fixed night connection.
E	Arranges the trunk so that the attendant may connect any station to any trunk for a night connection.

TABLE B

OPTIONS APPLYING TO ATTENDANT FEATURES
OF LOCKOUT, RESTRICTION AND SECRECY

OPTION	FEATURE
Z	Without Lockout - Attendant may re-enter a trunk connection previously established.
Omit Z	With Lockout - Attendant may re-enter the trunk before the called party answers or in response to a recall signal.
X	With Restriction - Attendant is prevented from originating outgoing calls over the trunk.
Y	Without Restriction - Attendant may originate outgoing calls over the trunk.
W	With Secrecy - The trunk is split when the attendant re-enters; the central office end is on hold and the attendant is connected to the station.
Omit W	Without Secrecy - The attendant re-enters the trunk on a bridging basis and may converse with both the calling and the called parties.

2. INCOMING CALL TO IDLE STATION (SC1)

A. Central Office Seizes and Rings Central Office Trunk

Seizure During Silent Interval

2.01 If the trunk is seized during the silent interval, relay H operates on the silent interval or trip battery operating relay CT.

2.02 Relay CT operated:

(a) Operates relay SR.

(b) Closes part of its locking path.

(c) Connects the central office end of the trunk to the link end of the trunk (cut through).

(d) Opens the operating path for relay MC via lead IT. This prevents the trunk from being seized by the marker.

(e) With option E or ZJ, opens a path between leads S and CW.

2.03 Relay SR operated:

(a) Connects battery to light lamps TL and L.

(b) Connects ground to lead IT to busy the trunk to the marker.

(c) Transfers the ring side of the trunk through the A and B diodes for future trunk-to-marker identification.

(d) Prepares a path for holding relay CT.

(e) Connects off-normal ground to the trunk.

2.04 Subsequently ringing signal from the central office operates relay R and relay R operated:

(a) Holds relay CT operated.

(b) Operates relay R1.

(c) Connects continuous ringing to the contacts of relay R1.

2.05 Relay R1 operated:

(a) Prepares an operating path for relay ACA.

(b) Locks operated to off-normal ground under control of relay S1.

(c) Opens an operating path for relay HM.

(d) Transfers lamp TL and L from steady to 120 ipm.

(e) Extends the continuous ringing lead CR via lead BZ to operate the audible signal.

2.06 Relay R follows central office ringing which causes the audible signal also to follow the ringing.

2.07 Note: Relays operated: H, CT, SR and R1. Relay R following central office ringing. Lamps L and TL flashing at 120 ipm.

Seizure During Ringing Interval

2.08 If the trunk is seized during the ringing interval, relay R operates and performs the following functions:

(a) Operates relay CT.

(b) Prepares an operating path for relay R1.

(c) Connects continuous ringing to the contacts of relay R1.

2.09 Relay CT operated:

(a) Operates relay SR.

(b) Prepares its locking path.

(c) Connects the central office end of the trunk to the link end of the trunk (cut through).

(d) Opens the operating path for relay MC. This prevents the marker from seizing the trunk.

(e) With E option, opens a path between leads S and CW.

2.10 Relay SR operated:

(a) Transfers the ring side of the trunk through the A and B diodes.

(b) Prepares a holding path for relay CT.

(c) Connects ground to lead IT to busy the trunk to the marker.

(d) Connects off-normal ground to the trunk. This operates relay R1.

2.11 Relay R1 operated:

(a) Prepares an operating path for relay ACA.

(b) Locks operated to off-normal ground under control of relay S1.

(c) Opens the operating path for relay HM.

(d) Connects 120-ipm battery to flash lamps TL and L.

(e) Completes a path to operate the audible signal under control of relay R which follows ringing from the central office.

2.12 Note: Relays operated: H, CT, SR, R1. Relay R following central office ringing. Lamps L and TL flashing at 120 ipm.

Ring-Up Circuit

2.13 The ring-up circuit is equipped with a thermistor-varistor-diode combination to prevent false line signals from operating relay R.

2.14 Thermistor R normally has a high resistance (over 50,000 ohms) but when ringing current is applied for about one-half second or longer, its resistance is reduced. This provides an operating path for relay R.

2.15 Diode D provides a low resistance operating path for the thermistor and also shunts relay R on one-half of the ringing cycle so that it will operate steadily during the other one-half cycle.

2.16 Varistor E has two functions:

(a) To shunt thermistor R and thus reduce heating current through it during dialing transients. This prevents false relay operation.

(b) To protect diode D and thermistor R by providing a shunt path which has low resistance to transient voltage peaks. The varistor has a very high resistance to normal ringing and dialing voltages.

2.17 When ringing current is applied to the trunk at the central office, one-half cycle flows through capacitor R, thermistor R and diode D and by-passes relay R. The other one-half cycle is blocked by diode D causing current to flow through thermistor R, capacitor R and the secondary winding of relay R. This operates relay R.

B. Attendant Answers Incoming Call (SC2)

2.18 The attendant answers an incoming trunk call by operating the pickup key associated with the flashing (120 ipm) L or TL lamp. With relay R1 and the pick-up key operated and relays SP and NT in the cordless position circuit normal, relay ACA operates.

2.19 Relay ACA operated:

(a) Operates relay AC and, with option B (without re-ring from the toll operator), operates relay TLA.

(b) Prepares a holding path under control of relays AC and S1.

(c) Connects both the line and central office end of the trunk circuit to the cordless position circuit.

(d) Connects the attendant telephone circuit across the central office end of the trunk to trip the ringing and operate relay S.

(e) Connects, in part, leads T and U from the cordless position circuit to the marker, lead BT from the cordless position circuit to the ringing circuit, and leads H, HG, HM, FB and SP from the cordless position circuit to the trunk.

2.20 Relay AC operated transfers the pick-up key control from relay ACA to AC and splits the trunk into a line and trunk end.

2.21 Relay S operated causes relay S1 to operate and perform the following functions:

(a) Connect a hold circuit for relays CT and ACA.

(b) Release relay R1.

(c) Connect off-normal ground to the trunk in parallel with relay SR.

(d) Release relay H.

(e) Transfer lamp L from 120-ipm to steady battery.

2.22 Relay R1 released transfers lamp TL from 120-ipm to steady battery and silences the audible signal if relay R is operated.

2.23 Note: Relays operated: ACA, AC, TLA (B option), S, S1, CT, and SR. Lamps L and TL steady.

C. Attendant Establishes PBX Dial Tone (SC5)

2.24 If the incoming trunk call requires connection from the trunk to a line within the PBX, the attendant operates the hold key (nonlocking) causing relay H in the cordless position circuit to operate and, with A option, operates relay TLA. Relay H follows the action of the hold key. When operated, it operates relay HD and prepares a path for relay SP.

2.25 Relay HD operated:

(a) Connects relay SL to the sleeve lead.

(b) Prepares a path for operating relay TT.

(c) Locks to off-normal ground.

(d) Operates relay SP in the cordless position circuit.

(e) Connects inductor H1 to hold the central office end of the trunk.

(f) Disconnects the attendant from the trunk end.

(g) Transfers lamps L and TL from steady battery to 30 ipm.

2.26 Cordless position circuit relay SP operated:

(a) Connects a short circuit across leads TT and TR toward the trunk end.

(b) Leaves the attendant telephone circuit across lead LT and LR toward the line end of the trunk.

(c) Locks to off-normal ground.

2.27 On release of the hold key, relay H in the cordless position circuit releases and performs the following functions:

(a) Prepares a locking path for relays RS and TT via leads H and HG.

(b) Transmits marker start by grounding leads T and TU.

2.28 When thus called by the central office trunk circuit, the marker functions to connect the trunk circuit to a dial pulse register. When the selector magnet timing relay in the marker operates, ground is transmitted through the operated trunk magnet relay in the marker to operate relay HM over lead ST. The marker has thus received a bid from the trunk for connection to a dial pulse register; it proceeds to operate the trunk hold magnet to establish the connection.

2.29 Relay HM and the trunk hold magnet in the marker operate in parallel. The trunk hold magnet operated:

(a) Closes the crosspoints which connect the loop of the attendant telephone circuit to the dial pulse register via the T and R leads. This gives the attendant PBX dial tone and connects the 100-ohm sleeve ground in the register to the sleeve lead to operate relay SL.

(b) Locks operated with relay HM. The marker having verified that the trunk hold magnet is operated, proceeds to release.

2.30 Relay HM operated:

(a) Holds operated to off-normal ground through operated relays HD and SL and released relay MC.

(b) Transfers holding of relay HD from lead HD to lead H.

(c) Opens the tens and units start lead to the marker.

(d) Opens the operating path for relay MC.

(e) Prepares an alternate path to hold itself and the trunk hold magnet when relays AC and ACA release.

(f) With options X and Y, opens an operating path for relay ACA.

Note: The number 6 contact of relay HM is a test point.

2.31 Note: Relays operated: CT, HD, AC, SR, HM, TLA, SL, ACA, S1, and S. Lamps L and TL flashing at 30 ipm. Cordless position relay SP operated.

2.32 When the attendant has completed dialing into the PBX, the dial pulse register receives and stores the dialed information. This completes the originating function of the call. The register then engages the marker to terminate the call. When the marker functions to terminate the call, the central office trunk circuit identifies itself to the marker as the originating circuit so that the proper connections can be made.

Note: This use of the term "terminate" refers to completing the connection between the trunk and the desired (terminal) PBX station.

2.33 If the call is to a station line, the marker directs the trunk to take the following actions:

(a) Start ringing if the line is idle.

(b) Return camp-on information if the line is already engaged.

(c) Return camp-on-busy indication if the line is already camped on.

2.34 If the call is to a tie trunk, the marker directs the central office trunk circuit to couple inductively to the called trunk. The tie trunk furnishes talking battery to the line side of the central office trunk circuit under this condition. If all tie trunks are busy, the marker directs the central office trunk circuit to return camp-on-busy indications.

D. Trunk to Marker Identification (SC6)

2.35 When the dial pulse register has received the dialed information from the central office trunk circuit, the register engages the marker to terminate the call and reverses battery and ground over the tip and ring of the link connection to the trunk circuit. This causes current to flow through diode A and operates relay P.

2.36 Relay P operated transfers lamp L from 30 ipm to steady battery and operates relay MC.

2.37 By operating relay MC, the central office trunk circuit identifies itself to the marker as the circuit requesting information.

2.38 Relay MC operated:

(a) Releases relay P.

(b) Locks to lead RLS under control of the marker.

(c) Transfers holding of relay HM and the trunk hold magnet in the marker to lead M. Relay HM and the trunk hold magnet are controlled by the marker via lead M while the marker is engaged in termination of the call.

(d) Connects leads for termination information as follows:

(1) Connects fast flash relay FF to lead FF.

(2) Connects busy relay BY to lead BY.

(3) Connects ring start relay RS to lead RS.

(4) Connects trunk terminating relay TT to lead TT.

(5) Connects toll-allowed relay TLA to lead TLA.

(6) Connects no-test relay NT to lead NT.

2.39 Relay P released transfers lamp L from steady battery to 30 ipm.

E. Ring Start (SC6)

2.40 If the marker finds the called station line idle, it transmits a ground on the RS lead to operate relay RS.

2.41 Relay RS operated:

(a) Locks to off-normal ground under control of relay RT.

(b) Prepares the trunk to transmit ringing current to called station line.

