

**CANCELLED - 11-20-72**

**558A PRIVATE BRANCH EXCHANGE  
DESCRIPTION OF SYSTEM OPERATION**

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**1. INTRODUCTION**

**GENERAL**

**1.01** This section describes the 40-line, 10-trunk, 558A manual crossbar private branch exchange (PBX) that uses a 29A2-type console as the attendant facility.

**1.02** The PBX switching equipment is quiet in operation and is housed in a single module (cabinet). This cabinet (Fig. 1) is designed to blend with most general office furniture. Therefore, this PBX equipment may be located in general office space on customer premises, thus eliminating the need for a separate equipment room or enclosure.

**1.03** The attendant facility is a cordless rotary dial (29A2R) or a TOUCH-TONE® (29A2T) telephone console (Fig. 2). This console is attractive in design and may be ordered in one of four colors (green, white, beige, or gray).

**1.04** Power for the 558A PBX is derived from a batteryless power supply that is located in the switching cabinet.

**1.05** For more information on the 558A PBX, reference should be made to the following Bell System Practices:

- (a) Section 536-580-210 (Identification, Installation, and Connections - SD-5E060-01).
- (b) Section 536-580-310 (Attendant Console, 29A2-Type Console - Method of Operation).
- (c) Section 536-580-510 (Manual Tests).

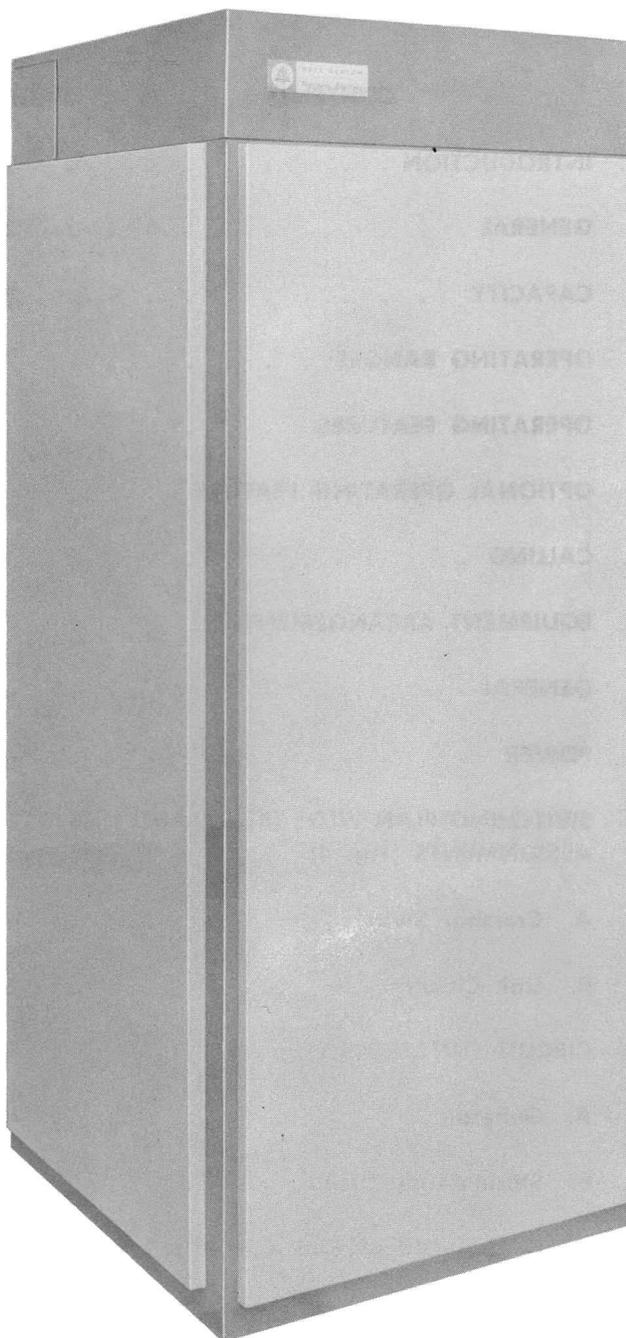
**CAPACITY**

**1.06** The capacity of the 558A PBX is as follows:

- (a) Station lines - 40

(b) Central office trunks - 10

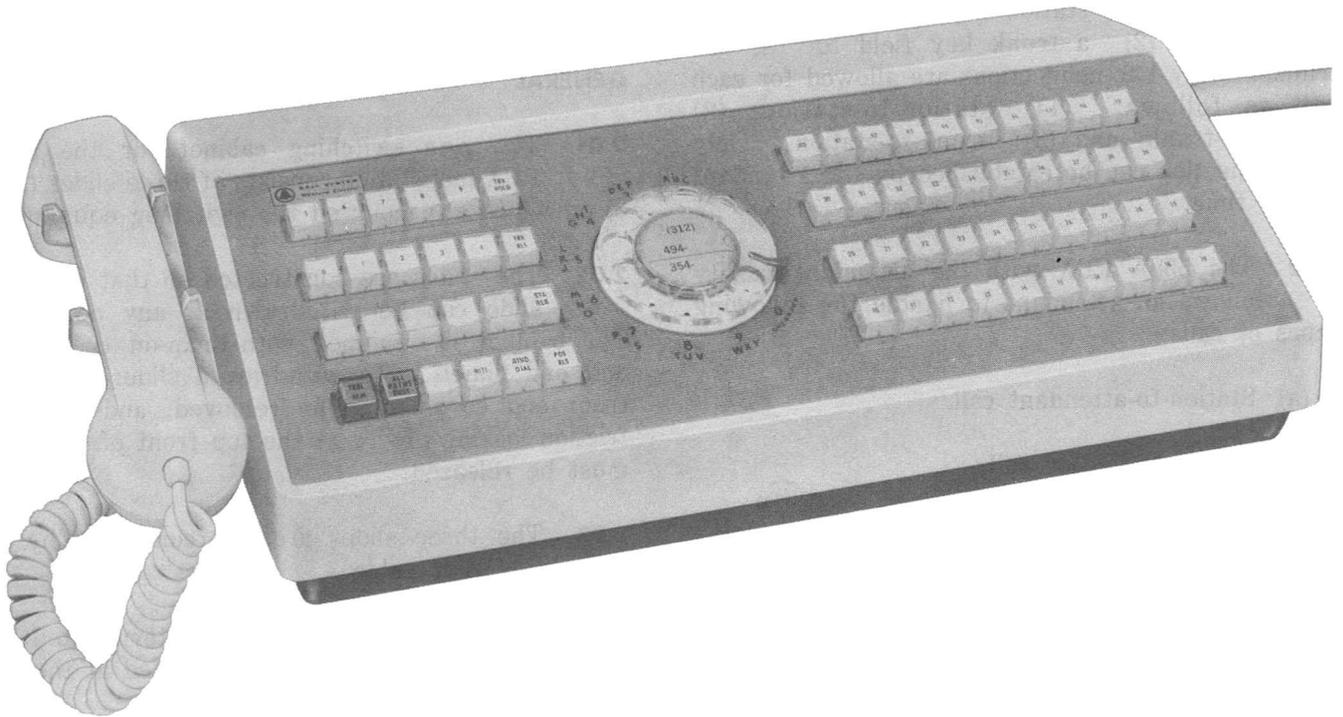
(c) Links - 10.



**Fig. 1—558A PBX Switching Cabinet**

**OPERATING RANGES**

**1.07** The maximum conductor loop resistance (including the telephone set) for the station



**Fig. 2.—Attendant Console for Use with the 558A PBX**

lines is 1200 ohms under normal PBX power supply conditions.

**1.08** The trunk conductor loop resistance plus the maximum station loop resistance shall not exceed the central office customer conductor loop range of the connecting central office less 25 ohms.

#### **OPERATING FEATURES**

**1.09** The 558A PBX with the attendant facility provides the following operating features for the 40-line installation:

- (a) A station key and lamp for each of the forty station lines.
- (b) A trunk key and lamp for each of the ten central office trunks.
- (c) Visual and audible signals for trunk and station incoming and visual signals for outgoing calls.
- (d) Automatic ringing on a called station.

- (e) Recall from a called station on an incoming trunk-to-station call.
- (f) Flexible night connections that are set up by the attendant.
- (g) Power failure transfer that connects designated central office trunks to certain station lines when loss of power is experienced.
- (h) Visual signals for trouble and all paths busy alarms.

#### **OPTIONAL OPERATING FEATURE**

**1.10** The 558A PBX with the attendant facility provides the following optional feature:

- (a) Station originated *second* central office call without attendant assistance.

#### **CALLING**

**1.11** In the normal mode of operation, all calls in the system are answered and completed by the attendant by means of console key operations. The connections for the calls are established by

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means of: (1) a station key field for the forty stations; and (2) a trunk key field for the ten trunks. Only two connections are allowed for each call as follows: (1) station-to-station; (2) station-to-trunk; and (3) trunk-to-station. Only one connection can be established by the attendant at one time.

