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50A CUSTOMER PREMISES SYSTEM

GENERAL DESCRIPTIVE INFORMATION

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1. INTRODUCTION

A. General

1.01 This section provides general descriptive information of the 50A Customer Premises System (CPS).

1.02 This section is reissued to:

- Identify interface of 50A CPS with No. 2 Electronic Switching System (ESS) central office (CO). Changes required to Fig. 1
- Include information on the flexible station hunting (FSH) and multiple position hunt (MUPH) features. Changes required to Table B
- Identify 400G key telephone unit (KTU) as a replacement for 400D KTU
- Identify 79B2 power unit as a replacement for 79B1 power unit
- Add new Table C to show 50A CPS available features when used with No. 2 ESS CO
- Correct Table A and Fig. 3

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- Delete 131B4T and 151B4T consoles from Table D (formally Table C).

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The 50A CPS furnishes the attendant(s) facility for private branch exchange (PBX-type) or Centrex-type service. The system can be used with a No. 1 ESS CO equipped with CTX5 or later (Section 966-102-100) or a No. 2 ESS CO equipped with EF-2 generic or later (Section 966-202-100). Loops (pairs from an ESS CO) connect to console equipment and stations (Fig. 1).

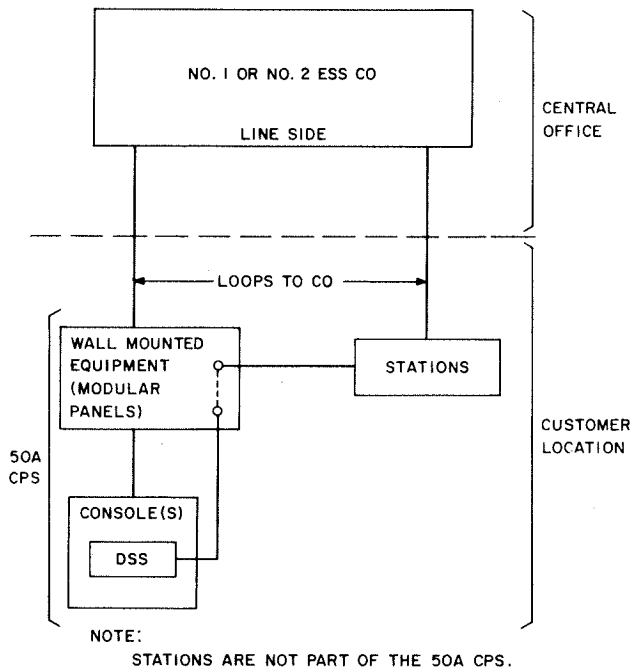


Fig. 1—Block Diagram of 50A CPS Attendant Facility

1.04 No switching occurs at the customer location. Switching is done at the CO in response to signals from the customer premises. Equipment located on the customer premises provides supervisory functions.

1.05 Power for a system without direct station selection (DSS) or busy lamp field (BLF) only features is provided by a batteryless 79B1 or 79B2 power unit. With attendant DSS or BLF only features, the 103B power unit is used. Battery

reserve (optional 104B power unit) is furnished to maintain all system functions except DSS or BLF only if commercial power fails.

B. Capacity

1.06 For successful No. 1 ESS CO call-handling, the recommended capacity of the system is:

- Fourteen loops per console.
- Two consoles (CTX6). CTX7 can provide distribution of incoming calls up to 16 consoles.

The maximum number of stations with DSS or BLF only is 200.

1.07 For successful No. 2 ESS CO call-handling, the recommended capacity of the system is:

- Fourteen loops per console.
- Up to 16 consoles (EF-2 generic).

The maximum number of stations with DSS or BLF only is 200.

2. SYSTEM FEATURES

2.01 50A CPS With No. 1 ESS: PBX and CTX feature packages available for use with No. 1 ESS CO are listed in Table A. Optional features are listed in Table B. See Section 231-090-178 which describes the features with characteristics unique to the 50A CPS and No. 1 ESS interface that involve console (Fig. 2) operation.

2.02 50A CPS With No. 2 ESS: EF-2 generic feature packages available for use with No. 2 ESS CO are listed in Table C. See Section 232-190-345 which describes the features with characteristics unique to the 50A CPS and No. 2 ESS interface that involve console (Fig. 2) operation.