(c) Maintains the holding bridge across the central office line.

(d) Releases relay HD.

(e) Maintains a holding path for relay SP.

(f) Prepares a path for holding relay HM and the trunk hold magnet in the marker after relays HD and MC release.

(g) Provides an alternate operating or holding path for relay ACA.

(h) Operates relay FB in the cordless position circuit.

2.42 Relay HD released:

(a) Releases relay SL.

(b) Connects the 100-ohm resistor SH to the sleeve lead to hold the station line hold magnet.

(c) Maintains a holding path for relays SP and FB.

(d) Opens one of the holding paths for the trunk end of the trunk.

(e) Provides an alternate path for holding relay HM and the trunk hold magnet when the marker releases.

(f) Disconnects relay P from the ring side of the trunk.

(g) Disconnects relay TT from lead TT.

(h) Flashes lamp SL at 30 ipm.

(i) Changes lamp TL from 30 ipm to steady.

2.43 After the marker has transmitted its terminating data, it releases itself and the dial pulse register from the connection. Release of the marker releases relay MC.

2.44 Relay MC released:

(a) Connects R1 ringing current through the primary winding of relay RT to the ring side of the trunk to ring the called station.

(b) Transfers the holding circuit to relay HM and the trunk hold magnet from the marker to the trunk.

(c) Disconnects relays BY, RS, NT, and TLA from their respective leads.

2.45 Relay FB in the cordless position circuit operated:

(a) Provides audible ringing feedback to the attendant as an indication that the called line is being rung.

(b) Provides transmission batteries to the called station as long as the trunk is split.

2.46 As long as the attendant remains on the connection during the establishment of the call, the transmission path between the central office and the station line remains split.

2.47 Note: Relays operated: RS, CT, HM, TLA, ACA, AC, SR, S1, and S. Lamp TL steady, lamps L and SL flashing at 30 ipm. Cordless position circuit relays SP and FB operated.

F. Attendant Releases (SC7)

2.48 When the attendant releases from the connection, operation of the release key releases the trunk pickup key causing relay AC to release.

2.49 Relay AC released:

(a) Connects the trunk side of the circuit to the line side.

(b) Releases relay ACA.

(c) Maintains the holding circuit for relay HM and the trunk holding magnet.

2.50 Relay ACA released releases relays FB and SP and disconnects the attendant telephone circuit from the trunk.

2.51 Disconnection of the attendant telephone circuit removes the short circuit bridge from the trunk side, allowing the central office to hear ringing induction through capacitor FB.

2.52 Note: Relays operated: RS, CT, HM, TLA, SR, S1, and S. Lamp TL steady, lamps L and SL flashing at 30 ipm.

G. Station Answers (SC8)

2.53 When the station answers, relay RT operates on the primary winding and performs the following functions:

(a) Locks operated through the secondary winding to off-normal ground.

(b) Closes the operating path for relay ACA if Z option is furnished.

(c) Releases relay RS.

(d) Maintains a holding circuit for relay HM and the trunk holding magnet.

(e) Connects a high resistance bridge across the trunk. This bridge consists of inductor H1 and 1200-ohm resistor HS; it provides nonthrough supervision to the central office.

2.54 Relay RS released:

(a) Removes the low holding bridge from the trunk.

(b) Transfers lamps L and SL from 30-ipm to steady battery.

(c) Transfers the line end of the trunk from ringing to the central office end.

(d) Opens an operating circuit for relay ACA.

2.55 The call is now extended from the attendant or from the central office if the attendant has disconnected prior to answer by the station.

2.56 Note: Relays operated: RT, CT, HM, TLA, SR, S1 and S. Lamps L, SL, and TL steady.

H. Remote Trunk Answer from Any Station

2.57 Relay LO- in the auxiliary position circuit is connected in parallel with relay R1 when the attendant places the PBX on remote trunk answer operation. Relay LO- operates when the central office seizes and rings the central office and the auxiliary position circuit signals the PBX that a call is waiting.

2.58 The call is answered by dialing the remote trunk answer code from any station. The marker completes a connection between the answering station and the auxiliary position circuit.

2.59 When the auxiliary position circuit is seized by the station, the auxiliary position circuit functions to close the loop to the cordless position circuit that replaces the attendant telephone circuit and to operate relay ACA.

2.60 Relay ACA operated connects the auxiliary position circuit loop across the central office end of the trunk to trip the ringing and operate relay S. This completes a talking path between the answering station and the central office end of the trunk via the auxiliary position circuit.

2.61 To complete the trunk call to another station, the auxiliary position circuit functions to steer the line end of the central office trunk into the PBX to establish a PBX dial tone.

2.62 The answering station dials the desired code. Trunk to marker identification and ring start proceed as described. Relay RT operates when the called station answers.

2.63 Relay RT operated opens the ground path to lead RTK- to prevent the auxiliary position circuit from releasing the connection between the called station and the line end of the trunk when the auxiliary position circuit releases.

2.64 The station that answered the trunk call disconnects to extend the call from the central office to the called station. The central office trunk functions in the same manner as when the attendant releases after the called station answers.

3. OUTGOING TRUNK CALL

A. Outgoing Dial Selected Trunk Call (SC22)

3.01 When a station, tie trunk (other than a ringdown tie trunk) or the attendant using a central office trunk or ringdown trunk dials the central office directing code, the marker tests for an idle central office trunk circuit by testing lead IT for battery. When the select magnet test relays operate in the marker, ground is connected to lead IT to operated relay MC.

3.02 Relay MC operated:

(a) Locks to the marker via lead RLS.

(b) Connects relays BY, RS, TT, TLA, NT, RT, and FF to the marker circuit via their respective leads.

(c) Opens the primary winding of relays P and RT.

(d) Operates relay HM and the trunk hold magnets.

(e) Connects lead M to lead ST.

3.03 If the station originating the call is a toll-allowed line, relay TLA operates when relay MC operates.

3.04 Relay TLA operated:

(a) Locks operated to off-normal ground.

(b) Connects a shunt path across diode A to prevent the operation of relay P if a toll code is dialed.

3.05 The trunk hold magnet closes the tip, ring, and sleeve of the calling line to the central office trunk circuit in parallel with the dial pulse register on the same link. Connections to and from the central office are made on a trunk class-of-call basis; that is, connections are made over a single link from the central office trunk circuit to the calling or called line.

3.06 Closure of the crosspoints performs the following functions:

(a) Connects ground through 100-ohm resistor SH to sleeve lead S to hold the calling line or tie trunk.

(b) Connects the station loop to operate relay S. The operating path for relay S is from battery at resistor BF to ground at contact 6 of relay SR.

3.07 Relay S operated operates relay S1 which performs the following functions:

(a) Lights lamps L, SL, and TL.

(b) Connects off-normal ground to the trunk circuit.

(c) Opens lead IT toward the trunk and connects ground toward the marker as a busy.

(d) Connects ground to the ring side of the trunk toward the central office as a start ground for the line circuit.

(e) Prepares a circuit to operate relay H when the line circuit in the central office has functioned.

3.08 After the marker tests to see that the trunk hold magnet is operated, it operates the marker release relays to release relay MC and the dial pulse register. Relay HM and the trunk hold magnet are held by off-normal ground.

3.09 When start ground is furnished to the central office, the central office line circuit operates and returns dial tone to the PBX; or, if a manual central office, the operator answers. In either case, relay H operates and in turn operates relay CT.

3.10 Relay CT operated:

(a) Operates relay SR.

(b) Connects the trunk tip and ring to the central office for second dial tone.

(c) Prepares a holding circuit under control of relays SR and S1.

3.11 Relay SR operated:

(a) Connects off-normal ground in parallel with relay S1.

(b) Replaces the ground on lead IT provided by relay S1.

(c) Connects battery in parallel with relay S1 to lamp TL.

(d) Releases relay H.

(e) Removes start ground from the ring side of the trunk.

(f) Completes the holding circuit for relay CT.

(g) Closes the P relay circuit (toll diversion) in the ring side of the trunk if relay TLA is unoperated. The calling station may now complete the call into the central office.

3.12 Note: Relays operated: CT, HM, SR, S1, S, TLA (if toll-allowed station). Lamps L, SL, and TL steady.

B. Toll-Allowed Service

3.13 If a station or tie trunk (other than a ringdown tie trunk) originating a call through the central office trunk circuit is equipped for toll-allowed service, the TLA relay operates when the trunk circuit is seized.

3.14 Relay TLA operated shunts diode A and opens the P relay circuit used to sense battery reversal from the toll office. Under this condition, the P relay does not operate and the call can progress to a toll circuit.

C. Toll-Denied Service (SC23)

3.15 When a toll-denied line or tie trunk (other than a ringdown tie trunk) connects to a central office trunk circuit for outward dialing, relay TLA does not operate. On a local call, battery from the central office flows through diode A and does not operate relay P. If a toll code is dialed, the reversal of battery from the toll office causes current to flow through diode B and the primary winding of relay P which operates.

3.16 Relay P operated:

(a) Locks operated to off-normal ground on its secondary winding.

(b) Releases relay CT.

(c) Connects busy tone to the ring side of the trunk toward the calling station.

(d) Connects ground to the tip side of the trunk.

(e) Prevents the connection of start ground to the ring side of the trunk when relay SR releases.

3.17 Relay CT released releases relay SR and disconnects the trunk from the central office. The calling line is thus denied access to toll and can proceed no further.

3.18 If the central office trunk is seized at the central office during the time that the diverted station line is connected to the busy tone signal, relay R operates as soon as ringing current is transmitted.

3.19 Relay R operates relay R1; but, since relay S1 is still operated, relay R1 follows relay R. When relay R1 operates and relay P is also operated, the holding ground for relay HM and the trunk hold magnet are disconnected.

3.20 Release of the trunk hold magnet retruns the toll-denied station to local PBX dial tone and releases the central office trunk circuit. During the next ringing cycle, relay R and the trunk circuit function as described under incoming central office calls.

D. Attendant Originates Trunk Call - Not Restricted - Y option (SC18)

3.21 If the attendant is not restricted, operation of a pickup key associated with an idle trunk operates relay ACA.

3.22 Relay ACA operated:

(a) Prepares locking circuits under control of relays AC and S1.

(b) Operates relay AC.

(c) Connects the attendant telephone circuit across the trunk.

3.23 Relay AC operated locks relay ACA and splits the trunk. Relay S operates via the loop through the attendant telephone circuit and operates relay S1.

3.24 Relay S1 operated:

(a) Holds relay ACA.

(b) Prepares an operating circuit for relay H.

(c) Connects start ground to the ring side of the trunk.

(d) Connects off-normal ground to the trunk.

(e) Operates relay TLA with option B.

(f) Light lamps L and TL.

(g) Connects ground to lead IT to busy the trunk to the marker.

3.25 The line circuit at the central office functions in response to the start ground to return dial tone or to bring in the central office operator and also operates relay H. Relay H operates relay CT.

3.26 Relay CT operated:

(a) Operates relay SR.

(b) Locks under control of relays S1 and SR.

(c) Cuts the trunk through to the attendant.

3.27 Relay SR operated:

(a) Releases relay H.

(b) Locks relay CT.

(c) Transfers ground on lead IT from relay S1 to relay SR.