**1.12** The 558A PBX with the attendant facility allows an attendant to handle the following types of calls:

- (a) Station-to-attendant call.
- (b) Station-to-station call.
- (c) Station to central office trunk call.
- (d) Central office trunk-to-attendant call.
- (e) Central office trunk-to-station call.
- (f) Incoming central office trunk call to attendant with all paths busy.
- (g) Attendant-to-station call.
- (h) Attendant-to-central office call.
- (i) Attendant to central office call with all paths busy.

**1.13** When a commercial power failure occurs, the 558A PBX installation is provided with five power failure connections on an automatic basis. When a power failure occurs, station lines 10, 11, 12, 13, and 14 are automatically connected to central office trunks 0, 1, 2, 3, and 4, respectively. Station lines 10 through 14 now have dialing capabilities.

**1.14** The attendant may establish a night connection between any *idle* station line and any *idle* central office trunk. Thus, the idle station line selected for the night connection may directly originate calls to the central office or receive incoming calls from the central office. A maximum of *ten* night connections may be established.

## 2. EQUIPMENT ARRANGEMENT

### GENERAL

**2.01** The *one* switching cabinet for the 558A PBX installation consists of three slides (Fig. 3) on which are mounted the switching equipment.

**2.02** The slides are constructed so that only one slide can be withdrawn at any one time. The cabinet is equipped with snap-on type front and end panels. To withdraw a slide: (1) the front end cover must be removed; and (2) the friction locking device at the top front of the slide must be released.

**2.03** The three slides are interconnected by an interslide cable.

**2.04** Cabling from the PBX is terminated on 66-type connecting blocks located at the top of slide one.

### POWER

**2.05** The batteryless power supply (see slide one of the cabinet) is equipped with a 3-conductor cable for connection to a 105- to 125-volt ac, 60-cycle; single-phase commercial power source.

**2.06** The commercial power source must be an individually fused 15 amperes circuit.

## 3. SWITCHING PLAN WITH TRUNK AND LINE ASSIGNMENTS (Fig. 4)

### A. Crossbar Switch

**3.01 General:** One of the basic elements of the 558A PBX installation is the 100-point, 6-wire crossbar switch. The crossbar switch is essentially a relay mechanism. For this installation, the crossbar switch consists of ten horizontal paths and ten vertical paths. Any horizontal path can be connected to any vertical path by means of contacts controlled by the operation of relay magnets. The points of connection are known as crosspoints.

**3.02 Horizontal Paths:** There are five horizontal selecting bars mounted across the face of each switch. Each selecting bar has flexible selecting fingers attached to it, one finger for each vertical path. The bars are rotated slightly by the operation

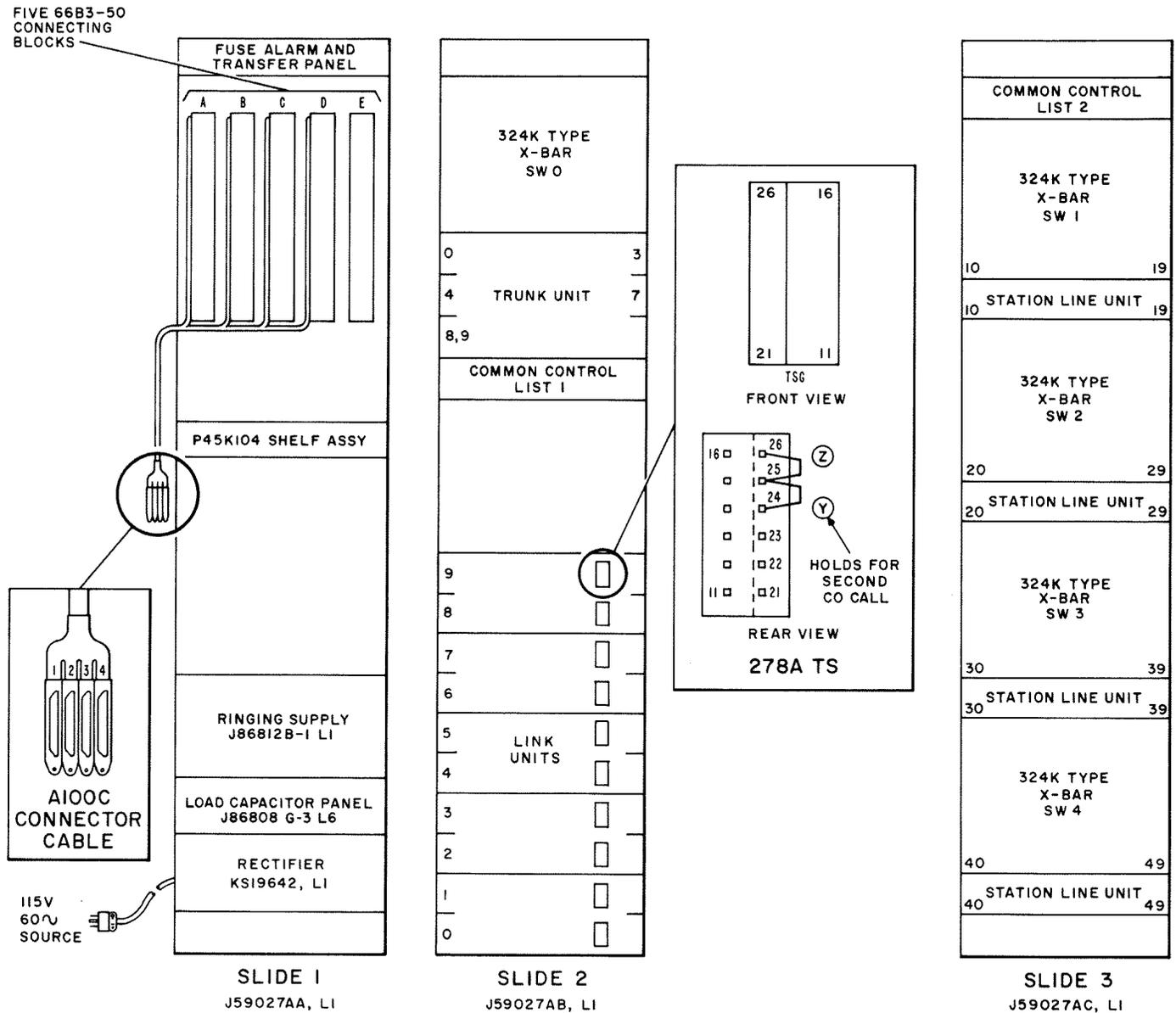


Fig. 3—558A Equipment Arrangement

of a selecting magnet to cause the select fingers to go either up or down.

**3.03 Vertical Paths:** Ten vertical units are mounted on the switch and each unit forms one vertical path. Each unit operates under control of a holding magnet and has ten groups of contacts (one for each horizontal path). Each group of contacts consists of six pairs of contact springs.

**3.04 Use of the Crossbar Switches for Station Line Circuits:** Four crossbar switches

(switches 1 through 4) are used for connection to the forty station line circuits. These forty line circuits appear on the forty verticals of the four switches. The ten horizontal paths are used as ten 6-wire links.

**3.05 Use of the Crossbar Switch for Trunk Circuits:** One crossbar switch (switch 0) is used for the ten central office trunk circuits. These ten trunks appear on the ten verticals of the switch. The ten horizontal paths are used as ten 6-wire links.

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### B. Link Circuit

**3.06 General:** Another essential element of the 558A PBX installation is the 6-wire link circuit. The link circuit is basically a relay controlled circuit. Ten 6-wire link circuits are available for use.

**3.07 Talking Connections:** Relay circuitry is provided to make possible the following types of talking connections:

- (1) Two stations with or without an attendant.
- (2) A station and a trunk with or without an attendant.
- (3) Attendant and a station.
- (4) Attendant and a trunk.

**3.08 Supervision:** Relay circuitry is also provided for: (1) trunk and station line supervision; (2) ringing conditions; and (3) trunk lamp flashing.

**3.09 Station Line Access to Links:** The horizontals on the four crossbar line switches are wired so that each of the forty station lines has access to each of the ten link circuits.

**3.10 Central Office Trunk Access to Links:** The horizontals on the crossbar trunk switch are wired so that each of the ten central office trunk circuits has access to each of the ten link circuits.

**3.11 Link Selection:** Link selection is controlled by the select magnet control circuit. The sequence of link selection begins with link 0. Therefore, link 0 will be selected unless it is busy. If link 0 is busy, link 1 will be selected, etc.

## 4. CIRCUIT FUNCTIONS (Fig. 5)

### A. General

**4.01** Figure 5 is a functional block diagram of the 558A PBX.

### B. Station Line Circuit

**4.02** Each of the forty station line circuits functions to:

- (1) Flash the station lamp at 60 ipm and operate the attendant's audible signal when a station lifts the receiver.
- (2) Light the station lamp steadily when the station line is seized by the attendant.
- (3) Transfer the tip, ring, and sleeve leads of the station line circuit from the terminating verticals of the crossbar switch to the originating verticals if the station is requesting service.
- (4) Transfer the tip, ring, and sleeve leads of the station line circuit from the terminating verticals of the crossbar switch to the originating verticals if the station is to be night connected.