2.03 Attendant Camp-on and Indication of Camp-on: The attendant can camp-on (call waiting) an incoming exchange or common control switching arrangement (CCSA) call for a busy station within the system until the called station becomes idle. The attendant position is free to handle other calls. Indication of camp-on provides an audible burst of tone that is heard by

TABLE A

50A CPS WITH NO. 1 ESS CO – COMMUNICATION SERVICE PACKAGES

PBX-TYPE FEATURES	CENTREX PACKAGES
Attendant Position (Console) Call Transfer-Attendant Direct Outward Dialing Night Service Power Failure Transfer-Station* Restriction From Outgoing Calls Station Hunting Station-to-Station Calling Attendant Camp-on† Attendant Conference (CTX6) Attendant DSS W/Busy Lamp Field Indication of Camp-on Consultation Hold Add-on Call Transfer-Individual Trunk Answer From Any Station	<div>CENTREX I</div> Attendant Position (Console) Attendant DSS W/Busy Lamp Field Call Transfer-Attendant Direct Inward Dialing Direct Outward Dialing Identified Outward Dialing Night Service Reserve Power Restriction From Outgoing Calls Station Hunting Station-to-Station Calling
	<div>CENTREX II</div> Centrex I Features Plus Consultation Hold Add-on Call Transfer-Individual Trunk Answer From Any Station

* See 1.05.

† See 2.03.

the attendant calling party and the called busy-station party. A burst of tone will be repeated 10 seconds later if the called station has not answered the incoming call. Camp-on and indication of camp-on features are recommended only with a BLF. The BLF will indicate the status of the station to be called before dialing.

2.04 Two-Console Operation: The uniform call distribution and call pickup features (No. 1 ESS CO—CTX6 or later and No. 2 ESS CO—EF-2 or later) provide each attendant with a balanced load and a means of answering incoming calls directed to the other attendant. Without these features, most of the calls could go to one console and the second attendant would be unable to assist the first. With these features, calls are alternated between attendants and each attendant can answer any calls directed to the other attendant by dialing a pickup code. If more than one call is unanswered, the call to be answered will be selected by the ESS CO. A station user can also answer any calls directed to another station line within a preselected group by dialing a pickup code.

2.05 MUPH No. 1 ESS CO and FSH No. 2 ESS CO Features: Provides a

distribution of incoming calls to a maximum of 16 console positions. The ESS CO holds calls in queue until a telephone console becomes idle by the operator depressing the release (RLS) key.

2.06 Attendant Conference (For No. 1 ESS CO—CTX6 or Later and No. 2 ESS CO—EF-2 or Later): Furnishes the attendant with a method of establishing a conference connection via the ESS CO for a maximum of five conferees plus the attendant.

2.07 Incoming Call Identification: Requires loop keys to be separately grouped for each trunk group associated with a call directed to an attendant position (3.04).

3. EQUIPMENT AND APPARATUS ARRANGEMENT

A. General

3.01 Wall space requirements for the equipment and apparatus used with the system are minimal. Modular panels used are 8.5 inches wide by 18.38 inches high by 5.84 inches deep. Figure 3 shows space required for equipment when used for a single console, 8-loop, 50-station DSS installation.

TABLE B

50A CPS WITH NO. 1 ESS CO — OPTIONAL FEATURES

Busy Verification — Station Lines	Inward Restriction
Call Forwarding*	Manual Line Service-Console
Call Forwarding — Busy Line	Miscellaneous Trunk Restrictions
Centrex	Paging — Loudspeaker
CCSA Access	Paging — Radio
Call Forwarding — Don't Answer	Power Failure Transfer-Attendant
Centrex	Recorded Telephone Dictation
CCSA Access	Reserve Power (Optional)
Call Hold	Speed Calling
Call Pickup†	Station Message Registers†
Consultation Hold — All Calls	Tie Trunks
3-Way Calling	Thru-Dialing
Call Transfer-Individual — All Calls	Toll Restriction —
CCSA Access	Per System Basis
Code Call	Per Station Basis
Code Restriction	TOUCH-TONE Calling
Call Waiting	Trunk Group Busy Lamps†
Conference Calling†	Multiple Position Hunt‡
Fully Restricted Station	
Incoming Call Identification (2.07)	

* Call forwarding outside available.

† No. 1 ESS CO with CTX6 or later.

‡ No. 1 ESS CO with CTX7 or later.