3.28 The attendant is now connected to the central office and may complete the call.

3.29 Note: Relays operated: TLA (with B option), CT, ACA, AC, SR, S1, S. Lamps L and TL steady.

4. CAMP-ON

A. Camp-On Call Station Busy (SC12, 13)

4.01 When the attendant has completed dialing into the PBX, the dial pulse register receives and stores the dialed information completing the originating function of the call. The register then engages the marker to terminate the call.

4.02 When the marker functions to terminate the call, the central office trunk circuit identifies itself to the marker as the originating circuit so that the proper connections can be made.

4.03 When the dial pulse register has received the dialed information from the central office trunk circuit, it reverses battery and ground over the tip and ring of the link connection to the trunk circuit. This causes current to flow through diode A and operate relay P.

4.04 Relay P operated transfers lamp L from 30-ipm to steady battery and operates relay MC.

4.05 By operating relay MC, the central office trunk circuit identifies itself to the marker as the circuit requesting termination. If the called station line is busy when the marker tests, the camp-on relays in the marker operate.

4.06 Relay MC operated:

(a) Releases relay P.

(b) Locks to lead RLS under control of the marker.

(c) Transfers the holding of relay HM and the trunk hold magnet to lead M (only while the marker is terminating the call).

(d) Connects relays FF, RS, BY, TT, TLA, and NT to their respective leads.

4.07 Relay P released transfers lamp L from steady battery to 30 ipm. The marker in terminating the call grounds lead BY which operates relay BY.

4.08 Relay BY operated:

(a) Disconnects the trunk tip and ring leads to the link so that ringing current will not be transmitted to the station line as long as the trunk is camped on.

(b) Operates relay DR which has no function at this time.

(c) Releases relay SL.

(d) Partially connects a sensing circuit to lead S consisting of resistor SH and relay SL which will operate when the called station line becomes idle.

(e) Connects busy tone to the cordless position circuit.

(f) Opens the CR lead.

(g) Connects lamp SL to 60-ipm battery.

(h) Locks operated under control of relays SL and HM.

4.09 During the process of marker functioning for a camp-on call, the camp-on relays in the marker release which removes ground from lead M allowing relay HM and the trunk hold magnet to release. Relay HM released extinguishes lamp SL.

4.10 The trunk is now free from its originating link on which the dial pulse register is still connected. The marker then functions to operate the select magnet for the link to which the busy station line is connected.

4.11 When the select magnet timing relay in the marker operates, ground is connected to lead M which operates relay HM and the trunk hold magnet. Relay HM operated connects lamp SL to 60 ipm.

4.12 The trunk is now connected to the busy link. When the hold magnet timing relay in the marker operates, ground is connected to lead RS to operate relay RS.

4.13 Relay RS operated:

(a) Releases relay HD.

(b) Locks operated to the fundamental ground under control of relay RT.

(c) Connects an alternate hold path for relays HM and the trunk hold magnet when relays MC and HD release.

(d) Completes the sensing circuit to relay SL.

(e) Maintains a holding circuit across the central office end of the trunk.

(f) Prepares the trunk to ring the station when relay BY releases.

(g) Prepares a circuit for the attendant to operate relay ACA.

(h) Maintains the holding circuit for relay SP in the cordless position circuit when relay HD releases.

(i) Operates relay FB in the cordless position circuit.

4.14 Relay HD released:

(a) Changes lamp L from 30 ipm to 60 ipm.

(b) Changes lamp TL from 30-ipm to steady battery.

(c) Changes the holding circuit for relays HM, the trunk hold magnet, and relay SP in the cordless position circuit.

(d) Connects leads TT and TR from the cordless position to the central office end of the trunk.

4.15 Having completed the connecting functions, the marker releases relay MC which restores the hold magnet control to the trunk circuit. The attendant is visually alerted with 60-ipm flashing lamps L and SL and audible alerted by busy tone in the telephone circuit.

4.16 Note: Relays RS, DR, CT, BY, HM, TLA, ACA, AC, SR, S1, S, are operated. Relays SP and FB are operated in the cordless position circuit. Lamp TL is steady. Lamps SL and L are flashing at 60 ipm.

4.17 Having received the camp-on indications, the attendant operates the release key in the cordless position circuit which mechanically releases the pickup key. When the pickup key releases, relays AC and ACA restore to normal releasing relays SP and FB in the cordless position circuit. Relay ACA released removes the busy tone from the attendant telephone circuit.

4.18 When the attendant reoperates the pickup key to notify the calling party of the camp-on condition, relay ACA operates in turn operating relays AC (and relay IC- if provided).

4.19 Relay IC- operated operates relay CS in the cordless position circuit and connects the tone generator of the cordless position circuit to the tip and ring of the line side of the trunk.

4.20 Relay CS operated transfers the operating path of relay CS to a holding path and prepares an operating path for the cordless position circuit relay SS.

4.21 After notifying the calling party of the camp-on condition, the attendant releases, mechanically releasing the trunk pickup key. The pickup key released releases relay AC which releases relay ACA and operates relay SS in the cordless position circuit.

4.22 Relay SS operated:

(a) Releases the slow-release relay CS.

(b) Provides a holding path for relay IC- upon the release of relay CS.

(c) Applies a ground start to the tone generator of the cordless position circuit (if the PBX is equipped for indication of camp-on to busy station). This gives a tone of approximately 1/2 second duration to the busy circuit as an indication of the camp-on.

4.23 Relay CS released releases slow-release relay SS.

4.24 Relay SS released releases relay IC- and removes ground start from the tone generator, stopping the indication tone.

4.25 Relays operated during camp-on are: RS, DR, CT, BY, HM, TLA, SR, S1, and S. Lamp TL is steady and lamps SL and L are flashing at 60 ipm.

B. Camp-On Station Becomes Idle (SC8,14)

4.26 With relays BY and RS operated, a sensing circuit is established on the sleeve of the connection to determine when the station line becomes idle.

4.27 Relay SL is connected in a bridge circuit consisting of resistors PD and SH in the central office trunk circuit, the line hold magnet in the marker, and the 100-ohm sleeve resistance in the circuit that is engaged with the busy station line.

4.28 During camp-on, the potential across relay SL is insufficient to operate it. As soon as the engaged connection releases and the 100-ohm ground on the sleeve is removed, relay SL is placed in series with the line hold magnet. Relay SL operates releasing relay BY.

4.29 Relay BY released:

(a) Releases relay DR if the station is on-hook.

(b) Connects the trunk tip and ring to the link toward the station for ringing.

(c) Releases relay SL.

(d) Connects resistor SH to the sleeve lead to hold the line hold magnet.

(e) Changes lamps L and SL from 60 ipm to 30 ipm.

4.30 Relay DR remains operated after relay BY releases if the called station is still off-hook. This action prevents the ringing current from being applied to the station line which would cause a premature ring trip condition.

4.31 When the station goes on-hook, relay DR releases to establish a ringing path through the primary winding of relay RT to the ring side of the trunk.

4.32 Note: Relays RS, CT, HM, TLA, SR, S1, and S are operated. Lamp TL is steady; lamps L and TL are flashing at 30 ipm.

4.33 When the station answers, relay RT operates and:

(a) Locks to the fundamental ground via the secondary winding.

(b) Prepares an operating circuit for relay ACA if option Z is provided.

(c) Connects a high-resistance bridge (resistor HS and inductor H1) across the trunk to hold the central office.

(d) Prepares an operating path for relay FF.

(e) Releases relay RS.

4.34 Relay RS released:

(a) Opens the low-resistance bridge (inductor H) across the trunk.

(b) Changes lamps L and SL from 30-ipm to steady battery.

(c) Disconnects ringing from the line.

(d) Connects the trunk to the link. The central office and the station may now converse.

4.35 Note: Relays RT, CT, HM, TLA, SR, S1, and S are operated. Lamps L, SL, and TL are steady.

C. Camp-On Discharge (SC16)

4.36 If the calling party elects to be connected to another line or to hang up after being notified of the camp-on condition, the attendant does not release but instead operates the hold key.

4.37 When the attendant operates the hold key (nonlocking), relay H operates in the cordless position circuit. Relay H operated:

(a) Releases relay RS by opening the lead to the fundamental ground.

(b) Maintains a holding path for the trunk hold magnet and relay HM when relay RS releases.

4.38 Relay RS released:

(a) Removes the H1 inductive bridge from across the trunk.

(b) Removes the ringing leads to the PBX end of the trunk.

(c) Disconnects the sensing circuit to relay SL.

(d) Partially restores the operating path for relay HD.

(e) Removes a holding path for the trunk hold magnet and relay HM.

4.39 When the hold key is released, relay H releases. This releases the trunk hold magnet and relay HM by removing ground via lead HM from the position circuit.

4.40 When the trunk hold magnet releases, the PBX link drops but the central office end of the trunk is held by the loop provided by the attendant telephone circuit leads TT and TR and relay SP normal in the position circuit.

4.41 Relay HM released releases relay BY and extinguishes lamp SL.

4.42 Relay BY released:

(a) Releases relay DR.

(b) Opens the busy tone lead BT.

(c) Changes lamp L to steady.

4.43 Note: Relays ACA, AC, CT, TLA, SR, S1, and S are operated. Lamps TL and L are steady.

4.44 If the call is to be rerouted, the attendant operates the hold key again for PBX dial tone and the action is the same as for a new incoming call.

4.45 If the call is to be disconnected, the attendant operates the release key. The trunk restores to normal when the central office disconnects.

D. Camp-On Busy (SC15,16)

4.46 The action of the trunk, marker, and register are the same as described in Section A except for the following considerations: The marker in terminating the call grounds lead BY to operate relay BY and in the process of link testing connects a solid ground on sleeve lead S.

4.47 When this test ground is connected to the sleeve lead S, there is a path through the trunk that has camp-on priority via contacts of operated relays BY, RS, and DR, diode F, and lead CW to operate the camp-on stop relay in the marker.

4.48 The G diode prevents the SL relay from operating in the trunk with camp-on priority. With the camp-on stop relay operated in the marker, relay FF operates.

4.49 Relay BY operated prepares a lockup circuit for relay FF. Relay FF operated:

(a) Connects an operating path for relay ACA.

(b) Connects in part a low shunt across the trunk.

(c) Bridges the cut-through contacts of relay CT.

(d) Parallels the operating path of relay DR.

(e) Locks operated under control of relays BY and SR.

(f) Changes lamp L from 30 to 120 ipm.

4.50 Relays BY and FF jointly connect 120 ipm busy tone to the attendant telephone circuit, and relays FF and DR jointly connect lamp SL to 120 ipm.

4.51 The operation of relay FF prevents relay SL from operating regardless of whether the camp-on line becomes idle. The sensing circuit is, therefore, functionless and only the trunk that was originally camped on will cut through and provide ringing when the line becomes idle.

4.52 When relay HM reoperates over the M lead with relay FF operated, the SL lamp changes to 120 ipm. When relay HD releases due to the operation of relay RS, the L lamp remains flashing at 120 ipm with FF operated.

4.53 Having completed the connecting functions, the marker releases relay MC which restores the hold magnet control to the trunk circuit. The attendant is visually alerted with 120 ipm flashing lamps L and SL and audibly alerted by busy tone interrupted at 120 ipm.

4.54 Note: Relays ACA, AC, RS, DR, CT, BY, HM, TLA, SR, S1, S, and FF and relays SP and FB in the cordless position circuit are operated. Lamp TL is steady and lamps L and SL are flashing at 120 ipm.

4.55 Having received the camp-on busy indication, the attendant operates the hold key which operates relay H in the cordless position circuit.