### C. Central Office Trunk Circuit

**4.03** Each of the ten central office trunk circuits functions to:

- (1) Flash the trunk lamp at 60 ipm and operate the attendant's audible signal when central office ringing is received.
- (2) Transfer the trunk lamp from steady to a 120 ipm wink when the trunk is placed on hold.
- (3) Connect directly to the attendant's telephone circuit when the attendant answers a trunk request for service while all paths are busy.
- (4) Transmit a signal to the common control circuit when the attendant answers a trunk request for service while all paths are busy.

### D. Common Control Circuit

**4.04** The common control circuit functions to:

- (1) Provide talking battery to a calling station when that station is connected to the attendant.
- (2) Prevent the attendant from extending a call to a station requesting service.

- (3) Prevent the attendant from obtaining a multiple connection by operating two or more station or two or more trunk keys simultaneously.
- (4) Prevent the attendant from adding another connection to an existing station-to-station, station-to-trunk, or trunk-to-station connection.
- (5) Exclude a calling station from the connection when the attendant extends a station request for service to a central office trunk.
- (6) Prevent the attendant from answering a recall signal until released from the present connection.
- (7) Recognize an all-paths-busy condition.
- (8) Light an all-paths-busy lamp at the console.
- (9) Transmit busy tone to all idle stations while all paths are busy.
- (10) Prepare the central office trunk circuits to allow the attendant to answer requests for service from central office trunks while all paths are busy.
- (11) Recognize when the crosspoints close between a link circuit and a station line circuit requesting service.
- (12) Provide a means for making the link circuits busy on an individual basis.
- (13) Prepare the station line circuits, link circuits, and the central office trunk circuits for flexible night connections when the night service key is operated.
- (14) Light an attendant dial lamp at the console when the attendant extends a station to a central office trunk.
- (15) Permit the attendant to reconnect the excluded station after the central office is seized on station to central office trunk call.

#### **E. Select Magnet Control Circuit**

**4.05** The select magnet control circuit functions to:

- (1) Allow the selection of the first idle link circuit on a bid for a link.
- (2) Busy a link circuit to any subsequent bids for a link.
- (3) Allow the attendant to return to an established central office trunk connection by the operation of the associated trunk key.

#### **F. Alarm and Transfer Circuit**

**4.06** The alarm and transfer circuit functions to:

- (1) Transmit an alarm signal to the console when any of the fuses in the PBX operate.
- (2) Automatically transfer five station lines directly to the central office in the event of a commercial power failure.
- (3) Disable the attendant's console when the handset/headset is removed from the console jack.
- (4) Transmit an alarm signal to the console when a power failure disconnects the flexible night connections.

#### **G. Ringing and Power Circuits**

**4.07** The ringing and power circuits function to provide:

- (1) -48 volt battery through the battery cutoff relay to trunk lamps, station lamps, and miscellaneous lamps (NITE, ALL PATHS BUSY, ATND DIAL).
- (2) -48 volt battery to the PBX circuits for talking battery and relay operation.
- (3) Ground to the PBX circuits.
- (4) Busy tone signals.
- (5) Ringing battery alarm signal.
- (6) A 10-volt ac alarm signal.

5. TYPES OF CALLS

A. Station-to-Station

5.01 Figure 6 provides a description and a block diagram of a station-to-station call.

B. Station-to-Trunk

5.02 Figure 7 provides a description and a block diagram of a station-to-trunk call.

C. Trunk-to-Station

5.03 Figure 8 provides a description and a block diagram of a trunk-to-station call.

D. Incoming Central Office Trunk Call with All Paths Busy

5.04 Figure 9 provides a description and a block diagram of an incoming central office trunk call with all paths busy.

E. Night Service Connections

5.05 Figure 10 provides a description and a block diagram of the night service connections.

F. Power Failure Transfer Connections

5.06 Figure 11 provides a description and a block diagram of the connections required to establish a talking path between certain station lines and certain central office trunks when a commercial power failure occurs.

G. Attendant Recall

5.07 **Called Station Flashes Switchhook to Recall Attendant:** Attendant recall is possible *only* on a central office trunk-to-station call. The called station may recall the attendant back to the connection by a switchhook flash. This action transfers the TRK- lamp from steady to a 120 ipm flash. Also, a 60 ipm audible tone is transmitted to the attendant. Thus, the attendant recognizes the 120 ipm flashing trunk lamp and the 60 ipm audible tone as a station recall.

5.08 **Attendant Responds to Recall Signal:**

The attendant responds to the recall signal by operating the trunk key associated with the 120 ipm flashing trunk lamp. When the TRK- lamp changes from a 120 ipm flash to steady, the attendant may release the TRK- key. Operation of the TRK- key as described establishes a three-way talking connection between the central office party, the called station, and the attendant. The attendant may again release from the connection at any time by operating the POS RLS key.

5.09 **Called Station Requests Attendant to Reconnect Central Office Trunk to Another Station:**

If the attendant, upon returning to the connection as described in 5.08, is requested by the called party to reconnect the central office party to another station, the STA RLS (station release) key must be operated. When the station lamp associated with the called station is extinguished, the attendant may release the STA RLS key.

**Note:** If the called station remains off-hook after the attendant has operated the STA RLS key, the associated lamp *will not* extinguish but will change from steady to 60 ipm. This action also activates the audible signal at the console. This condition exists until the called station goes on-hook.

5.10 **Called Party Requests Transfer to a Station That Is Busy:**

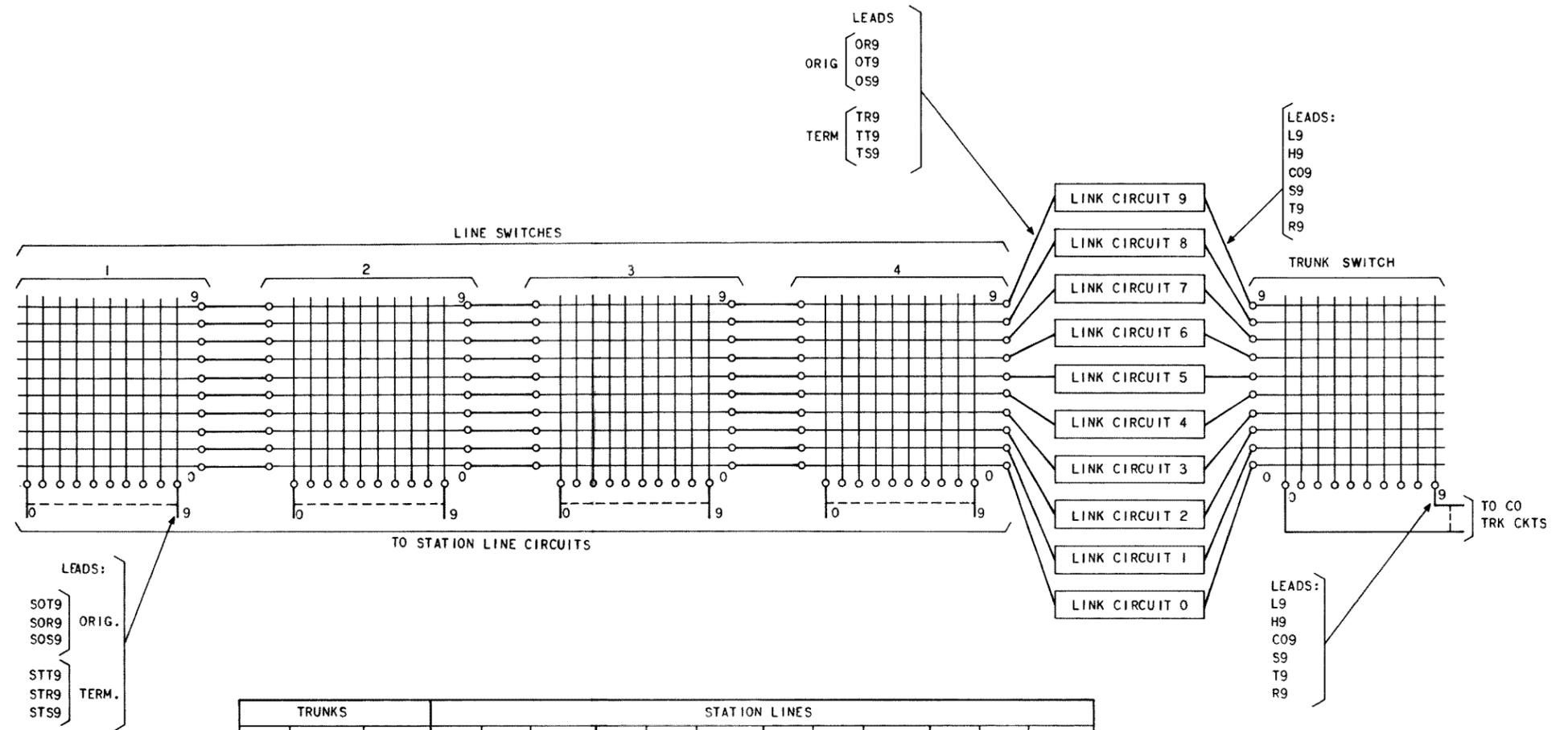
If the called party requests a transfer to a station that is busy, the attendant: (1) may place the central office trunk on hold by operating the TRK HOLD key; or (2) release the connection completely by operating the POS RLS key.