TABLE C

50A CPS WITH NO. 2 ESS CO —
AVAILABLE FEATURES

Call Transfer
 Attendant Control of Facilities (ACOF)
 Attendant Call Forwarding of Lines
 Thru Dial
 Blocked Access to Fully Restricted Terminating
 Lines
 Night Service
 Attendant Camp-on
 6-Port Conference
 TGB and/or ACOF Lamps
 Position Busy
 Calls Routed to the Consoles Only When the
 Attendant Is Released*
 Calls Routed to Multiple Console Groups on a
 "Most Idle Attendant Basis"*
 Queuing*
 Direct Station Selection (DSS)/Busy Lamp
 Field (BLF)
 A Temporary Hold State
 Call Waiting Lamps*

* These features are included with flexible station hunting (FSH).

Approximately 10.63 square feet of wall space is needed.

B. Consoles

3.02 All consoles used with the system are equipped for TOUCH-TONE® calling. Consoles used as attendant positions are shown in Fig. 2 and Table D. The system is designed to operate with a maximum of two consoles (No. 1 ESS CO—CTX6 or later and No. 2 ESS CO—EF-2 or later); however, MUPH allows distribution of incoming calls to a maximum of 16 consoles. ESS CO lines are extended to console loop keys. A maximum of 14 loops (per console) can be provided.

3.03 With 2-console operation, loops are *not* multiplied between consoles. Separate groups of loops serve each console.

3.04 Console keys are locally designated. Loop keys are the numbered keys shown in Fig. 2 and can be functionally designated to meet customer

requirements. For example, a customer may require:

- Four listed directory number (LDN) loops.
- Two attendant (ATND) loops for dial "0" calls.
- One tie trunk (TT).

The numbered loop keys shown in Fig. 2 could be grouped and designated as follows:

KEY	DESIGNATION
0&1	ATND
3	TT
5-8	LDNs (designated with customer's own LDNs)

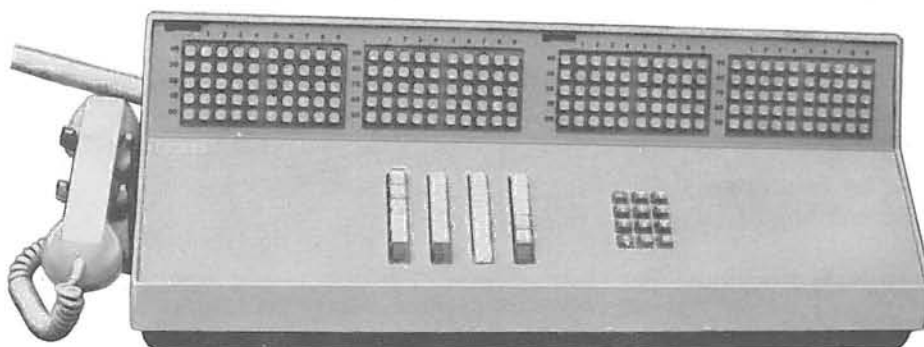
Keys 2, 4, and 9 through 13 would be unassigned and undesignated.

3.05 Console key functions are as follows.

(a) **Loop Key:** A locking, releasing, illuminating key, when operated, connects the attendant to the associated circuit. Visual indications allow the attendant to supervise the progress of call. The two unused control keys can be used to display trunk group busy (TGB), attendant control of facilities (ACOF), and/or calls waiting (CW) information.

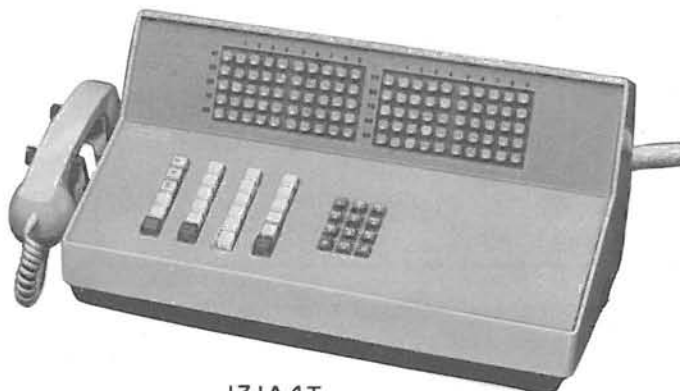
(b) **Attendant Direct Station Selection (DSS) Key:** A nonlocking, nonreleasing, illuminating key used to signal the called station without use of a TOUCH-TONE dial. (See Table C.) The associated busy lamp allows the attendant to supervise the busy or idle state of a station line.

(c) **Release (RLS) Key:** A locking, releasing, nonilluminating key used to disconnect the attendant telephone circuit from a loop and place a temporary hold on a call until the called party answers. By using MUPH, the operation of the RLS key will signal the ESS CO that the console is available for a new incoming call. A lamp beneath the key is available to indicate CW.