4.56 Relay H follows the action of the hold key (nonlocking). When relay H in the cordless position circuit operates, relay RS releases, in turn releasing relay SP in the cordless position circuit. Relay SP releases relay FB in the cordless position circuit.

4.57 When the hold key is released, relay H in the cordless position circuit releases releasing the trunk hold magnet and relay HM. This causes relay BY to release and in turn release relay DR.

4.58 Relay SP in the cordless position circuit released removes the short circuit from the trunk and relay FB released disconnects the 120-ipm tone. The attendant now advises the calling party of the progress of the call.

4.59 Note: Relays CT, TLA, ACA, AC, SR, S1, and S are operated. Lamps L and TL are steady.

4.60 A make contact on relay DR is provided in lead CW to isolate the CW lead. This prevents a faulty diode in some other trunk circuit from feeding out to the CW lead and falsely operating relay SL.

4.61 At calling party request, the attendant may reroute the call to another station of many disconnect. The action is the same as described in the preceding section for rerouting or disconnection.

E. PBX On Remote Trunk Answer Operation

4.62 When the PBX has been conditioned for remote trunk answering, the action of the trunk, marker, and register is the same as described for camp-on busy except for the following considerations:

4.63 The marker in terminating the call grounds leads BY and FF to operate relays BY and FF when the called station line is busy.

4.64 Relays ACA, BY and FF operated and relays FB in the cordless position circuit operated complete a path to return busy tone, interrupted at 120 ipm, to the answering station via the auxiliary position circuit.

4.65 The auxiliary position circuit functions to operate and release relay H in the cordless position circuit to discharge the busy condition. The PBX functions to reconnect the answering station to the central office so that the calling party can be advised of the progress of the call.

5. RECALL

A. Station Recall - Option ZW (SC11)

5.01 Once a station has answered on an incoming central office call or a dial back call, the station may recall the attendant by momentarily depressing the switchhook. Relay S follows the operation of the switchhook and when released removes ground to release relay S1 and connects ground to operate relay FF.

5.02 Relay FF operated:

(a) Prepares a circuit so the attendant may operate relay ACA.

(b) Connects a low resistance bridge (resistor LS and inductor H1) across the central office end of the trunk.

(c) Bridges the cut-through contacts of relay CT.

(d) Locks under control of relays AC and SR.

(e) Prepares circuits to transfer lamps L and SL to 120 ipm and to operate the audible signal.

5.03 When the switchhook is released, relay S reoperates. Relay S operated:

(a) Holds relay S1 if it has not released.

(b) Operates relay S1 if it did release.

(c) Operates relay DR.

5.04 Relay DR operated transfers lamps L and SL to 120 ipm and connects continuous ringing to the audible signal.

5.05 Note: Relays DR, CT, RT, HM, TLA, SR, S1, FF, and S are operated. Lamp TL is steady; lamps L and SL are at 120 ipm.

5.06 The attendant recognizes the 120 ipm flashing lamps and the continuous audible signal as a station recall. When the attendant answers the recall by operating the pickup key, relay AC operates.

5.07 Relay AC operated releases relay FF and, with W option, operates relay SP in the cordless position which splits the trunk to provide secrecy.

5.08 Relay FF released:

(a) Disconnects the low-resistance bridge from the trunk.

(b) Silences the audible signal.

(c) Releases relay DR.

(d) Transfers lamps L and SL from 120-ipm to steady battery.

(e) Opens the operating path of relay ACA to prevent the attendant from re-entering for any reason other than recall if option Z is not provided.

5.09 Note: Relays CT, RT, HM, TLA, ACA, AC, SR, S1, and S are operated. Lamps L, SL, and TL are steady.

5.10 If the switchhook is depressed until relay S1 releases, relay CT releases allowing relay SR to start to release. When relay S1 reoperates, relay CT operates through the make contact of relay FF.

5.11 Relay CT operated re-establishes the operate path for relay SR. Thus as long as relay CT can be reoperated before relay SR releases, the switchhook signal actuates a recall condition.

5.12 If the switchhook signal is of such duration that relay SR releases before relay CT is reoperated, the central office disconnects.

B. Station Dial Transfer - Option ZX

5.13 After a station has answered an incoming central office call or dial back call, the station may transfer this call to another station by momentarily depressing the switchhook.

5.14 Relay S follows the operation of the switchhook and when released removes ground to release relay S1 and connects ground to operate relay FF.

5.15 Relay FF operated:

(a) Prepares a circuit so the attendant may operate relay ACA.

(b) Connects a low-resistance bridge (resistor LS and inductor H1) across the central office end of the trunk.

(c) Bridges the cut-through contacts of relay CT.

(d) Locks under control of relays AC and SR.

(e) Prepares circuits to transfer lamps L and SL to 120 ipm.

5.16 When the switchhook is released, relay S reoperates.

5.17 Relay S operated:

(a) Holds relay S1 if it has not released.

(b) Operates relay S1 if it did release.

(c) Operates relay DR.

5.18 Relay DR operated grounds lead TP- to the station dial transfer controller circuit operating relay TP- in the controller circuit to start a station dial transfer.

C. Trunk Recall

5.19 When the central office trunk is terminated by a tie trunk other than a ringdown tie trunk, the station terminating the tie trunk may recall the attendant by momentarily depressing the switchhook. If the tie trunk is terminated by a cord switchboard, recall is accomplished by momentarily removing the cord.

5.20 In either case, relay P releases and reoperates. Relay P released:

(a) Releases relay S by opening the bridge across the central office end of the trunk.

(b) Changes lamp L from steady to 30 ipm.

5.21 Relay S released operates relay FF.

5.22 Relay FF operated:

(a) Provides a path for the attendant to operate relay ACA.

(b) Connects low-resistance shunt (resistor LS and one winding of inductor H) across the central office end of the trunk.

(c) Bridges the cut-through contacts of relay CT.

(d) Locks operated under control of relay AC.

(e) Prepares a circuit to operate relay DR.

(f) Transfers lamp L from 30 ipm to the contacts of relay DR.

5.23 When relay P reoperates, it operates relay S which in turn operates relay DR. Relay DR operated connects continuous ringing to lead BZ to activate the audible signal and connects lamps L and SL to 120 ipm. The attendant is now alerted for a tie trunk recall.

5.24 Note: Relays P, DR, CT, TT, RT, HD, HM, TLA, SL, SR, S1, FF, and S are operated. Lamp TL is steady and lamps L and SL are at 120 ipm.

5.25 When the attendant answers the recall, the trunk action is the same as described in section A except that relays P, HD, TT and SL remain operated.

6. RERING

A. Toll-Allowed Station (SC28)

6.01 If a toll-allowed station originates a call to the toll office and elects to hang up while the toll operator holds the connection, relay S releases causing relay S1 to release.

6.02 Relay S1 released:

(a) Causes relay H to operate from the hold connection.

(b) Removes the holding circuit for relay CT.

(c) Removes one of the parallel fundamental grounds.

(d) Restores the locking path for relay R1.

(e) Extinguishes lamp SL leaving lamps L and TL lighted steady.

6.03 Relay H operate holds relay CT. When the toll operator rerings on the circuit, only the station is rung. Relay R operates on the ringing current but since relay TLA is operated, relay R1 is prevented from operating.

6.04 With relay R1 normal, the attendant is bypassed. When the station answers, relay S operates, in turn operating relay S1. Relay S1 operated:

(a) Releases relay H.

(b) Holds relay CT.

(c) Connects a parallel off-normal ground.

(d) Lights lamp SL.

6.05 If the toll operator had disconnected instead of reringing, relay H would have released, in turn releasing relay CT. Relay CT released releases relay SR which removes the fundamental ground, releases relay HM and the trunk hold magnet and extinguishes lamps L and TL.

B. Toll-Denied or Restricted Station (SC38)

6.06 If a toll-denied or a restricted station has been connected to a toll office by the attendant using the no-test key and the station elects to hang up, relay S releases, in turn releasing relay S1 and operating relay FF.

6.07 Relay FF operated:

(a) Provides a path for the attendant to operate relay ACA.

(b) Connects a low-resistance bridge (resistor LS and inductor H1) across the trunk toward the trunk office.

(c) Bridges the cut-through contacts of relay CT.

(d) Locks operated under control of relay AC and SR.

(e) Extinguishes lamp SL. Relay S1 released connects relay H to the trunk circuit and releases relay CT which in turn releases relay SR.

6.08 Relay SR released:

(a) Releases relay FF.

(b) Removes ground from lead IT.

(c) Removes the fundamental ground which releases relay HM and the trunk hold magnet.

6.09 The station is now disconnected since the crosspoints are open. As long as the toll operator holds, the circuit relay H remains operated. When relay FF restores to normal, relay CT operates in turn operating relay SR.

6.10 Relay SR operated connects the fundamental ground to the trunk and connects ground to lead IT to busy the trunk. The trunk circuit is now in the same condition as if it were seized at the central office during the silent interval of the ringing cycle. When the toll operator rerings, the attendant receives the signal as an incoming call.

C. Attendant Originated Call to Toll Office

6.11 With option B, if the attendant disconnects, the toll operator is unable to rering because relay TLA operated opens the operating circuit for relay R1.

6.12 With option A, if the attendant disconnects, the toll operator may rering. The rering operates relay R in turn operating relay R1 (relay TLA normal). Relay R1 operated locks to the fundamental ground under control of relay S1 and changes lamp TL to 120 ipm.

6.13 Relay R and R1 operated jointly connect ringing current to the audible signal in the cordless position circuit. (The audible signal follows the rering.)

6.14 With options A or B if the attendant holds instead of releasing, the toll operator may rering. The rering operates relay R in turn operating relay R1. Relay R1 operated flashes lamp TL at 120 ipm and relays R and R1 operated jointly connect ringing current to the audible signal. (The audible signal and 120-ipm flashing TL lamp follow the rering.

7. HOLDING

A. Attendant Holds Incoming Call (SC19)

Register Sized Before Attendant Releases

7.01 If a register is seized and a dial tone connection is established, the course of events is as described in 2C. The operation of the release key in the cordless position circuit releases the pickup key which in turn releases relay AC.

7.02 Relay AC released:

(a) With relay HD operated, connects inductor H in series with diode C across the line side of the trunk.

(b) Releases relay ACA.

(c) Maintains a holding circuit for relay HD.

7.03 Relay ACA released:

(a) Disconnects the attendant telephone circuit from the trunk.

(b) Releases relay SP.

(c) Opens leads H, HG, HD, HM, SP, SR, BT, NT, T, U, and FB.

7.04 The disconnection of the attendant telephone circuit removes the loop causing relay L in the dial pulse register to release. (Diode C presents an open circuit to relay L.)

7.05 Relay L released causes the dial pulse register to release which removes the 100-ohm ground from the sleeve of the link. The removal of this ground releases the register hold magnet and relay SL.

7.06 Relay SL released releases relay HM (relay TLA operated has opened an alternate holding path) and releases the trunk hold magnet. Relay HD remains operated to keep lamps L and TL flashing at 30 ipm and maintains the holding bridge (inductor H1) across the trunk toward the central office.

Attendant Releases Before Register is Seized

7.07 If the attendant holds a trunk and a register is not seized due possibly to heavy traffic, the operation of the hold key (nonlocking) operates relay H in the cordless position circuit.