5.11 **Called Party Requests Transfer to a Station That Is Idle:**

If the called party requests a transfer to a station that is idle, the attendant may connect the trunk to the idle station by operating the associated station key.

6. TEST CONSOLE CONNECTIONS

6.01 Connectors are provided at the PBX switching cabinet for connection to a console. These connections parallel the connections made for the attendant's console and provide a means for connecting the console at the PBX switching cabinet for ease in installation and maintenance testing.



TRUNKS			STATION LINES											
NO.	SW NO.	VERT. NO.	NO.	SW NO.	VERT. NO.	NO.	SW NO.	VERT. NO.	NO.	SW NO.	VERT. NO.	NO.	SW NO.	VERT. NO.
0	0	0	10	1	0	20	2	0	30	3	0	40	4	0
1	0	1	11	1	1	21	2	1	31	3	1	41	4	1
2	0	2	12	1	2	22	2	2	32	3	2	42	4	2
3	0	3	13	1	3	23	2	3	33	3	3	43	4	3
4	0	4	14	1	4	24	2	4	34	3	4	44	4	4
5	0	5	15	1	5	25	2	5	35	3	5	45	4	5
6	0	6	16	1	6	26	2	6	36	3	6	46	4	6
7	0	7	17	1	7	27	2	7	37	3	7	47	4	7
8	0	8	18	1	8	28	2	8	38	3	8	48	4	8
9	0	9	19	1	9	29	2	9	39	3	9	49	4	9

Fig. 4—558A PBX—Switching Plan with Trunk and Line Assignments

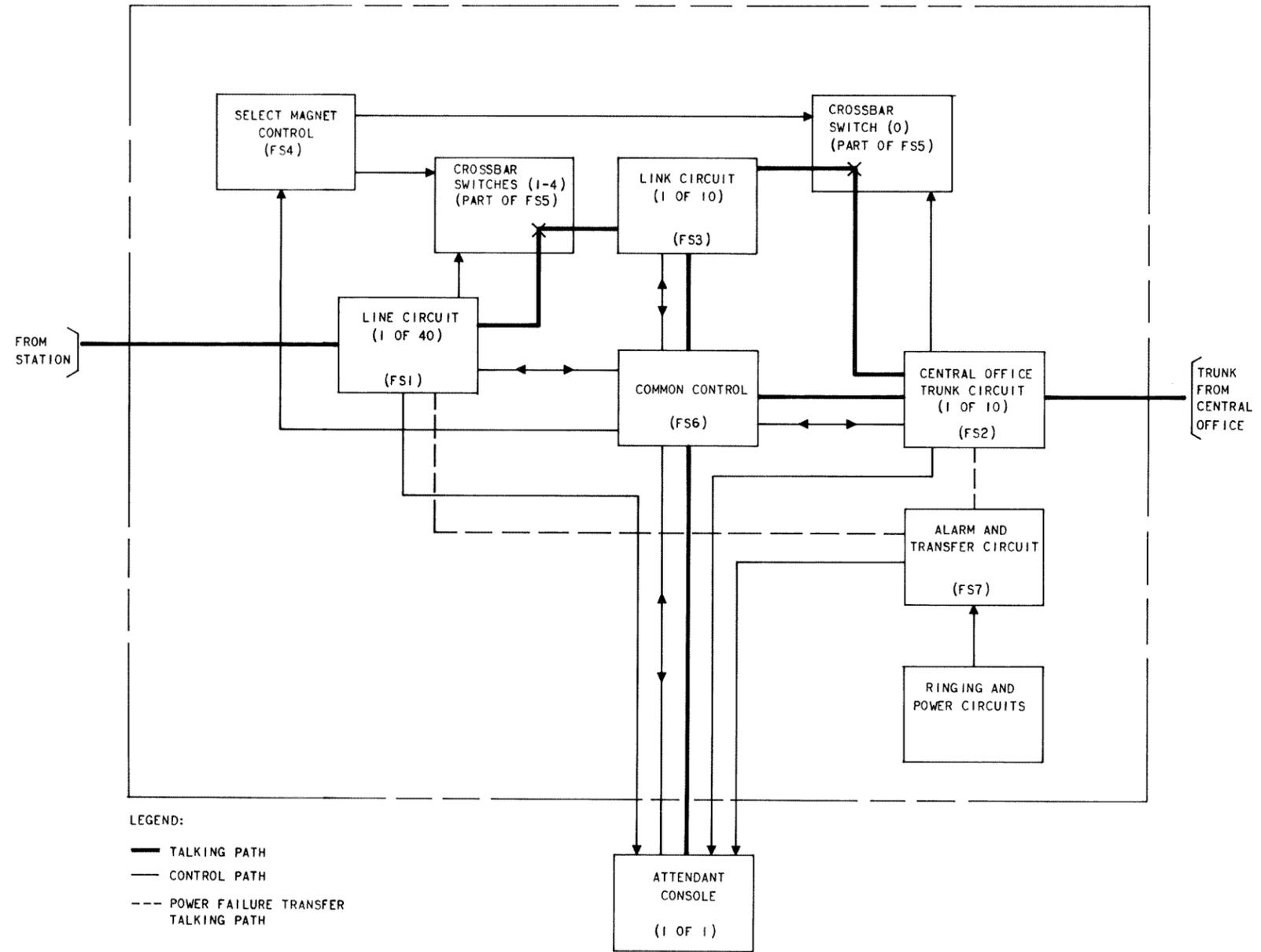
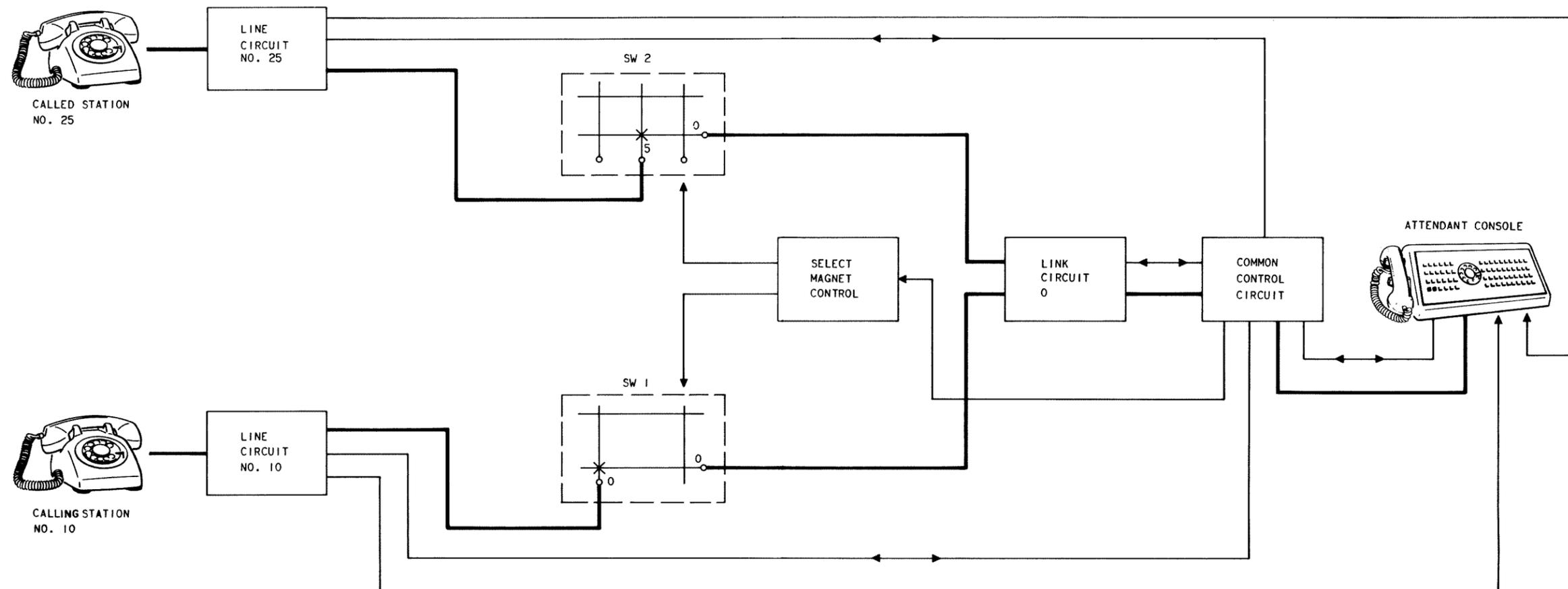