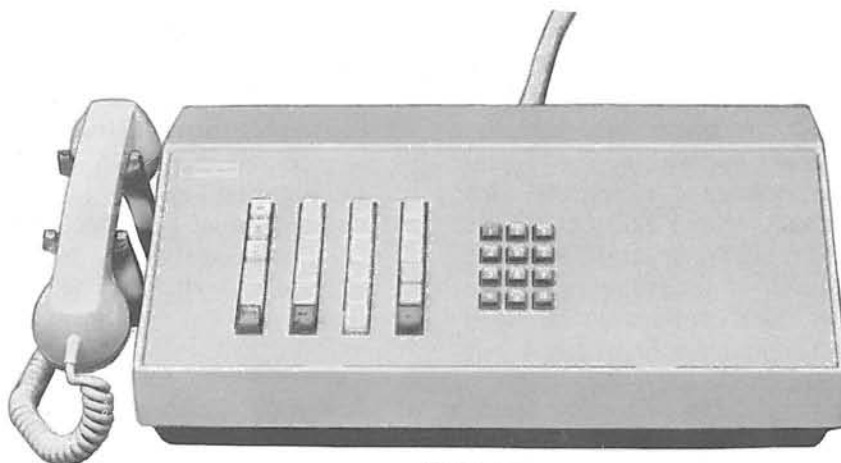
151A4T

NITE	9	3	0
AUD SIG	10	4	1
POS BSY	11	5	2
	12	6	SPLT
	13	7	CC
DISC	HOLD	8	RLS



131A4T

NOTE:
CONTROL KEYS ARE THE
SAME FOR ALL CONSOLES



121A4T

Fig. 2—Telephone Consoles

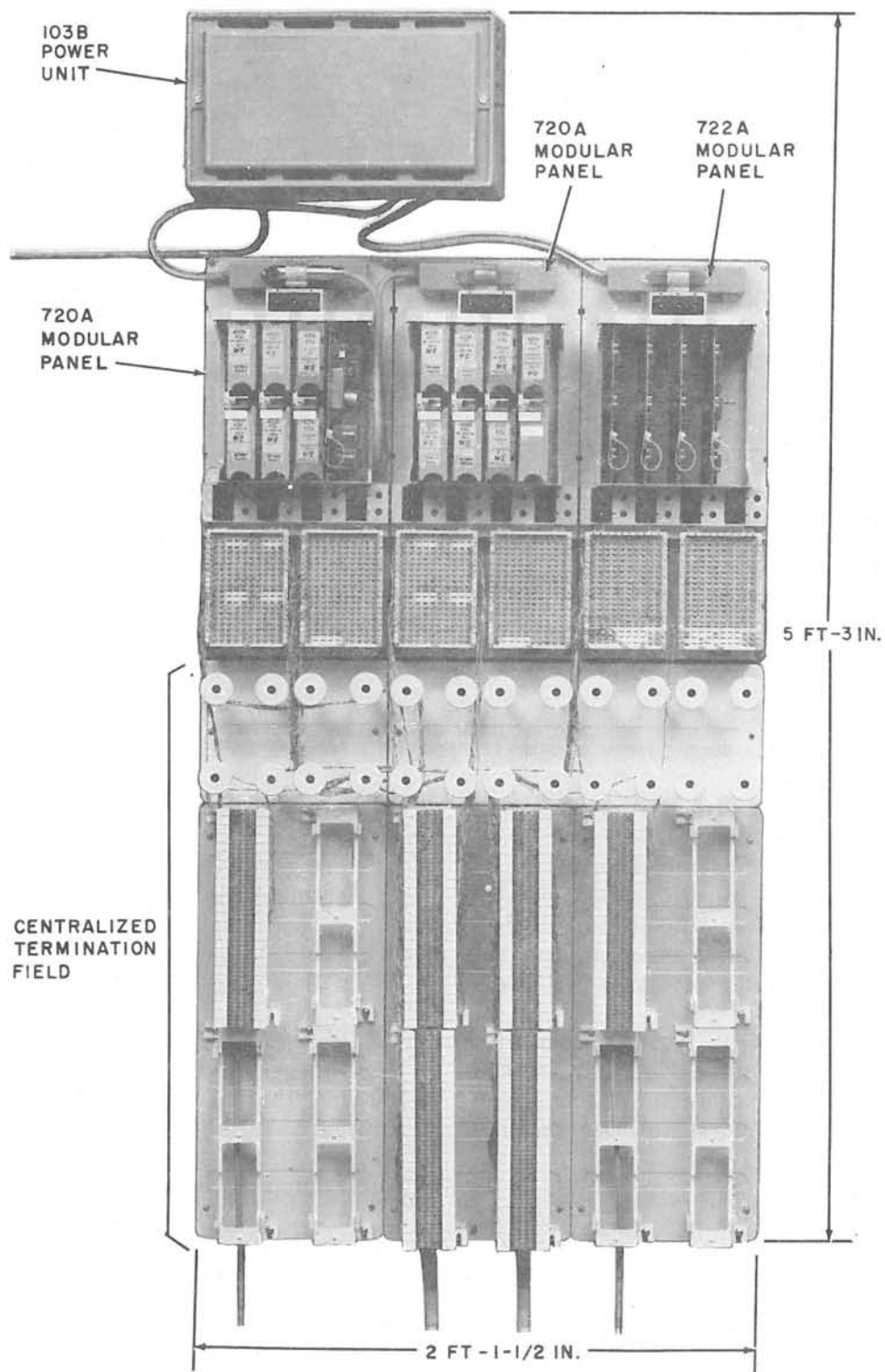


Fig. 3—Wall-Mounted Equipment

TABLE D

ATTENDANT POSITION APPARATUS

CONSOLE	FEATURE		CONTROL KEYS	
CODE	NUMBER OF STATIONS		LOOP	MISC*
	DSS	BLF		
121A4T	100	100	14	10
131A4T				
151A4T	200	200		

* Two spare keys can be used for optional trunk group busy feature (Fig. 2).

(d) **HOLD Key:** A nonlocking, release on upstroke, nonilluminating key used to disconnect the attendant telephone circuit from a loop and place a hold on a call until the attendant releases or until both parties disconnect.

(e) **Disconnect (DISC) Key:** A nonlocking, release on upstroke, nonilluminating key used to disconnect the attendant telephone circuit from a loop and open the loop to the ESS CO.

(f) **Call Control (CC) Key:** A nonlocking, nonreleasing, nonilluminating key, when first operated, furnishes the attendant with dial tone used to extend a call to the called party. Reoperation of the CC key will disconnect the ESS CO in case of a dialing error or remove the busy tone when a busy extension is dialed.

(g) **Split (SPLT) Key:** A nonlocking, nonreleasing, nonilluminating key, when operated before dialing, excludes the calling party while the attendant announces an incoming call to the called party.

(h) **Night (NITE) Key:** A push-to-operate, push-to-release, nonilluminating key used (with the attendant handset or headset plugged into the console) to signal the ESS CO to establish trunk answer from any station or fixed night service.