7.08 Relay H follows the action of the hold key to operate relay HD and prepares a circuit to operate relay SP.

7.09 Relay HD operated:

(a) Locks to off-normal ground.

(b) Operates relay SP in the cordless position circuit.

(c) Connects inductor H1 across the trunk to hold the central office.

(d) Disconnects the attendant from the central office end of the trunk.

(e) Transfers lamps L and TL from steady battery to 30 ipm.

7.10 The operation of the release key releases the pickup key which releases relay AC. Relay AC released releases relay ACA. Since the dial pulse register was not seized, the release of relays AC and ACA simply disconnects the attendant telephone circuit from the trunk. Relay HD remains operated to hold the central office and to keep lamps L and TL flashing at 30 ipm.

7.11 Note: Relays CT, HD, TLA, SR, S1, S are operated. Lamps L and TL are flashing at 30 ipm.

B. Attendant Re-Enters Held Incoming Trunk (SC20)

7.12 The attendant re-enters a held trunk by operating the pickup key associated with the held call. Relay ACA operates through relay HM normal and Y option, or through relay HM normal, relay S1 operated, and X option.

7.13 Relay ACA operated:

(a) Connects the attendant telephone circuit to the trunk.

(b) Extends leads FB, HD, SP, H, HM, HG, T, U, NT, and BT to the cordless position circuit.

(c) Operates relay AC.

(d) Prepares a locking circuit for relay HM.

(e) Locks up under control of relay AC.

7.14 Relay AC operated:

(a) Splits the trunk.

(b) Releases relay HD.

(c) Locks relay ACA.

7.15 When relay HD releases, it connects the attendant to the central office end of the trunk and changes lamps L and TL from 30-ipm to steady battery.

7.16 Note: Relays ACA, AC, CT, S, S1, SR, and TLA are operated. Lamps L and TL are steady.

7.17 If the attendant wishes to complete the incoming call, the hold key must be operated to establish PBX dial tone. The action is the same as described in 2C except that relay TLA is already operated.

8. MISCELLANEOUS

A. Dial Back Call (SC21)

8.01 When a station line dials the attendant trunk code for assistance in establishing a central or toll office connection, the attendant instructs the calling line to remain off-hook until the connection is established.

8.02 The attendant then:

(a) Holds the attendant trunk circuit.

(b) Completes a call to the central office as described in 3D.

(c) Requests the called central office party to remain on the line.

(d) Holds the central office trunk to establish PBX dial tone as described in 7A.

(e) Operates the no-test key in the cordless position circuit.

(f) Dials the station that is being held on the attendant trunk circuit.

8.03 The operation of the no-test key operates relay NT in the cordless position circuit which locks operated to lead NT.

8.04 The initial action after dialing is the same as for camp-on at a called station, described in 4A, except that when relay MC operates, relay NT in the marker operates via the NT lead from the position circuit.

8.05 The operation of relay NT in the marker prevents the operation of the BY relay and operates relay RT.

8.06 Relay RT operated:

(a) Opens the locking path for relays RS.

(b) Locks to the off-normal ground.

(c) Connects a high-resistance bridge across the trunk.

(d) Provides alternate holding paths for relay HM and SP (in the cordless position circuit).

8.07 The marker in terminating the call operates and releases relay RS. Relay RS operated releases relay HD.

8.08 Relay HD released:

(a) Removes the holding bridge from the trunk but relay SP in the cordless position still has the trunk end short circuited.

(b) Extends the trunk to the attendant telephone circuit.

(c) Releases relay SL.

(d) Provides a holding path for relay HM and the trunk hold magnet.

(e) Lights lamp SL.

(f) Transfers lamps L and TL from 30-ipm to steady battery.

(g) Connects the 100-ohm resistor SH to lead S to hold the line hold magnet.

8.09 Since the marker performs as if the call were going to camp-on, the central office trunk circuit is transferred from its originating link, on which the dial tone connection was established, to the link on which the calling station is waiting.

8.10 Relay NT operated in the marker also connects ground to the KO (kick-off) lead to the attendant trunk circuit operating relay TN which in turn releases relay B in that circuit.

8.11 Relay B released releases the attendant trunk hold magnet which opens the crosspoints allowing the attendant trunk to release.

8.12 After the marker has transmitted its terminating data, it releases itself and the dial pulse register from the connection. The release of the marker causes relay MC to release.

8.13 Relay MC released transfers the holding path for relay HM and the trunk hold magnet from marker control to trunk control and disconnects relays BY, RS, NT, and TLA from their respective leads.

8.14 Relays FB and SP in the cordless position circuit remain operated as long as the attendant remains on the connection. Relay FB provides transmission battery for the called station and relay SP keeps the short circuit across the central office end of the trunk.

8.15 When the attendant releases, the station and central office are connected, the station receiving transmission battery from the central office.

8.16 Note: Relays CT, RT, HM, TLA, SR, S1, S are operated. Lamps L, SL, and TL are steady.

8.17 If the trunk is connected to any busy station other than the station awaiting service on a dial-back basis, the attendant may discharge the connection by operating the hold key.

B. Disconnection - Called Station Remains Unanswered

8.18 The condition of the trunk prior to the operation of the release key is the same as for ring start, dial-back call or trunk terminating as described in 2E, 8A or 8D respectively. If the attendant has not released after dialing is completed, the call may be discharged and the attendant may reconnect to the central office end of the trunk by operating the hold key.

8.19 The operation of the hold key, which is nonlocking, causes relay H to operate in the cordless position circuit. Relay H operated opens the locking path over leads CL, H, and HG to release relays TT and HD or RS depending upon the type of connection.

8.20 Relays SP and SL or FB in the cordless position circuit subsequently release in sequence due to the elimination of holding paths previously supplied by relay HD or RS.

8.21 When the hold key is released, relay HM and the trunk hold magnet in the marker release since there is no longer a holding path to the fundamental ground.

8.22 The attendant is now connected to the central office end of the trunk. Relays ACA, AC, CT, S, S1, SR, and TLA are operated; and lamps L and TL are steady.

8.23 If the attendant had released from the connection after dialing was completed, the condition of the trunk would be the same as described above prior to the operation of the release key except that relays ACA, AC, SP, and FB would release when the release key is operated.

8.24 It is therefore necessary that the attendant operate the pickup key to operate relays ACA and AC. The action of the trunk when the attendant subsequently operates the hold key is the same as described above.

8.25 Should the attendant wish to reroute the call, the hold key must be reoperated for PBX dial tone.

8.26 If the attendant wishes to disconnect the trunk, the release key is operated. Relays AC and ACA release in sequence which removes the attendant telephone circuit from the trunk allowing relay S to release and release relay S1.

8.27 Relay S1 released releases relays CT, SR, and TLA in sequence restoring the trunk to normal.

8.28 If the central office does not disconnect immediately, relay H operates when relay S1 releases to hold relay CT operated. When the central office disconnects, relay H releases releasing relays CT, SR, and TLA and restoring the trunk to normal.

8.29 When the PBX is on remote trunk answer operation, the answering station remains on the line after dialing is completed. The auxiliary position circuit holds relays AC and ACA operated.

8.30 The answering station causes the auxiliary position to operate and release relay H in the cordless position circuit to discharge the call. The PBX functions to discharge the call and reconnect the answering station to the central office as previously described.

8.31 Should the answering station wish to reroute the call, the auxiliary position circuit functions to operate and release relay H in the cordless position circuit and the PBX functions to return dial tone.

8.32 If the answering station wishes to disconnect the trunk, the handset is placed on the switchhook. The auxiliary position circuit functions to release relays AC and S and disconnection proceeds as previously described.

C. Emergency Trunk Service - Options V,T,E, and F

8.33 Central office trunks 0,1,2, and 5 (F option) or central office trunks 0, 1, and 2 (E or ZJ option) are wired to station line circuits 30, 31, 32, and 33 or to line circuits 30, 31, and 32, respectively, through the alarm transfer and test circuit per T option.

8.34 When there is a power failure, relays AT and ATA release in the alarm transfer and test circuit to transfer the above central office cable pairs from the central office end of the trunk units directly to the station instruments, effectively bypassing the trunks. These stations will receive incoming central office calls.

8.35 To make outgoing central office calls, a start key which is provided with each of these stations must be operated to connect start ground to the ring side of the cable pair and cause the central office line circuit to function.

8.36 When power is restored, relays AT and ATA reoperate to transfer the trunk circuits to the cable pairs and the station instruments to their respective line circuits. I one of these stations is busy when power is restored, the central office connection is broken.

8.37 The remainder of the central office trunk circuits are wired per V option and do not have the transfer feature.

D. Trunk Terminating

Other Than Ringdown Tie Trunk

8.38 If the incoming call requests a connection to a tie trunk other than a ringdown tie trunk, the initial action is the same as when the attendant establishes PBX dial tone and trunk-to-marker identification as described in 2C and 2D.

8.39 The marker in terminating the call connects a ground from the dial pulse register to lead TT causing relay TT to operate. Since relay TK8 in the marker is operated, there is no ground connected to lead RS.

8.40 Relay TT operated:

(a) Locks to off-normal ground.

(b) Changes lamp TL from 30-ipm to steady battery.

(c) Connects lamp SL to 30-ipm.

(d) Prepares a path for the attendant to reoperate relay ACA.

(e) Connects inductor H into the trunk circuit. This inductively couples the PBX and central office ends of the trunk circuit.

8.41 If the attendant remains on the line, the loop through the attendant telephone circuit or, if the attendant disconnects, the loop through one winding of inductor H, causes the tie trunk to function.

8.42 When the tie trunk answers, battery is reversed to provide supervision. The reversed battery operates relay P through its primary winding.

8.43 Relay P operated:

(a) Changes lamp L from 30-ipm to steady battery.

(b) Operates relay RT.

(c) Opens the operating path (via relay TT) for relay ACA.

(d) Provides a holding circuit for relay S when relay RT operates.

8.44 Relay RT operated:

(a) Locks to off-normal ground.

(b) Provides a path for the attendant to operate relay ACA if Z option is used.

(c) Connects resistor HS in parallel with relay S as a high-resistance bridge across the trunk.

(d) Changes lamp SL from 30-ipm to steady battery.

(e) Prepares a path to operate relay FF if relay S releases.

8.45 The central office trunk and tie trunk (other than a ringdown tie trunk) are now connected.

8.46 Note: Relays P, CT, TT, RT, HD, HM, TLA, SL, SR, S1, and S are operated. Lamps L, SL, and TL are steady.

Ringdown Tie Trunk

8.47 If a ringdown tie trunk code is dialed by the attendant, the action is the same as described above except that in answering, the ringdown tie trunk will not reverse battery and ground to operate relay P.

8.48 Under this condition, relay RT does not operate and lamps L and SL remain at 30 ipm. There is no supervision to the attendant other than a steady TL lamp and a flashing L or SL lamp; hence, the attendant must challenge this connection periodically.

E. Cord Switchboard Used as Attendant Equipment - App. Fig. 2

8.49 When the central office trunk has an appearance on the cord switchboard, an incoming call from the central office causes the trunk circuit to:

(a) Connect battery to lead C.

(b) Connect continuous ringing to the audible signal.

(c) Connect 120-ipm battery via lead L to flash the switchboard L lamp.

8.50 The attendant inserts a cord into the trunk jack T associated with the flashing lamp. Relay SE is operated via lead SL to ground at the answering jack. Relay SL operated completes the tip and ring paths to connect the attendant to the trunk.