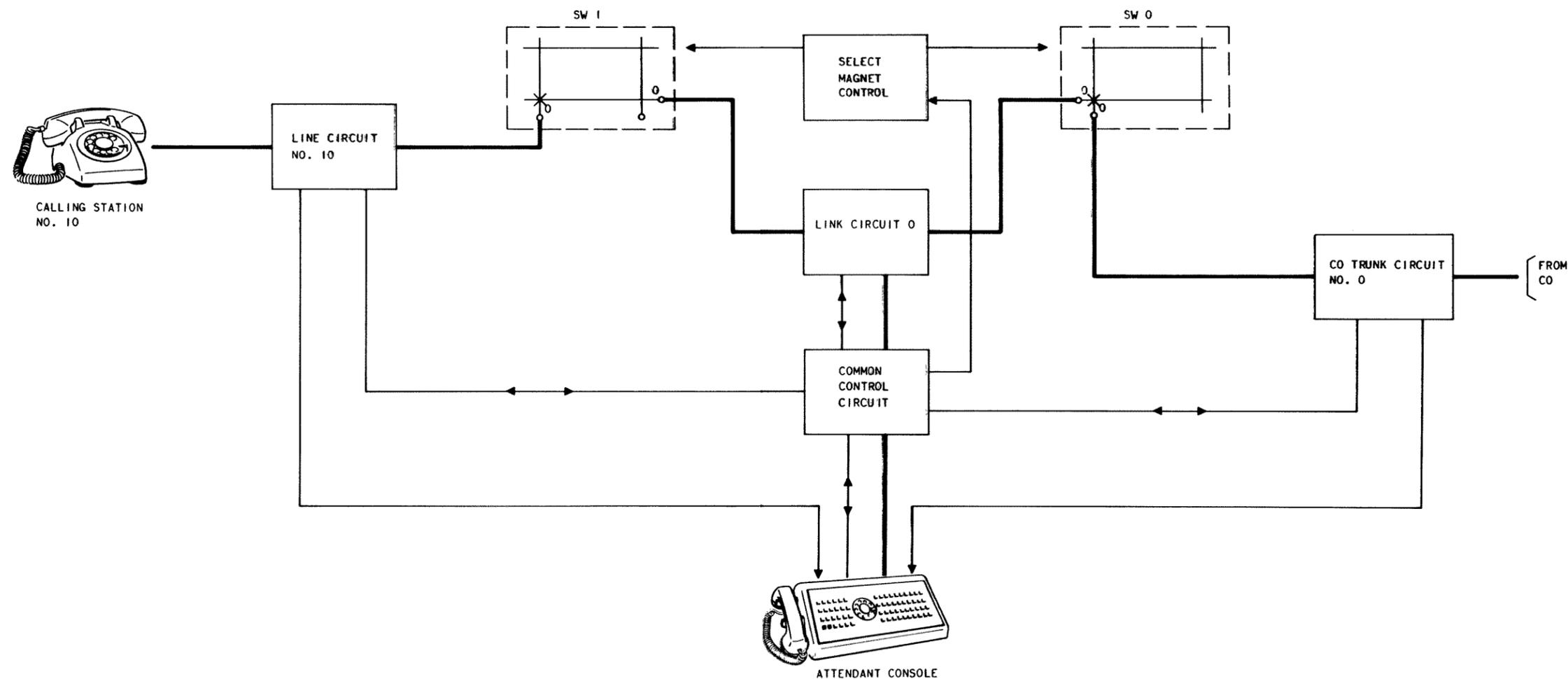
Fig. 5—558A PBX Functional Block Diagram



## NOTES:

1. FOR THIS EXAMPLE, THE FOLLOWING ASSUMPTIONS ARE MADE:
  - (A) LINK CIRCUIT 0 IS IDLE.
  - (B) STATION LINE CIRCUIT 25 IS IDLE.
2. WHEN STATION 10 LIFTS THE RECEIVER TO MAKE A CALL:
  - (A) LINE RELAY 10 OPERATES.
  - (B) STATION LAMP 10 AT CONSOLE FLASHES AT 60 IPM.
  - (C) SIG RELAY IN COMMON CONTROL CIRCUIT OPERATES TO PROVIDE AUDIBLE 60 IPM SIGNAL AT CONSOLE.
3. WHEN THE ATTENDANT OPERATES THE STATION KEY ASSOCIATED WITH THE 60 IPM FLASHING LAMP:
  - (A) SELECT MAGNETS ASSOCIATED WITH LINK 0 OPERATE.
  - (B) THE OPERATED SELECT MAGNETS ACTIVATE LINK CIRCUIT 0 WHICH SIGNALS THE COMMON CONTROL TO OPERATE THE HOLD MAGNETS ASSOCIATED WITH STATION 10.
  - (C) TALKING PATH IS NOW ESTABLISHED BETWEEN THE ATTENDANT AND STATION 10. TALKING BATTERY FOR ORIGINATING STATION 10 IS SUPPLIED BY THE COMMON CONTROL CIRCUIT. TALKING BATTERY FOR THE ATTENDANT IS SUPPLIED BY THE LINK CIRCUIT.
4. WHEN THE ATTENDANT OPERATES STATION KEY TO EXTEND THE CALL TO STATION 25:
  - (A) HOLD MAGNET ASSOCIATED WITH STATION LINE 25 OPERATES.
  - (B) OPERATED HOLD MAGNET CONNECTS STATION LINE 25 TO LINK CIRCUIT 0.
  - (C) AUTOMATIC RINGING IS APPLIED TO STATION LINE 25. ATTENDANT MAY OPERATE THE POS RLS KEY BEFORE STATION 25 ANSWERS AND BE DROPPED FROM THE CONNECTION. HOWEVER, IF THE ATTENDANT RELEASES FROM A STATION-TO-STATION CONNECTION, A RETURN TO THE CONNECTION CANNOT BE MADE.
  - (D) STATION 25 ANSWERS. TALKING PATH IS NOW ESTABLISHED FROM STATION 10 THROUGH LINE SWITCH ONE, LINK CIRCUIT ZERO AND LINE SWITCH TWO TO STATION 25. TALKING BATTERY FOR STATION 10 AND STATION 25 IS SUPPLIED BY THE LINK CIRCUIT. DISCONNECT SUPERVISION IS PROVIDED BY THE CALLING STATION 10.

Fig. 6—558A PBX—Station-To-Station Call



## NOTES:

## 1. FOR THIS EXAMPLE, THE FOLLOWING ASSUMPTIONS ARE MADE:

- (A) CENTRAL OFFICE TRUNK 0 IS IDLE.
- (B) LINK CIRCUIT 0 IS IDLE.
- (C) ATTENDANT DIALS THE CO PARTY DESIRED, ADDS THE CALLING STATION TO THE CONNECTION AND RELEASES.

## 2. WHEN STATION 10 LIFTS THE RECEIVER TO MAKE A CALL:

- (A) LINE RELAY 10 OPERATES.
- (B) STATION LAMP 10 AT CONSOLE FLASHES AT 60 IPM.
- (C) SIG RELAY IN COMMON CONTROL CIRCUIT OPERATES TO PROVIDE AUDIBLE 60 IPM SIGNAL AT CONSOLE.

## 3. WHEN THE ATTENDANT OPERATES THE STATION KEY ASSOCIATED WITH THE 60 IPM FLASHING LAMP:

- (A) SELECT MAGNETS ASSOCIATED WITH LINK 0 OPERATE.
- (B) THE OPERATED SELECT MAGNETS ACTIVATE LINK CIRCUIT 0 WHICH SIGNALS THE COMMON CONTROL CIRCUIT TO OPERATE THE HOLD MAGNETS ASSOCIATED WITH STATION 10.
- (C) TALKING PATH IS NOW ESTABLISHED BETWEEN THE ATTENDANT AND STATION 10. TALKING BATTERY FOR ORIGINATING STATION 10 IS SUPPLIED BY THE COMMON CONTROL CIRCUIT. TALKING BATTERY FOR THE ATTENDANT IS SUPPLIED BY THE LINK CIRCUIT.