(i) **Audible Signal (AUD SIG) Key:** A push-to-operate, push-to-release, nonilluminating key used to switch the console tone ringer signal on or off.

(j) **Position Busy (POS BSY) Key:** A push-to-operate, push-to-release, nonilluminating key used with 2-console operation (by either attendant) to signal the ESS CO to make that console only busy to incoming calls.

C. Panels

3.06 The basic J59203A, List 1 equipment unit consists of two 720A modular panels which provide for up to eight loops. The supplementary J59203A, List 2 equipment unit (one 720A panel) provides for up to four additional loops. J59203A, List 3 equipment provides a mounting bracket to hold circuit description (CD) and schematic drawing (SD) binder H320-259. Each J59203B equipment unit (722A panel) provides for 50 busy lamp circuits [HK6 circuit packs (CPs)] plus 2 spare circuits.

3.07 The 720A and 722A modular panels (Fig. 3) used with the system are compatible with backboards used with centralized key telephone installations (Section 518-010-101). Each panel:

- Houses CPs and/or KTUs.
- Provides a quick-connect termination field.
- Provides a test lamp used to monitor busy or idle state of circuits.

3.08 The 720A modular panel (Fig. 3), equipped with KTUs and CPs, is:

- (a) Used to furnish loop (and common if the first panel in a line-up) control for four circuits that terminate on loop keys at the console.
- (b) Equipped with a plug and a cable assembly with a connector used to interconnect to the preceding 720A panel or to the power unit if the first 720A panel in a lineup.

3.09 The 722A modular panel (Fig. 3) is:

- (a) Furnished when DSS or BLF only feature is required.
- (b) Provided with up to 50 circuits (plus 2 spares) which are shared by 2 consoles in a multiple console installation.