8.51 Battery through resistance lamp SL or ground through resistor SL causes the cord sleeve relays to function.

8.52 To make an outgoing call, the attendant inserts a cord into trunk jack T. If the central office trunk circuit is idle, battery via lead C and Y option operates relay SE. Relay SE operated connects the tip and ring leads to the cord circuit. The loop of the cord circuit operates relay S from ground to the tip via relay SR operated to battery via the BF resistor.

8.53 Relay SE operated connects the tip and ring leads to the cord circuit. The loop of the cord circuit operates relay S from ground to the tip via relay SR operated to battery via the BF resistor.

8.54 Relay S operated operates relay S1 which operates lamp L (FS 5) and activates the trunk in a manner similar to the action described for cordless operation.

8.55 If the central office trunk circuit had been busy, lamp T would have been lighted as a busy lamp.

8.56 Note: Attendant options X, Y, and Z apply to the cord switchboard attendant the same as for a cordless operation.

8.57 Night connections may be established by using the cord circuit with the night and through dialing key operated. When the plug is inserted into trunk jack T, relay SE operates on battery via lead C and option Y. Relay SE operated connects the tip and ring leads to the plug of the cord. Outgoing calls function as described for cordless operation.

F. Direct Station Selection

Incoming Central Office Call

8.58 The attendant operates the pickup key and, after determing that the calling party wishes to be connected to a station, momentarily depresses the push button key associated with the station to be called if the particular station busy lamp is dark.

8.59 This key, when depressed, results in the same functions as operating the hold key, receiving dial tone, and dialing the station.

8.60 If the central office calling party wishes to be completed to a busy line (indicated by a lighted station busy lamp), the attendant immediately informs the calling party of the busy condition of the station.

8.61 If the central office party wishes to wait, the attendant depresses the station key. This causes the central office trunk to camp on the busy line.

8.62 The operation of the station key operates relays H, HA, and DS in the cordless position circuit.

8.63 Relay DS operated prepares a path to operate relay CS in the cordless circuit position and prevents cordless position relay SS from operating.

8.64 The marker in terminating the call grounds lead BY which operates relays BY and IC-.

8.65 Relay IC- operated operates relay CS in the cordless position circuit and connects the tone generator of the cordless position circuit to the tip and ring of the line side of the trunk.

8.66 With the camp-on connection completed, the attendant releases the station key which releases relay HA and DS. Relay DS released operates relay SS in the cordless position circuit.

8.67 Relay SS operated releases slow-release relay CS and applies ground start to the tone generator causing the called party to receive the indication of camp-on tone for approximately 1/2 second.

8.68 Relay CS released releases slow-release relay SS which removes ground from the tone generator.

8.69 The attendant receives audible and visual indications of camp-on at the end of register and marker action.

8.70 The attendant then operates the release key which mechanically releases the pickup key. When the pickup key releases, relays AC and ACA releases releasing relay IC-.

Dial Back

8.71 To complete outgoing calls on a dial back basis, the no-test key in the cordless position circuit is operated after the attendant has been connected to the central office party. The attendant then depresses the station key which starts register and marker action to complete the connection between the station and central office.

G. Station Message Registration

Message Register Pulsing

8.72 Each operation of relay SX in the message register pulse circuit applies positive 48 volts to the sleeve via lead SS1, operating the station message register in multiple with the line hold magnet. The positive voltage holds the line hold magnet during message registration.

Message Register Surcharging

8.73 When the calling station goes on-hook relay S releases releasing relay S1. Relay S1 released releases the slow releasing relay pulse circuit relay P (furnished for panel only) and removes a shunting ground from lead S1, permitting the operation of relay DS in the message register surcharge circuit.

8.74 Surcharge circuit relay DS operated prevents new calls from ringing until all surcharge pulses have been registered. When surcharge pulsing is completed, relay MS in the surcharge circuit will release releasing the trunk. The release of relay SR will release surcharge circuit relay DS.

9. NIGHT CONNECTIONS

A. Fixed Night Connections - Option F

9.01 When the attendant operates the night service key, relays AT and ATA release in the alarm, transfer and test circuit.

9.02 Relay AT released transfers the tip and ring of stations 30, 31, 32, and 33 from their associated line relays to back contacts of relay ATA.

9.03 Relay ATA released transfers the central office cable pairs from central office trunks 0, 1, 2, and 5 to stations 30-33. The stations are now connected directly to the central office.

9.04 Calls are completed as described for emergency trunk service except that relays AT and ATA are under control of the night service key.

B. Flexible Night Connections - Option Y, E

Idle Trunk to Idle Station (SC33,34)

9.05 When the attendant operates the night service key, relay NS releases in the alarm, transfer, and test circuit. This connects ground to leads NSO and NSE and connects leads NC (0-9) to leads CN (0-9).

9.06 The attendant then operates the pickup key associated with a central office trunk to be night connected. Relays ACA, AC, S and S1 and lamps TL and L operate as described for an attendant-originated call with the following exceptions and additions:

9.07 When the pickup key is operated, relay N1 operates in parallel with relay ACA.

9.08 If the PBX is provided with an auxiliary position circuit, relay NC- in the auxiliary position circuit operates in parallel with relays N1 and ACA.

9.09 Since relay BN in the auxiliary position circuit is operated when the PBX is on remote trunk answer operation and thus opens the operate path for relay N1 and relay NC- in the auxiliary position circuit, the attendant cannot set up night connections after placing the PBX on remote trunk answer operation.

9.10 Relay N1 operated:

(a) Disconnects the trunk circuit from the central office conductors with the exception of the ringing bridge.

(b) Connects battery and ground to the tip and ring to operate relay H.

(c) Locks operated under the control of relays ACA and S1 (via lead J).

(d) Prepares the operate path for relay N with ZZ option.

9.11 Relay ACA operated provides holding ground for relay N1 and operates relay N.

9.12 Relay N operated:

(a) Connects ground to the trunk.

(b) Operates and locks relay TLA with B option.

(c) Locks operated under control of relay NS in the alarm, transfer, and test circuit.

(d) Opens ringing lead R1.

(e) Partially completes a path to prevent the connection of two trunks to one station.

(f) Prepares a lockup path for relay RS.

9.13 After relay H operates, relays CT and SR operate and relay H releases.

9.14 Note: Relays ACA, AC, CT, N, N1, S, S1, and SR are operated. Lamps L and TL are steady.

9.15 The attendant operates the hold key for PBX dial tone. Upon receiving dial tone, the attendant dials the number of the station to be night connected and the action is the same as trunk to marker identification.

9.16 Note: Relays ACA, AC, CT, HD, HM, N, N1, S, S1, SL, SR, and TLA are operated. Lamps L and TL are flashing at 30 ipm. Relay SR is operated in the cordless position circuit.

9.17 If the marker finds the called station line idle, the marker, register, and trunk function as described for ring start except that ringing is not applied to the called station since operated relay N has opened ringing lead R1.

9.18 Note: Relays ACA, AC, CT, HM, N, N1 RS, S, S1, SR, and TLA are operated. Lamp TL is steady. Lamps L and SL are flashing at 30 ipm. Relays SP and FB are operated in the cordless position circuit.

9.19 Lamp SL, flashing at 30 ipm, is an indication to the attendant that the station and trunk are connected.

9.20 The attendant operates the release key which releases, in sequence, relays AC, ACA, and relays FB and SP in the cordless position circuit.

9.21 In addition, relay ACA released releases relay RS. Relay RS released removes the holding bridge from the trunk allowing relay S to release in turn releasing relay S1.

9.22 Relay S1 released:

(a) Releases relay CT.

(b) Releases relay N1 by removing ground from diode J.

(c) Extinguishes lamp SL.

9.23 Relay CT released releases relay SR and extinguishes lamps TL and L.

9.24 Relay N1 released removes battery and ground from the trunk and connects the trunk conductors to the central office.

9.25 Note: Relays TLA, N, and HM will remain operated as long as the night service key remains operated.

Camp-On (SC33-36)

9.26 If the attendant sets up a night connection and the station to be connected is busy, the sequence of events up to the time the register responds to the attendant dial is the same as described above. The action from this point on is the same as for a camp-on call, including the operation of the release key by the attendant after receiving visual and audible indication of the connection.

9.27 Preparation of a night connection to a busy station is now complete. The night connection will be established without further attendant action.

9.28 Note: Relays RS, DR, CT, BY, HM, TLA, N1, N, SR, S1, and S are operated. Lamp TL is steady. Lamp L and SL are flashing at 60 ipm.

Camped On Station Becomes Idle (SC36)

9.29 Relay SL operates and releases; relays BY and DR release when the camp-on station becomes idle. However, when relay DR releases during a night connected camp-on condition, relay RS releases since, with relay N operated, there is no locking path via lead CL.

9.30 Relay N operated also prevents ringing via the R1 lead when the camped on station becomes idle.

9.31 Relay RS released removes the holding bridge from the trunk allowing relay S to release.

9.32 Relay S released releases, in sequence, relays S1, N1, CT, and SR which extinguish lamps L, SL, and TL as explained for attendant release. The trunk and station are now connected for night service.

9.33 Note: Relays TLA, N, and HM remain operated as long as the night service key remains operated.

9.34 The path via E option between sleeve lead S and lead CW is provided to prevent two trunks from being connected to one station.

9.35 If the attendant attempts to connect a second trunk to an existing night-connected trunk, which is either idle or camped on, a camp-on busy condition will exist; 120-ipm busy tone will be connected to the attendant and lamp SL will flash at 120 ipm.

9.36 The attendant must remove this condition by the following (sequential) procedure:

(a) Restore the night service key. This releases all night connections.

(b) Operate the pickup key associated with the flashing SL lamp.

(c) Operate the hold key.

(d) Operate the release key.

(e) Re-establish all night service connections.

9.37 When the attendant releases the night connections at the start of business, any busy connection will not be disturbed; upon becoming idle, the trunks will restore to normal.

Incoming Central Office Call to Night Connected Stations

9.38 If the trunk is seized by the central office during the silent interval, relay H operates.

3.39 Relay H causes relays CT and SR and lamps TL and L to operate in sequence.

9.40 When the central office applies ringing current, relay R operates but does not operate relay R1 since relay TLA remains operated during night service connections.

9.41 When relay CT operates, the central office is cut through to the station and ringing current causes the station ringer to operate.

9.42 If the trunk is seized during the ringing intervals, relay R operates causing relay CT to operate. Relay CT operated operates relay SR which functions as above and cuts through the central office trunk; ringing current operates the station ringer.

9.43 Note: Relays CT, HM, TLA, N, and SR are operated with R following central office ringing.

9.44 When the station answers, the loop trips ringing and operates relay S in turn operating relay S1. Relay S1 operated lights lamp SL.

9.45 When the station hangs up, relays S and S1 release, lamp SL is extinguished, and relay H is operated to hold relay CT operated. When the central office disconnects, relays H, CT, and SR release and lamps TL and L are extinguished.

Outgoing Call from a Station on Night Connection

9.46 When the station goes off hook, relay S operates from battery through resistor BF, the station loop, and to ground.

9.47 Relay S operated operates relay S1 which furnishes a start ground to the ring side of the central office line circuit and lights lamps TL, SL, and L.

9.48 Once the start ground is furnished to the central office, the central office line circuit functions to return dial tone or if a manual central office, the operator answers.