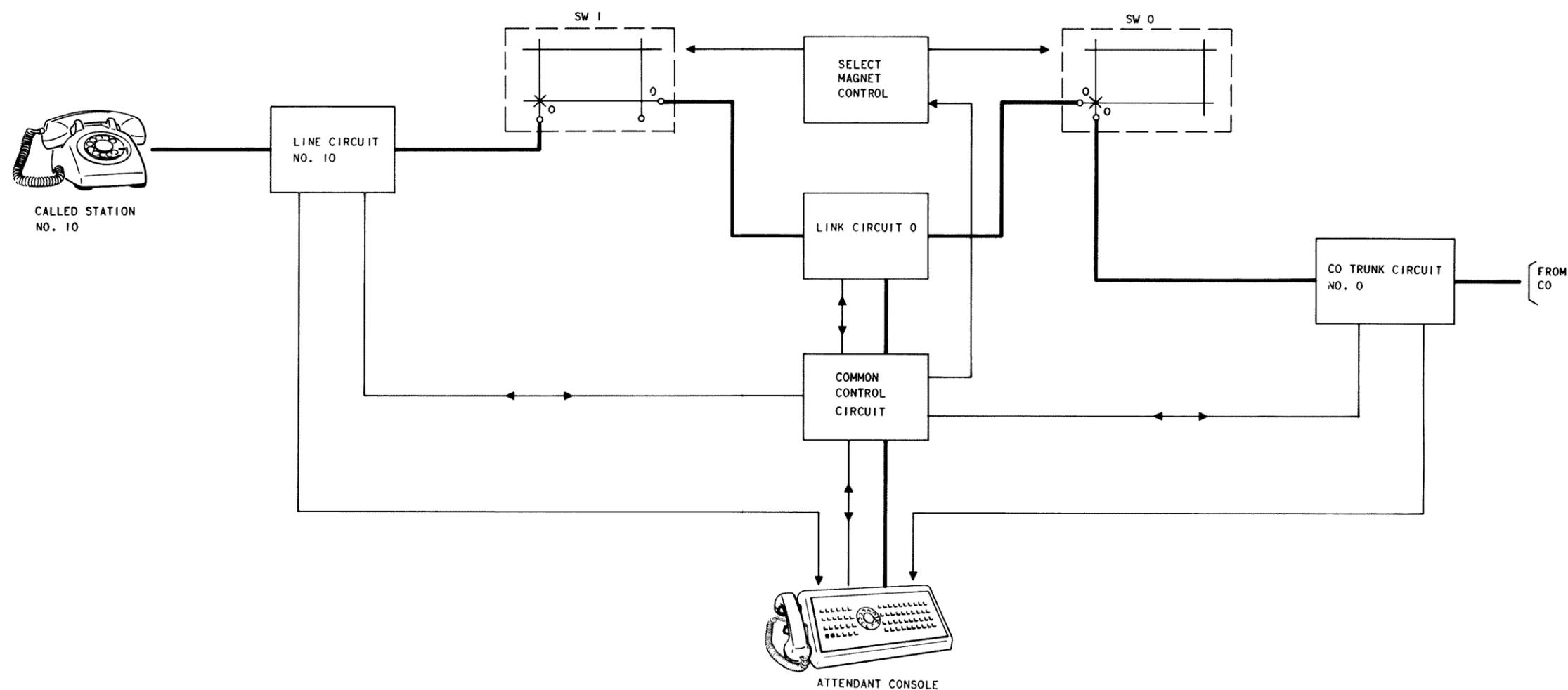
## 4. WHEN THE ATTENDANT OPERATES TRUNK KEY 0 TO EXTEND THE CALL TO CENTRAL OFFICE TRUNK 0:

- (A) HOLD MAGNET ASSOCIATED WITH CENTRAL OFFICE TRUNK 0 OPERATES.
- (B) THE OPERATED HOLD MAGNET CONNECTS CENTRAL OFFICE TRUNK 0 TO LINK CIRCUIT 0. LINK CIRCUIT 0 FUNCTIONS TO SPLIT STATION 10 FROM THE ATTENDANT AND CENTRAL OFFICE TRUNK 0.
- (C) CENTRAL OFFICE RESPONDS TO THE LOOP START AND RETURNS DIAL TONE TO THE ATTENDANT.
- (D) ATTENDANT DIALS THE NUMBER OF THE CO PARTY.
- (E) ATTENDANT ADDS CALLING STATION 10 TO CONNECTION BY OPERATING ATND DIAL KEY. 3-WAY CONVERSATION.
- (F) ATTENDANT DISCONNECTS BY OPERATING POS RLS KEY. CALLING STATION 10 IS CONNECTED TO THE CO PARTY THROUGH LINE SWITCH ONE, LINK CIRCUIT 0, TRUNK SWITCH 0, AND CENTRAL OFFICE TRUNK 0. 2-WAY CONVERSATION. DISCONNECT SUPERVISION IS PROVIDED BY CALLING STATION 10. TALKING BATTERY IS SUPPLIED BY THE CENTRAL OFFICE.

## 5. OTHER ATTENDANT ACTIONS ON A STATION TO CENTRAL OFFICE CALL:

- (A) WHEN ATTENDANT RECEIVES CENTRAL OFFICE DIAL TONE, ATTENDANT MAY OPERATE POS RLS KEY. OPERATION OF POS RLS KEY CONNECTS CALLING STATION 10 TO CENTRAL OFFICE TRUNK 0 AND DISCONNECTS ATTENDANT. CALLING STATION 10 DIALS THE CALLED NUMBER.
- (B) WHEN ATTENDANT COMPLETES DIALING CALLED NUMBER, ATTENDANT MAY OPERATE POS RLS KEY TO RELEASE FROM CONNECTION IN THIS CASE, CALLING STATION 10 IS AUTOMATICALLY ADDED TO THE CO TRUNK.
- (C) ATTENDANT MAY REENTER A STATION TO CENTRAL OFFICE CALL AT ANY TIME BY OPERATING THE ASSOCIATED TRUNK KEY.

Fig. 7—558A PBX—Station-To-Central Office Trunk Call



## NOTES:

## 1. FOR THIS EXAMPLE, THE FOLLOWING ASSUMPTIONS ARE MADE:

- (A) LINK CIRCUIT 0 IS IDLE.
- (B) STATION LINE CIRCUIT 10 IS IDLE.
- (C) ATTENDANT RELEASES AS SOON AS THE CONNECTION FROM STATION 10 TO CENTRAL OFFICE TRUNK 0 IS MADE.

## 2. WHEN THE RING-UP BRIDGE IN CENTRAL OFFICE TRUNK CIRCUIT 0 DETECTS CENTRAL OFFICE RINGING:

- (A) ATTENDANT IS ALERTED TO THE REQUEST FOR SERVICE BY THE 60 IPM FLASHING TRUNK LAMP AND THE 60 IPM AUDIBLE SIGNAL.

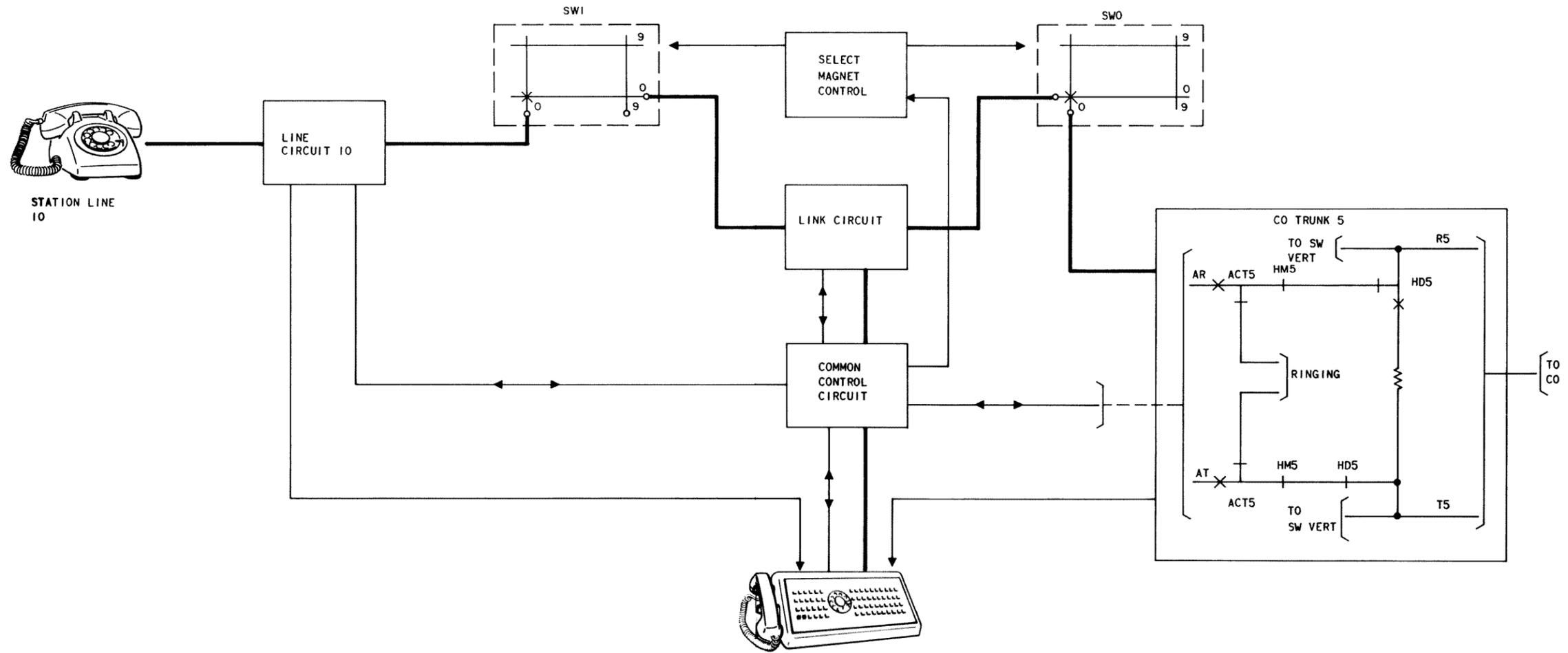
## 3. WHEN THE ATTENDANT OPERATES THE TRUNK KEY ASSOCIATED WITH THE 60 IPM FLASHING LAMP:

- (A) SELECT MAGNETS ASSOCIATED WITH LINK CIRCUIT 0 OPERATE.
- (B) THE OPERATED SELECT MAGNETS ACTIVATE LINK CIRCUIT 0 WHICH SIGNALS THE COMMON CONTROL CIRCUIT TO OPERATE THE HOLD MAGNETS ASSOCIATED WITH TRUNK 0. TRUNK LAMP 0 GOES STEADY.
- (C) TALKING PATH IS NOW ESTABLISHED FROM THE ATTENDANT THROUGH THE COMMON CONTROL CIRCUIT, LINK CIRCUIT 0, AND TRUNK SWITCH 0 TO CENTRAL OFFICE TRUNK 0. TALKING BATTERY FOR THE ATTENDANT IS SUPPLIED BY THE CENTRAL OFFICE.