(c) Equipped with a connector and a cable assembly with a plug used to interconnect to the preceding 722A panel, or to a power unit, if the first in a lineup of 722A panels.

D. Key Telephone Units and Circuit Packs

3.10 The circuit components of the system are as follows.

(a) **400D or 400G KTU (Line Circuit):** Provides the console with pickup, hold, key lamp, and tone ringer control.

(b) **429B KTU or AE34 CP (Supplementary Hold Detector Circuit):** Places a temporary hold on a call until the called party answers. Provides lamp control and determines hold release timing.

(c) **430A KTU (Flutter Generator Circuit):** Flutters loop key lamp at console to indicate a call is on temporary hold.

(d) **AE32 CP (Loop Control Circuit):** Provides access by common circuitry to four loops.

(e) **AE33 CP (TGB Circuit):** Provides steady lamp supervision to a preselected lamp location at the console when a trunk group is busy; also controls the CW lamp.

(f) **HK5 CP (Common Control Circuit):** Provides common control circuitry for timed flash, break detect, automatic hold, interrupter control, and night service interlock; also provides access (by common control) to four loops.

(g) **HK6 CP (Line Busy Circuit):** Indicates a busy station line (via lamp supervision) to attendant using 131- or 151-type console. Each CP contains 13 circuits.

(h) **JM1 CP (DSS Dialer Circuit Located in Console):** Transmits TOUCH-TONE signals to CO when the DSS key (131A4T and 151A4T consoles only) associated with a station line is momentarily operated; also signals CO to split a call (one-way) when SPLT key is operated before dialing.

(i) **JN1 CP (SPLT Key Circuit Located in Console):** Transmits TOUCH-TONE

signals for splitting (one-way) to CO when the SPLT key is operated before dialing (121A4T console only).

E. Power

3.11 The 79B1 or 79B2, 103B, and 104B power units have been designed for use with the 50A CPS. Each has a self-contained interrupter. Each is used with a plug and connector that mate with the plug and/or connector of the cable assemblies on the 720A or 722A modular panels.

3.12 One 79B1 or 79B2 power unit can provide power to up to two consoles which do not have a battery reserve, DSS, or BLF. One 103B power unit is provided per console if DSS or BLF only is furnished. The 103B power unit is also used if the loop resistance between the 720A panel and the console exceeds 20 ohms. Each unit requires a 3-conductor cord for connection to a 105- to 125-volt ac 60-Hz single-phase commercial power source not controlled by a switch.

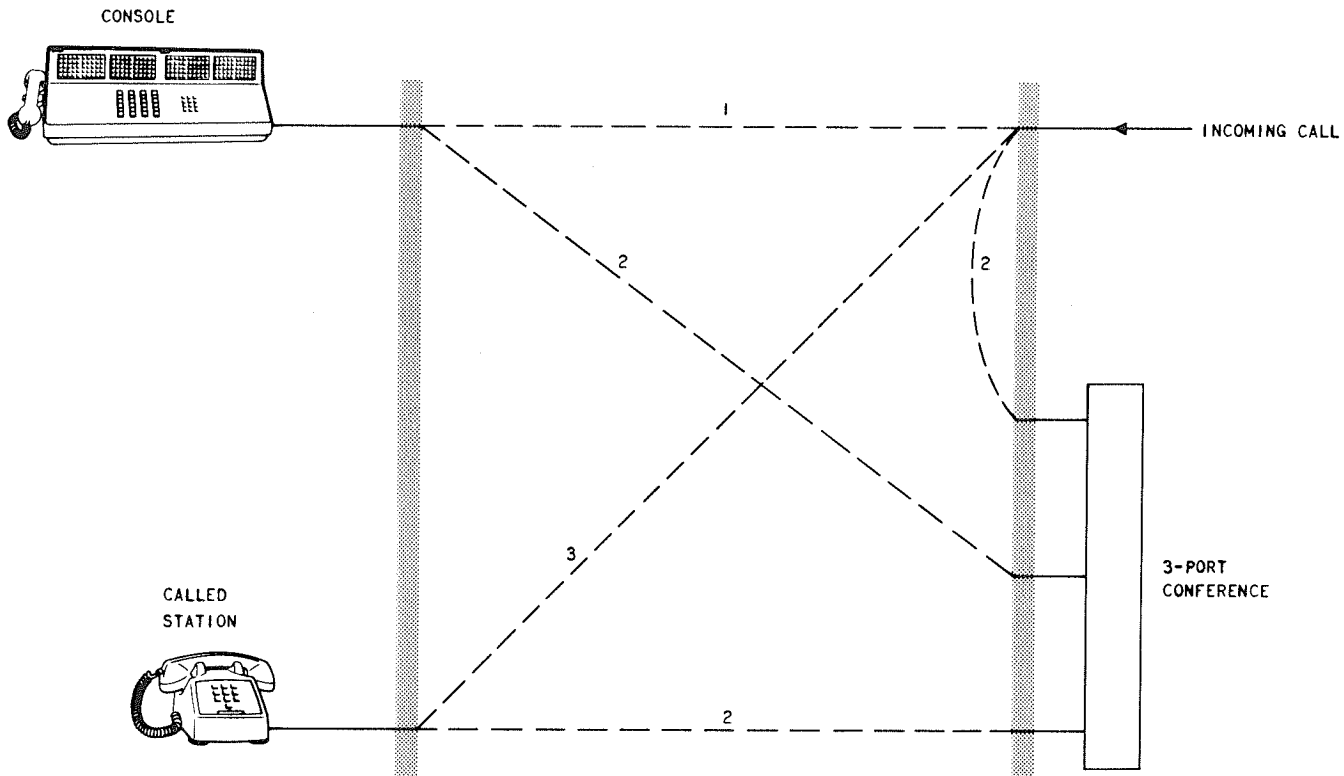
3.13 The optional 104B power unit provides battery reserve for all system features except DSS or BLF. One unit per console is furnished when required.