9.49 This action causes relay H to operate in turn operating relay CT.

9.50 Relay CT operated:

(a) Operates relay SR.

(b) Locks operated through the operated S1 and SR contacts.

(c) Closes the tip and ring of the trunk through to central office which gives the station central office dial tone.

9.51 Relay SR operated releases relay H and removes the start ground from the ring side of the trunk.

9.52 Disconnection is the same as for an incoming central office call to a night-connected station.

10. DISCONNECTION (SC9-10)

A. Incoming Central Office Trunk Call Connected to a Station

10.01 If the station disconnects first, the removal of the station loop releases relay S which operates relay FF and releases relay S1.

10.02 Relay S1 released connects relay H across the tip and ring toward the central office. Relay H operates on central office battery, extinguishing lamp SL, and releasing relay CT.

10.03 Relay CT releases relay SR which removes the off-normal ground to release relays RT, HM, TLA, FF, and the trunk hold magnet, and extinguishes lamps L and TL.

10.04 Relay FF released operates relay CT which operates relay SR.

10.05 Relay SR operated lights lamp L and TL and connects the fundamental ground to the trunk.

10.06 When the central office disconnects, relay H releases in turn releasing relay CT which releases relay SR. Relay SR released extinguishes lamps L and TL.

10.07 If a central office arranged for calling party control disconnects first, all relays release, all lamps are extinguished and the station is returned to local PBX dial tone.

10.08 If a central office arranged for joint control disconnects first, no action occurs until the central office times out; then the action is as above.

B. Incoming Central Office Trunk Call Connected to the Attendant

10.09 If the attendant disconnects first (SC3 and 4), operation of the release key causes relay AC to release in turn releasing relay ACA.

10.10 Relay ACA released disconnects the attendant telephone set from the trunk causing relay S to release in turn releasing relay S1.

10.11 Relay S1, released with S or R option, connects relay H in the trunk which operates from the central office.

10.12 Relay H operated holds relay CT in turn holding SR which supplies the off-normal ground to hold relay TLA if operated with B option and holds lamps L and TL steady.

10.13 When the central office times out or disconnects, relay H releases in turn releasing relay CT which releases relay SR. Relay SR released releases relay TLA and extinguishes lamps L and TL.

10.14 If a central office arranged for calling party control releases first, relay S releases in turn releasing relay S1.

10.15 Relay S1 released releases relay ACA (with X option) and relay CT.

10.16 Relay ACA released releases relay AC.

10.17 Relay CT released releases relay SR which removes the fundamental ground and extinguishes lamps L and TL, restoring the trunk to normal.

10.18 If Y option is provided and the attendant has not disconnected when relay SR releases, the action is the same as if the attendant initiates an outgoing call.

10.19 When the attendant disconnects, all relays release and all lamps are extinguished.

10.20 If a central office arranged for joint control disconnects first, no action occurs until the central office times out at which time the action is as above.

C. Incoming Central Office Trunk Call Held by the Attendant

10.21 If a central office arranged for calling party control disconnects from a hold condition after the attendant has released and the call was originated at the central office, the trunk relays release in the following order: S, S1, CT, SR, TLA, and HD. Lamps L and TL are extinguished when relay SR releases.

10.22 If the attendant has not restored the pickup key with Y option furnished, all operated relays release; but when the HM relay and SR relay release, relays ACA and S reoperate causing the trunk to function as for an attendant originated call. When the attendant disconnects, all reoperated relays release and all lamps are extinguished.

10.23 If the central office disconnects from a hold condition before the attendant restores the pickup key and X option is furnished, relay S releases releasing relays ACA and S1.

10.24 Relay ACA released releases relays HD, AC, and SP in cordless position circuit.

10.25 Relay HD released releases relay S1. Relay S1 released releases relay CT which releases relay SR removing the off-normal ground.

10.26 Relays HM and TLA release and all lamps are extinguished.

10.27 If the central office is arranged for joint control and the central office disconnects, the holding bridge in the trunk holds the connection until the central office times out at which time disconnection is the same as above.

D. Outgoing Call from Station to Central Office

10.28 If the central office disconnects first, no action takes place in the trunk circuit and when the station disconnects, all trunk relays release in order as follows: relay S, S1, CT, SR, TLA, and HM. (RT releases if call was completed on a dial back basis.)

10.29 Relay SR released extinguishes lamps L, SL, and TL.

10.30 If the station disconnects first, all relays release as above and the trunk is restored to normal.

E. Trunk Camped On Busy Station

10.31 If the central office is arranged for calling party control and the central office disconnects before the camped on trunk cuts through to the station, relay S releases in turn releasing relays S1 and DR.

10.32 Relay S1 released releases relay CT which releases relay SR. Relay SR removes the off-normal ground causing relays TLA, HM, and RS to release and extinguishes lamps L and TL. Relay HM released releases relay BY and extinguishes lamp SL.

10.33 If the central office is arranged for joint control and the calling party disconnects before the trunk cuts through to the station, the bridge in the trunk holds the connection until such time that the office times out. After time out, the trunk releases as above.

F. Trunk in a Camped On Busy Condition

10.34 If a central office arranged for calling party control disconnects first after the attendant has advised the calling party of the progress of the call, relay S releases causing relays DR and S1 to release.

10.35 Relay S1 released releases relay CT in turn releasing relay SR.

10.36 Relay SR released removes the off-normal ground to release relays SP and FB in the cordless position circuit, release relays RS, HM, TLA, and FF and extinguish lamps L and TL.

10.37 Relay HM released extinguishes lamp SL and releases relay BY.

10.38 If X option is provided, relay ACA releases when FF and RS release releasing relay AC.

10.39 If Y option is furnished, relay ACA remains operated or reoperates when relay HM releases causing the trunk to function as for an attendant originated outgoing call.

10.40 When the attendant disconnects, all relays release and all lamps are extinguished.

10.41 If the attendant disconnects first, relay AC releases in turn releasing relay ACA which releases relays SP and FB in the cordless position circuit. When the central office disconnects, the trunk releases as described above.

10.42 If the central office is arranged for joint control, the bridge in the attendant telephone circuit holds the connection until the office times out which causes the trunk to disconnect as described for calling party control. Otherwise when the attendant disconnects, the bridge is removed from the trunk causing the central office to release.

G. Tie Trunk (Other than Ringdown) to Central Office

10.43 If a tie trunk is connected to a central office trunk circuit and the central office disconnects first, no action takes place in the central office trunk circuit. When the tie trunks disconnect, the action is the same as for a station.

H. Incoming Central Office Trunk to Tie Trunk (Other than Ringdown)

10.44 When a central office trunk is connected to a tie trunk and the central office arranged for calling party control disconnects first, relay S releases causing relays S1, CT, and SR to release in turn.

10.45 Relay SR released releases relays HD, HM, TLA, TT, RT, and extinguishes lamps L and TL.

10.46 Relay HM released extinguishes lamp SL and relay HD released releases relays P and SL. The central office trunk is now normal.

10.47 If the tie trunk disconnects first, relay P releases causing relays S, S1, CT, and SR to release in turn.

10.48 Relay SR released functions as above to release the trunk.

10.49 If the central office still has not disconnected, the action is the same as a seizure from the central office during the silent period.

10.50 If a central office arranged for joint control disconnects first, no action occurs until the central office times out; then the action is as above.

J. Ringdown Tie Trunk to Central Office

10.51 When a ringdown tie trunk is connected to a central office arranged for calling party control and the tie trunk disconnects first or last, nothing happens.

10.52 When the central office disconnects, relays S, S1, CT, and SR release in turn.

10.53 Relay SR released releases relays TLA and HM and extinguishes lamps L and TL. Relay S1 released extinguishes lamp SLO.

10.54 If a central office is arranged for joint control, no action occurs until the central office times out; then the action is as above.

K. Central Office Trunk to Ringdown Tie Trunk

10.55 The only difference between this type call and a ringdown tie trunk call to a central office is that relay TT is operated when the central office trunk is connected.

L. Incoming Central Office Trunk Call Connected to a Station Via the Auxiliary Position Circuit

10.56 When the PBX is on remote trunk answer operation and the answering station disconnects, the auxiliary position circuit opens the loop to the central office through which relay S is held operated and opens the path holding relay AC operated.

10.57 Relays S and AC released function as described under disconnection for an incoming central office trunk call connected to the attendant.

11. EXPLANATION OF OPTIONS

A. Option A

11.01 When the attendant places a call to a toll office and disconnects for any reason, the toll operator is unable to rering on the central office trunk circuit unless option A is provided.

11.02 The inability to rering on the trunk circuit is due to the operation of relay TLA which opens the operating path of relay R1 which is required to operate the audible signal and flash the trunk lamp.

11.03 Wiring option A prevents relay TLA from operating unless the attendant operates the hold key in the cordless position circuit. With this wiring option, the toll operator may rering the PBX attendant as follows:

11.04 If the attendant disconnects, the rering locks in a flashing trunk lamp and the audible signal follows the ringing current.

11.05 If the attendant holds, the flashing trunk lamp and audible signal both follow the ringing current.

11.06 Diode A prevents the locking of relay H after the toll-allowed relay in the trunk circuit has operated.

B. Option ZB

11.07 When the secrecy feature is provided and the central office trunk camps on a busy station, the attendant is prevented from reporting back to the calling central office party unless the trunk is removed from the camp-on condition.

11.08 Option ZB adds a contact of the ring start relay in the control path of splitting relay of the cordless position circuit; therefore, the connection will not be split until the ring start relay has operated.

C. Option ZH

11.09 If a trunk is camped on a busy station and the party connected to the busy station disconnects while the busy station remains in the off-hook condition, it is possible for the busy station and the party connected to the camped on trunk to talk with reduced transmission through the FB capacitor.

11.10 To prevent this, option ZH is added in conjunction with one of options ZL, or ZJ. With option ZH, the path through the FB capacitor is opened when relay DR operates.

D. Option ZD

11.11 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 unless option ZD is provided.

11.12 Option ZD provides for each BZ (buzzer) lead to be separate and to connect to relay contacts in the cordless position circuit.

11.13 Straps are added across the make and break contact 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 BZ leads not strapped are opened. Only those BZ leads strapped will cause the common ringer to operate.

E. Option ZN

11.14 With option ZN, trunk units 8 and 9 are used as single digit dial 8 long distance trunks. On incoming calls from the toll office, the trunks function as a regular central office trunk; outgoing they are not available unless a single digit 8 is dialed and converted to 90.

11.15 When the SD relay in the dial pulse register operated, the IT lead is connected toward the marker circuit and the trunk is selected.

F. Option ZO

11.16 Option ZO prevents preliminary pulse emission upon seizure of the central office trunk.

G. Option ZP

11.17 Option ZP extends delay single digit dialing to trunks 6 and 7. Option ZP and ZN are the same otherwise.

H. Option ZQ

11.18 Option ZQ makes the trunk busy to the marker when the trunk is being used for a night connection with a cord switchboard.

I. Option ZS

11.19 Option ZS provides steady audible signal to a switchboard attendant when the central office trunk is seized by an incoming call.

J. Option ZV

11.20 Option ZV isolates a trunk ground from the central office ground on the ring side of the line when the attendant reconnects after camp-on.