## 4. WHEN THE ATTENDANT OPERATES STATION KEY 10 TO EXTEND THE CALL TO STATION 10:

- (A) HOLD MAGNET ASSOCIATED WITH STATION LINE 10 OPERATES.
- (B) OPERATED HOLD MAGNET CONNECTS STATION 10 TO LINK CIRCUIT 0.
- (C) AUTOMATIC RINGING IS APPLIED TO STATION LINE 10. TRUNK LAMP 0 CHANGES FROM STEADY TO 30 IPM.
- (D) STATION 10 ANSWERS. TALKING PATH IS NOW ESTABLISHED FROM STATION 10 THROUGH LINE SWITCH 1, LINK CIRCUIT 0, TRUNK SWITCH 0, AND CENTRAL OFFICE TRUNK CIRCUIT 0. THE STATION TALKING BATTERY IS SUPPLIED BY THE LINK CIRCUIT. DISCONNECT SUPERVISION IS UNDER CONTROL OF CALLED STATION 10.

Fig. 8—558A PBX—Central Office Trunk-To-Station Call



NOTES:

1. FOR THIS EXAMPLE, THE FOLLOWING ASSUMPTIONS ARE MADE:
  - (A) THE ALL PATHS BUSY LAMP AT THE CONSOLE IS LIGHTED TO ALERT THE ATTENDANT THAT THE SYSTEM HAS REACHED MAXIMUM CALL CAPACITY. THAT IS, ALL TEN LINKS ARE BUSY.
  - (B) A CALL IS INCOMING FROM THE CENTRAL OFFICE ON TRUNK 5. THIS CALL IS INTENDED FOR STATION 10.
  - (C) STATION 10 IS IDLE WHEN A LINK BECOMES AVAILABLE.
2. FOR THIS CALL, THE FOLLOWING ACTIONS OCCUR:
  - (A) THE ATTENDANT ANSWERS TRUNK 5 REQUEST FOR SERVICE BY OPERATING TRUNK KEY 5. WITH ALL PATHS BUSY, OPERATION OF TRUNK KEY 5 RESULTS IN OPERATION OF CERTAIN RELAYS IN TRUNK CIRCUIT 5 THAT RESULT IN THE OPERATION OF RELAY ACT5. OPERATION OF RELAY ACT5 REMOVES THE TRUNK RING-UP BRIDGE FROM THE TIP AND RING CONDUCTORS OF TRUNK 5, AND CUTS LEADS AT, AR DIRECTLY TO THE ATTENDANT THROUGH THE COMMON CONTROL CIRCUIT.

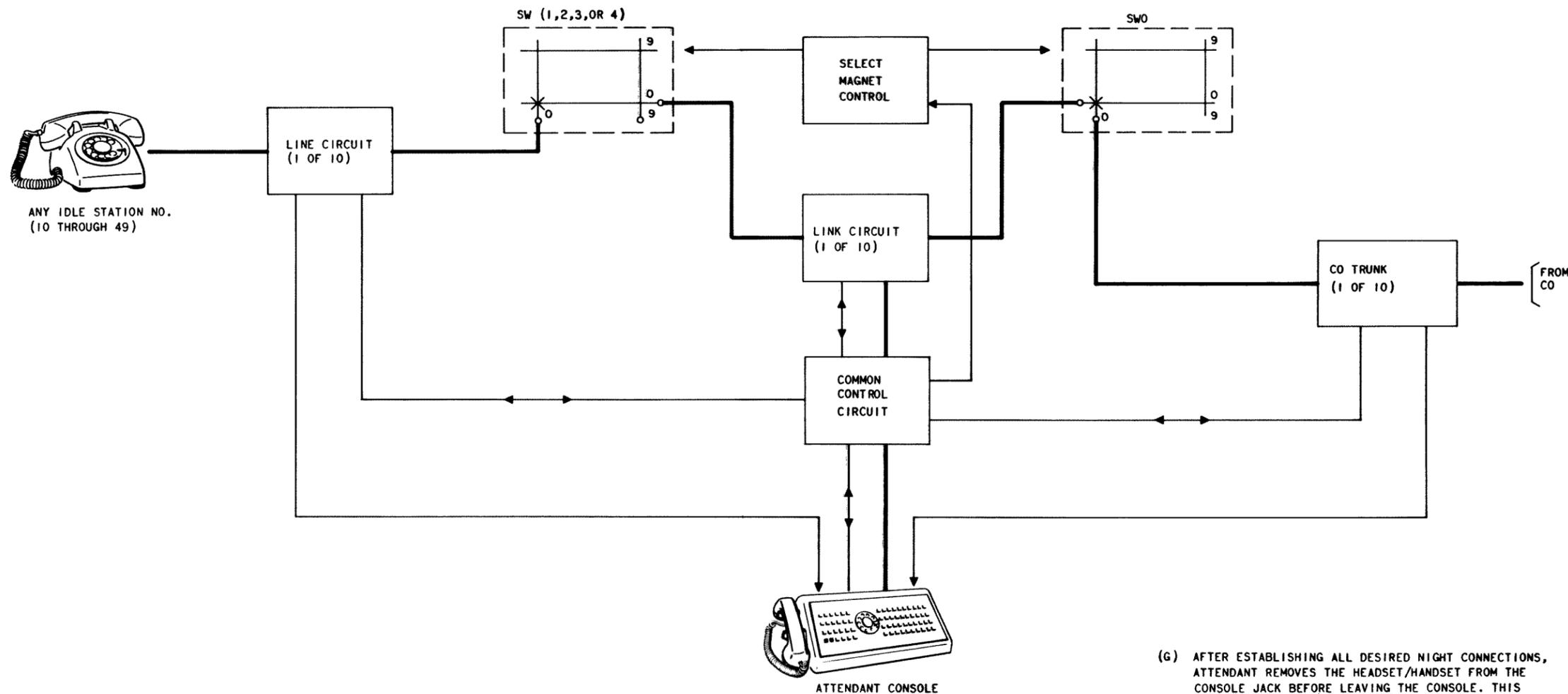
2. (CONT)

- NOTE: A LINK OR A LINK CIRCUIT IS NOT USED FOR THIS CONNECTION. A TALKING CONNECTION IS NOW ESTABLISHED FROM THE CONSOLE THROUGH TRUNK 5 TO THE CENTRAL OFFICE. TALKING BATTERY IS SUPPLIED BY THE CENTRAL OFFICE.
- (B) ATTENDANT MAY:
    - (1) PLACE TRUNK 5 ON HOLD. OPERATION OF TRK HOLD KEY APPLIES A HOLDING BRIDGE IN TRUNK CIRCUIT 5, TRANSFERS TRUNK LAMP 5 FROM STEADY TO A 120 IPM WINK, AND RELEASES ATTENDANT FROM CONNECTION. ATTENDANT MAY NOW HANDLE OTHER TRAFFIC UNTIL THE CALL CAN BE COMPLETED. ATTENDANT MAY ALSO RETURN TO TRUNK 5 AT ANY TIME DURING THE ALL PATHS BUSY CONDITION BY OPERATING TRUNK KEY 5.
    - (2) OPERATE POS RLS KEY AND DROP THE CONNECTION.

2. (CONT)

- (C) WHEN ONE OF THE TEN LINKS BECOMES AVAILABLE, THE ALL PATHS BUSY LAMP EXTINGUISHES. ATTENDANT OPERATES TRUNK KEY 5. THIS ACTION CONNECTS TRUNK 5 TO THE ATTENDANT THROUGH THE LINK THAT HAS BECOME AVAILABLE. THE ATTENDANT NOW COMPLETES THE CALL TO STATION 10 BY OPERATING STATION KEY 10. WHEN STATION 10 ANSWERS A 3-WAY CONVERSATION EXISTS.
- (D) ATTENDANT MAY NOW OPERATE THE POS RLS KEY AND BE REMOVED FROM THE CONNECTION. A 2-WAY CONVERSATION NOW EXISTS BETWEEN STATION 10 AND TRUNK 5. DISCONNECT SUPERVISION IS UNDER CONTROL OF STATION 10.