4. SWITCHING PRINCIPLES

4.01 The ESS CO provides all switching functions. Loops (pairs) extend from the line side of the CO (through modular panel equipment) to loop keys on the console. Loops (pairs) extend from the line side of the CO directly to stations (Fig. 1).

4.02 Switching principles involved when completing a typical (incoming) call are shown in Fig. 4. When the attendant extends an incoming call, operation of the CC key generates a measured flash that seizes a 3-port conference circuit used to complete the call.

4.03 Part 5 describes operation involved with typical calls. For further switching information, refer to Sections 966-102-100, 966-202-100, and 231-118-333.



STEPS

1. AN INCOMING CALL IS CONNECTED TO THE CONSOLE.
2. LOOP TO CONSOLE, LOOP TO STATION, AND INCOMING CALL ARE EACH CONNECTED TO A PORT OF THE 3-PORT CONFERENCE EQUIPMENT.
3. INCOMING CALL IS DIRECTLY CONNECTED TO CALLED STATION. (THE ATTENDANT RELEASES THE CONSOLE LOOP AND THE 3-PORT CONFERENCE EQUIPMENT FROM THE CONNECTION.)

Fig. 4—50A CPS Switching Principles

5. TYPICAL CALLS—ATTENDANT OPERATION

5.01 *Incoming LDN Call to Attendant:* On an incoming call:

- (a) The CO establishes the connection and applies ringing current to an idle loop.
- (b) The line circuit connects the console tone ringer and flashes the loop key lamp.
- (c) Operation of the loop key silences the ringer, lights the loop key lamp steadily, and connects the console telephone circuit to the incoming call.

5.02 *Attendant Extends Incoming LDN Call (Unsplit) to Station:* If the incoming call is not to be split:

- (a) Momentary operation of the CC key after answering the incoming call connects the calling party to the 3-port conference circuit (Fig. 4) and the attendant to dial tone.
- (b) Operation of the RLS key before answer places a temporary hold on the call. This frees the attendant to handle other calls.
- (c) The loop key lamp flutters until the called party answers and the loop is released from the console, freeing the loop to receive other calls.

5.03 Attendant Extends Incoming LDN Call (Split) to Station: When splitting an incoming call:

- (a) Momentary operation of the CC key after answer of the incoming call connects the calling party to the 3-port conference circuit (Fig. 4) and the attendant to dial tone.
- (b) Momentary operation of the SPLT key before dialing (either DSS or TOUCH-TONE) allows the attendant to announce the call privately to the called party.
- (c) Reoperation of the CC key after the called party answers unplits the call and makes 3-way conversation possible.
- (d) Momentary operation of the DISC key releases the loop and the attendant cannot reenter the call.

5.04 Attendant Holds Incoming Call: After extending an incoming call to the called station, operation of the HOLD key holds the call and frees the console to handle other calls.

Note: While the call is held on the console, the attendant can reenter but cannot be recalled. When the parties disconnect, the holding bridge releases the loop to the console after 10 to 25 seconds.