K. Option ZZ

11.21 Option ZZ enables the trunk to function with the auxiliary position circuit for remote trunk answering.

L. Option YA

11.22 Option YA provides wiring associated with apparatus figure 6 to provide indication of camp-on.

M. Apparatus Figure 5

11.23 Option figure 5 prevents false flashing signals (false recall) when the trunk is wired to a panel central office.

N. Apparatus Figure 6

11.24 Option figure 6 connects a warning tone of approximately one-half second from the cordless position circuit to the tip and ring as an indication of a central office trunk camped on a busy station.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Maximum External Loop Resistance for Tripping during the silent interval - 1400.

1.02 Maximum External Loop Resistance for Tripping during the ringing interval - 2000.

1.03 The trunk conductor loop resistance plus the maximum station loop resistance of the S relay shall not exceed the central office subscriber range of the connecting central office less 65 ohms.

2. FUNCTIONAL DESIGNATIONS

2.01 The functional meanings of the designations of the relays of the central office trunk circuit are listed below:

Designation	Meaning
AC,ACA	Attendant Connector
BY	Busy
CT	Cut Through
DR	Delayed Ring
FF	Fast Flash
H	Historical Designation (Monitors Tip and Ring Toward Central Office)
HD	Hold
HM	Hold Magnet Slave
IC	Indicate Camp-On
MC	Marker Connector
N	Night Service
N1	Auxiliary Night Service
P	Polarized
R	Ringup
R1	Ringup Auxiliary
RS	Ring Start
RT	Ring Trip
S	Supervisory
S1	Supervisory Auxiliary
SE	Sleeve of Answer Jack
SL	Sleeve
SR	Slow Release
TLA	Toll Allowed
TT	Trunk Terminating

3. FUNCTIONS

A. Incoming Calls

3.01 To make the link end of the trunk busy to the marker when the central office end is seized.

3.02 To light the trunk lamp steadily when the central office trunk is seized during the silent interval of the ringing cycle.

3.03 To flash the trunk lamp at 120 ipm and operate the cordless position audible signal when central office ringing is received.

3.04 To trip ringing, light the trunk lamp steadily, silence the cordless position audible signal, and complete the transmission path to the cordless position circuit when the attendant answers.

3.05 To hold and split the central office end of the trunk from the attendant, flash the trunk lamp at 30 ipm and complete the transmission and dialing path from the cordless position to the line end of the trunk (thereby furnishing local dial tone) when the hold key is momentarily depressed.

3.06 To provide for tandem operation from a tie trunk which is arranged for tandem dial operation.

3.07 To flash the station lamp at 30 ipm when dialing is completed until the called line answers.

3.08 To exclude the central office from the talking circuit until the attendant releases after dialing into the PBX.

3.09 To light the trunk and station lamps steadily when the talking circuit is completed.

3.10 To camp-on a busy station line and give a warning tone to the station user as an indication of camp-on.

3.11 To flash the station lamp at 60 ipm and transmit busy tone to the attendant when the trunk circuit camps-on a busy line.

3.12 To flash the station lamp at 120 ipm and transmit 120-ipm busy tone to the attendant when the trunk circuit encounters a camp-on busy.

3.13 To provide camp-on busy indications in response to an all called trunks busy condition.

3.14 To remove the splitting feautre and disconnect the attendant when the release key is operated, preparatory to reporting a busy to the calling party.

3.15 To reconnect the transmission path between the central office and the attendant when the pickup key is reoperated to report a busy to the calling party.

3.16 To release the called line, extinguish the station lamp and steer the attendant to the central office when the hold key is momentarily operated to discharge a camp-on, camp-on busy, or line does not answer call.

3.17 To flash the station lamp at 120 ipm and operate the cordless position ringer steadily when the called line recalls the attendant.

3.18 To light the station lamp steadily, silence the ringer, and bridge the attendant on the talking circuit when the pickup key is operated to answer a recall.

3.19 To exclude the central office from the talking circuit when the attendant answers a recall if the secrecy option is provided.

3.20 To release the calling line and extinguish the station lamp when the attendant momentarily operates the hold key to transfer a call.

3.21 To flash the trunk lamp at 30 ipm, hold the central office and re-engage the PBX equipment to provide local dial tone when the hold key is momentarily reoperated to transfer a call.

3.22 To release and extinguish the station and trunk lamps on disconnect.

3.23 To provide delay-through supervision.

B. Outgoing Calls from Stations or Trunks

3.24 To light the trunk and station lamps steadily and make the circuit test busy to the marker after seizure.

3.25 To signal the central office.

3.26 To connect the calling line to the central office when the operator answers in the case of a manual central office or when the dial equipment functions and is ready to receive dial pulses in the case of a dial central office.

3.27 To disconnect toll-denied lines from the central office and divert them to busy tone when a toll trunk is called.

3.28 To provide for reringing a toll-allowed station from the toll office when toll delays are experienced.

3.29 To provide outgoing central office connections from restricted stations on a dial-back basis.

3.30 To rering the cordless position circuit when the toll operator rerings on a delayed toll call to a restricted station.

3.31 To release the station line, extinguish the station lamp, flash the trunk lamp at 120 ipm, and operate the cordless position ringer if the trunk circuit is seized by an incoming call after the station has been diverted to busy tone due to being denied access to toll.

3.32 To hold the PBX end of the trunk busy until the central office end of the trunk is released.

3.33 To provide a disconnect signal to the central office when the PBX station disconnects.

3.34 To extinguish both station and trunk lamps when both PBX line and central office finally disconnect from the trunk circuit.

C. Outgoing Calls Originated by the Attendant

3.35 To light the trunk lamp steadily and make the circuit test busy to the marker when the attendant originates an outward call.

3.36 To signal the central office.

3.37 To connect the attendant telephone circuit through to the central office when the operator answers in a manual office or when the dial central office is ready to receive dial pulses.

3.38 To flash the trunk lamp at 30 ipm and place a holding bridge across the central office end of the trunk when the attendant momentarily operates the hold key and then the release key to hold the trunk.

3.39 To light the trunk lamp steadily and remove the holding bridge when the trunk circuit is re-entered again by the attendant.

3.40 To permit rering from the central office into the holding bridge, to flash the trunk lamp at 120 ipm and operate the cordless position ringer.

3.41 To provide a disconnect signal to the central office when the attendant disconnects.

3.42 To extinguish the trunk lamp when the attendant disconnects.

D. Functions With Key Telephone Set Used as Attendant Position

3.43 To provide only the moving lamp signal when moving signals are present.

3.44 To operate exactly the same as the cordless position does except that the switchhook replaces the pickup and release keys and no no-test key is provided.

3.45 To provide the attendant a means of establishing night connections between any central office trunk and any station.

E. Functions When Trunk is Used With a Cord Switchboard

3.46 To provide a trunk appearance at a cord switchboard.

3.47 To make the trunk busy to the marker when being used for night connections.

3.48 To provide a steady audible signal to a switchboard attendant on incoming calls.

F. Functions With Auxiliary Position Circuit When PBX is on Remote Trunk Answer Operation

3.49 To signal the auxiliary position circuit to activate the remote answer signal when an incoming call is received.

3.50 To trip ringing and complete the transmission path to the cordless position circuit when the call is answered by a PBX station.

3.51 To hold and split the central office end of the trunk from the answering station and complete the dialing path from the auxiliary position circuit to the line end of the trunk (thereby furnishing local dial tone) when the call is to be completed to another station.

3.52 To exclude the central office from the talking circuit until the trunk answering station disconnects after dialing into the PBX and answer by the called station.

3.53 To provide camp-on busy indication in response to a called station busy condition.

3.54 To release the called line and steer the trunk answering station to the central office under control of a signal from the trunk answering station.

3.55 To release the called line and then release if the trunk answering station disconnects without discharging a called station busy or called line does not answer call.

3.56 To release on disconnect.

3.57 To provide delay-through supervision.

G. Functions With Station Dial Transfer Trunk Circuit and Controller Circuit When PBX is Arranged for Station Dial Transfer Operation

3.58 To signal the station dial transfer controller circuit on station recall.

3.59 To light the trunk and station lamps steadily while transferring occurs.

3.60 To activate the marker in calling a dial pulse register when a station has been attached to the transfer trunk circuit.

3.61 To transmit dial tone to a transferring station when a dial pulse register has been attached to a transfer trunk circuit.

3.62 To transmit pulses into the register when pulsing starts after a register is attached to the line end of the trunk circuit.

3.63 To trip ringing and complete the transmission path through the station dial transfer circuits when a transfer call is answered by a PBX station.

3.64 To flash the station lamp at 120 ipm and operate the cordless position audible signal when a PBX station dials zero when transferring.

3.65 To hold and split the central office end of the trunk and complete the transmission and dialing path when a PBX station momentarily operates his switchhook to transfer a call.

3.66 To make the trunk busy to the marker when being used in transferring a call.

3.67 To return a transferring station to the attendant without going through an attendant trunk.

3.68 To release a PBX station attached to the line end of the trunk after the transfer has taken place.

3.69 To release the transferring and transferred lines when the trunk end station disconnects.

3.70 To release or disconnect.

3.71 To provide delay-through supervision.

4. CONNECTING CIRCUITS

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

4.02 This circuit will function with the following PBX system and central office circuits:

(a) 756A PBX Line, Link and Marker Circuit - SD-65741-01.

(b) 756A PBX Alarm, Transfer, and Test Circuit - SD-65743-01.

(c) 756A PBX Cabling Diagrams - SD-65746-01.

(d) 756A PBX Cordless Position Circuit - SD-65757-01.

(e) Typical Subscriber Line Circuit Arranged for Ground Signaling on the Ring Conductor - SD-25553-01.

(f) Typical Long Trunk Circuit - SD-66192-01.

(g) SxS Toll Diverting Trunk Circuit - SD-32067-01.

(h) Ringing Circuit - SD-81288-01.

(i) Power Supply Circuit - SD-81326-01.

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

(k) No. 608A Auxiliary Signal, Fuse Alarm, Battery Cut-Off, and Miscellaneous Circuit - SD-65722-01.

(l) Toll Subscribers Line Circuit - SD-56501-01.

(m) 756A Station Dial Transfer Controller Circuit - SD-66909-01.

(n) 756A Auxiliary Position Circuit - SD-66910-01.

(o) 756A PBX Feature Cabling Diagram - SD-66920-01.

(p) Station Message Register Pulse Circuit SD-66915-01.

(q) Station Message Register Surcharge Circuit - SD-66922-01.

5. TAKING EQUIPMENT OUT OF SERVICE

5.01 The central office trunk circuit can be taken out of service by removing the strap between terminals 18 and 28 on the unit terminal strip and connecting a strap between terminals 18 and 17. This busies the trunk toward the marker. To prevent incoming calls, the central office trunk should be made busy at the central office.

6. MANUFACTURING TESTING REQUIREMENTS

6.01 The 2-way central office trunk shall be capable of performing all the service functions specified in this circuit description and of meeting all the requirements of the circuit requirements table.

7. ALARM INFORMATION

A. Fuse Alarm

7.01 An operated fuse supplying the 2-way central office trunk circuit will result in a major alarm being transmitted to the plant service center if alarm sending is provided and in any case by a visual signal at the attendant position and in the alarm transfer and test circuit.

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

A.1 To provide for station message registration.

D. Description of Changes

D.1 Sheet B6 is added.

D.2 Option YB is added and option YC is designated to provide operation with the station message register pulse and surcharge circuits.

D.3 On sheets B3, B5, C2, and E7, minor corrections are made.

D.4 On sheet B3 sheet note D is added.

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