Fig. 9—558A PBX—Incoming Central Office Trunk Call with All Paths Busy



- NOTES:
1. THE ATTENDANT MAY ESTABLISH A NIGHT CONNECTION BETWEEN ANY IDLE STATION AND ANY IDLE CENTRAL OFFICE TRUNK. A MAXIMUM OF TEN NIGHT CONNECTIONS MAY BE ESTABLISHED BY THE ATTENDANT.
  2. WHEN THE ATTENDANT PLACES THE PBX SYSTEM IN THE NIGHT SERVICE MODE, THE FOLLOWING ACTIONS OCCUR:
    - (A) ATTENDANT OPERATES THE NITE KEY (LOCKING). THE NITE LAMP GOES STEADY. THE N AND N (1-4) RELAYS IN THE COMMON CONTROL CIRCUIT ARE NOW RELEASED. THESE N RELAYS ARE NORMALLY OPERATED.
    - (B) ATTENDANT OPERATES A STATION KEY ASSOCIATED WITH AN IDLE STATION AND HOLDS THE KEY OPERATED UNTIL THE STATION LAMP GOES STEADY.
    - (C) ATTENDANT RELEASES STATION KEY. CONNECTION BETWEEN THE STATION AND ATTENDANT IS NOW ESTABLISHED.

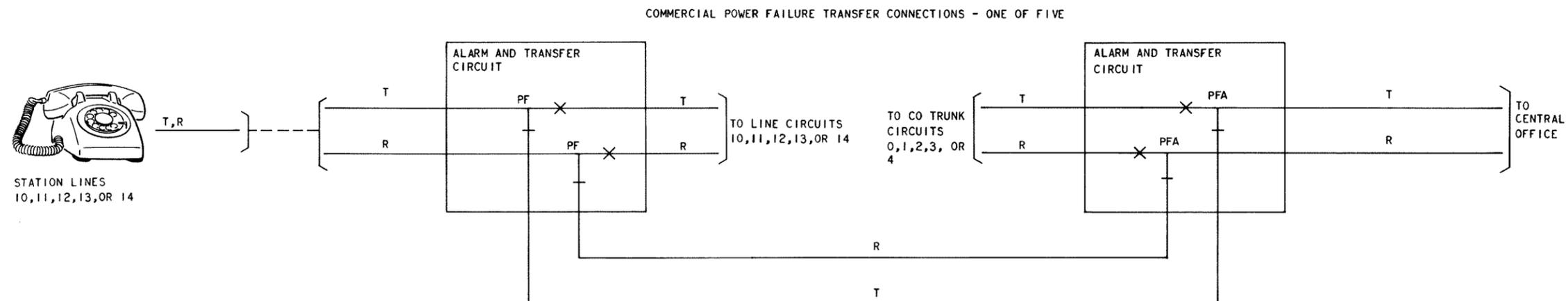
- NOTE: AT THIS POINT, THE ATTENDANT COULD OPERATE THE POS RLS KEY. THIS ACTION WOULD:
- (1) RELEASE THE CONNECTION FROM THE STATION TO THE ATTENDANT. THE OTHER NIGHT CONNECTIONS THAT MIGHT HAVE BEEN ESTABLISHED ARE NOT DISTURBED.
  - (2) FREE THE ATTENDANT TO ESTABLISH THE REMAINING NIGHT CONNECTIONS.
- (D) ATTENDANT OPERATES AND HOLDS THE TRUNK KEY ASSOCIATED WITH AN IDLE CENTRAL OFFICE TRUNK. THE TRUNK LAMP GOES STEADY. CENTRAL OFFICE DIAL TONE IS HEARD AT THE CONSOLE.
  - (E) ATTENDANT RELEASES THE TRUNK KEY ASSOCIATED WITH THE SELECTED TRUNK. CONSOLE IS NOW DROPPED FROM THE CONNECTION. THE SELECTED STATION IS NOW CONNECTED VIA THE LINK CIRCUIT TO THE ASSOCIATED STATION TRUNK. THE STATION MAY NOW RECEIVE CALLS FROM THE CENTRAL OFFICE AND MAY ORIGINATE CALLS TO THE CENTRAL OFFICE WITHOUT AID OF THE ATTENDANT.
  - (F) ATTENDANT MAY NOW PROCEED TO SET UP THE REMAINING NIGHT CONNECTIONS BY FOLLOWING THE SAME SEQUENCE.

- (G) AFTER ESTABLISHING ALL DESIRED NIGHT CONNECTIONS, ATTENDANT REMOVES THE HEADSET/HANDSET FROM THE CONSOLE JACK BEFORE LEAVING THE CONSOLE. THIS ACTION RELEASES THE BATTERY CUT-OFF RELAY, THUS REMOVING BATTERY FROM THE CONSOLE AND EXTINGUISHING ALL LAMPS IN THE LAMP FIELD.
 

**CAUTION: WHENEVER LEAVING THE CONSOLE UNATTENDED, ATTENDANT SHOULD ALWAYS REMOVE THE HEADSET/HANDSET FROM THE CONSOLE JACK EVEN THOUGH NIGHT CONNECTIONS MAY NOT BE IN EFFECT.**

**NOTE: AFTER NIGHT CONNECTIONS ARE ESTABLISHED, ATTENDANT CANNOT ANSWER ANY CALL (INCOMING FROM A TRUNK OR ORIGINATING FROM A STATION) UNTIL THE NIGHT CONNECTIONS ARE RELEASED.**
3. WHEN THE ATTENDANT RETURNS TO THE CONSOLE THE FOLLOWING ACTIONS OCCURS:
  - (A) ATTENDANT INSERTS HEADSET/HANDSET INTO CONSOLE JACK. BATTERY IS RESTORED TO THE CONSOLE. THE LAMP FIELD IS NOW FUNCTIONAL.
  - (B) ATTENDANT OPERATES THE NITE KEY. THE N AND N (1-4) RELAYS ARE NOW OPERATED (NORMAL STATE). ALL IDLE NIGHT CONNECTIONS ARE RELEASED.

Fig. 10—558A PBX—Night Service Connection—Typical Example



## NOTES:

1. POWER FAILURE RELAYS PF AND PFA ARE NORMALLY OPERATED.
2. THE TIP AND RING CONDUCTORS FOR STATION LINES 10, 11, 12, 13, AND 14 ARE RUN TO LINE CIRCUITS 10, 11, 12, 13, AND 14 RESPECTIVELY VIA POWER FAILURE (PF) RELAY OPERATED IN THE ALARM AND TRANSFER CIRCUIT.
3. THE TIP AND RING CONDUCTORS FOR CENTRAL OFFICE TRUNKS 0, 1, 2, 3, AND 4 ARE RUN TO CENTRAL OFFICE TRUNK CIRCUITS 0, 1, 2, 3, AND 4 RESPECTIVELY VIA POWER FAILURE (PFA) RELAY OPERATED IN THE ALARM AND TRANSFER CIRCUIT.
4. WHEN A COMMERCIAL POWER FAILURE OCCURS, STATION LINES 10, 11, 12, 13, AND 14 ARE DIRECTLY CONNECTED VIA THE PF AND PFA RELAYS RELEASED TO CENTRAL OFFICE TRUNKS 0, 1, 2, 3, AND 4 RESPECTIVELY. THUS ALL FIVE DESIGNATED STATION LINES MAY PLACE CALLS TO THE CENTRAL OFFICE. EACH STATION MAY GET EITHER CENTRAL OFFICE DIAL TONE OR AN OPERATOR BY GOING OFF-HOOK.
5. WHEN COMMERCIAL POWER IS RESTORED, TWO POSSIBLE PBX CIRCUIT ACTIONS MAY OCCUR AS INDICATED:
  - (A) IF POWER FAILURE OCCURRED WHILE THE PBX WAS NOT ON NIGHT SERVICE (NIGHT SERVICE CONNECTIONS NOT IN EFFECT):
    - (1) POWER FAILURE CONNECTIONS RELEASED.
    - (2) PBX CIRCUITRY RETURNED TO NORMAL. THAT IS, THE TIP AND RING CONDUCTORS OF ALL STATION LINES AND TRUNKS ARE CONNECTED THROUGH THE PBX SWITCH TRAIN.
  - (B) IF POWER FAILURE OCCURRED WHILE THE PBX WAS IN THE NIGHT MODE OF OPERATION (NIGHT SERVICE CONNECTIONS IN EFFECT):
    - (1) RELAYS PF AND PFA REMAIN RELEASED, THUS HOLDING THE POWER FAILURE CONNECTIONS.
    - (2) TR AND TRBL ALM LAMPS ARE LIGHTED.
    - (3) THEREFORE, WHEN THE ATTENDANT RETURNS TO THE CONSOLE, THE TR AND TRBL LAMPS ARE LIGHTED AND WHEN THE HEADSET/HANDSET IS CONNECTED, THE NITE LAMP IS LIGHTED, AND TRUNK AND STATION LAMPS OF THE NIGHT CONNECTIONS ARE DARK. TO RELEASE THE POWER FAILURE CONNECTIONS, THE NITE KEY MUST BE RELEASED. WHEN THE NITE KEY IS RELEASED, THE POWER FAILURE RELAYS OPERATE, THE TR AND TRBL ALM LAMPS EXTINGUISH, AND CENTRAL OFFICE TRUNKS 0 THROUGH 4 AND STATION LINES 10 THROUGH 14 ARE RESTORED TO NORMAL.

Fig. 11—558A PBX—Power Failure Transfer Connections