5.05 Attendant Extends Call to Busy Station via Camp-on: If there is a request for camp-on:

- (a) The attendant verifies that the called station line is busy (via BLF lamp) and extends the call.
- (b) Audible ringing tone is returned to the attendant, calling party, and busy-station party. (If a preceding call is camped on the busy station, busy tone is returned and the call will not camp-on.)
- (c) A burst of tone (repeated after 10 seconds) notifies the busy station that a call is waiting.
- (d) The attendant releases (via RLS key) from the connection.

(e) The call is automatically completed when the busy station becomes idle. After the called station answers, the loop key goes dark.

(f) The station does not answer within 20 seconds after request for camp-on, the attendant can reenter call and inform the calling party of the extended hold condition or give the option of being transferred to an idle station.

5.06 Attendant Conference Calling (No. 1 ESS CO—CTX6 or Later and No. 2 ESS CO—EF-2 or Later): When a conference call is requested:

- (a) The attendant dials the conference access code after establishing a dial-tone connection (via ATND loop and CC keys).
- (b) Interrupted (two interruptions followed by steady) dial tone is returned, indicating the conference equipment is seized.
- (c) The attendant dials the code of the first conferee who is connected to the conference equipment on answer.
- (d) Reoperation of the CC key returns interrupted dial tone and the attendant dials the code of the next conferee.
- (e) The method used in (d) is repeated for each of the remaining conferees. If the attendant is not a conferee, operation of the DISC key releases the console telephone circuit.

Note: The maximum number of conferees is five.

5.07 Attendant Establishes Flexible Night Service (Uses Call Forwarding Variable Feature): After obtaining dial tone (via an ATND loop key), the attendant:

- (a) Dials the call forwarding code.
- (b) Dials the LDN to be night-connected.
- (c) Dials code of station to be night-connected to the LDN. Two short bursts of dial tone followed by audible ringing tone confirm that the night connection is established. It is not necessary for station to answer.

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(d) Operates the CC key to obtain dial tone used to dial the next LDN.

(e) Repeats (a) through (d) until all night connections have been established and then releases (via the DISC key).

5.08 Attendant Cancels Flexible Night Service: After obtaining dial tone, the attendant:

(a) Dials the call forwarding cancellation code.

(b) Dials the LDN to be released from night connection. Two short bursts of dial tone confirm release of the LDN.

(c) Repeats (a) and (b) until all LDNs are released from night connection.

(d) Momentarily operates the DISC key to release the loop from the console.

6. REFERENCES

6.01 Refer to the following sections for further information:

SECTION	TITLE
167-456-101	103B Power Unit Identification, Installation, and Connection
167-457-101	104B Power Unit Identification, Installation, and Connection
231-090-178	50A CPS—Attendant Position Feature Document—2-Wire No. 1 Electronic Switching System
231-118-333	Overall Procedures for Adding a Centrex CO or PBX CO Customer (All Generic Programs) 2-Wire, No. 1 Electronic Switching System
232-190-345	Simplified Console Attendant (50A CPS, Call Directors, and Keysets) No. 2 Electronic Switching System
504-220-151	Telephone Consoles—121-, 131-, and 151-Types—Identification

SECTION

TITLE

540-580-101	50A Customer Premises System—Identification, Installation, Connections, and Installation Tests
540-580-301	Attendant and Station Equipment—Method of Operation—50A Customer Premises System
540-580-302	50A Customer Premises System—Trouble-Locating Procedures
809-150-150	50A Customer Premises System Equipment Design Requirements—PBX Systems
966-102-100	2-Wire No. 1 Electronic Switching System—Centrex and PBX-CO Service—General Description
966-202-100	Centrex Central Office Service—General Description—No. 2 Electronic Switching System

6.02 The following list of acronyms is used in this section:

ACOF	Attendant Control of Facilities
ATND	Attendant
BLF	Busy Lamp Field
CCSA	Common Control Switching Arrangement
CD	Circuit Description
CO	Central Office
CP	Circuit Pack
CPS	Customer Premises System
CW	Calls Waiting
DSS	Direct Station Selection
ESS	Electronic Switching System
FSH	Flexible Station Hunting
KTU	Key Telephone Unit

LDN	Listed Directory Number	SD	Schematic Drawing
MUPH	Multiple Position Hunt	TGB	Trunk Group Busy
PBX	Private Branch Exchange	TT	Tie Trunk

