CENTREX/ESSX-1 SERVICE

GENERAL DESCRIPTION

2-WIRE NO. 1 AND NO. 1A ELECTRONIC SWITCHING SYSTEMS

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1. GENERAL

1.01 This section describes the Centrex/ESSX-1 services available for use in conjunction with the 2-wire No. 1 and No. 1A Electronic Switching Systems (ESS). The features available with these systems are explained, general explanations of the basic systems' operations are given, and the equipment used is described.

1.02 This section is reissued to incorporate the following:

(a) Add coverage for features provided by 1E5/1AE5, 1E6/1AE6 and 1E7/1AE7 generic programs

(b) Add coverage for 50B CPS attendant consoles.

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

2. CENTREX/ESSX-1 DESCRIPTIONS

2.01 The 2-wire No. 1 and 1A ESS Centrex/ESSX-1 service is a centralized telephone communications exchange service that uses the data handling capabilities of a nearby 2-wire No. 1 and 1A ESS central office.

2.02 No switching equipment is installed at the customer premises. All customer subscriber lines are directly connected to a 2-wire No. 1 or 1A ESS central office in the same manner as the regular telephone subscriber lines.

2.03 Centrex/ESSX-1 programs and translations at the No. 1 or 1A ESS, to which the customer group is connected, indicate which subscriber lines are part of a centrex customer group and determine the treatment the subscriber lines will receive.

2.04 Centrex/ESSX-1 service may be offered to a customer in one of two basic ways:

(1) With centrex data link hardware for the 51A Customer Premises System (51A CPS) or

(2) Without centrex data link hardware (50A CPS or 50B CPS).

A. Centrex Service With Data Link Hardware

2.05 Each centrex customer being provided centrex service with data link hardware is equipped with one or more 1B-, 2B-, 27A-, or 47A-type 51A CPS universal telephone consoles to provide attendant services.

2.06 A centrex data loop interconnects the attendant telephone consoles at the customer premises with the 2-wire No. 1 or 1A ESS central office. This loop is a peripheral unit which provides 2-way data communications between the central office and the attendant consoles. Lamp data is transmitted by means of this loop to the attendant consoles in order to control the states of lamps on the consoles, which indicate service requests or other supervisory signals to the attendant. Key signals from the attendant consoles are also transmitted to the central office by the data loop. These key signals are interpreted at the ESS central office as requests for specific actions at the central office. One data loop circuit is capable of controlling up to four attendant consoles. With some system arrangements, a data loop circuit may control only three of the consoles.

2.07 Each centrex customer group is assigned a listed directory number (LDN). All calls to the LDN are routed, in the order of their arrival, to an attendant associated with that particular customer group.

2.08 Call distribution is provided to spread the load evenly to all attendants and to prevent a new call from being switched to a console before the attendant is ready to answer it.

2.09 Centrex stations may be equipped with either TOUCH-TONE® or rotary dial telephones.

2.10 Centrex service requires the use of two additional specialized equipment units other than

the attendant telephone consoles and the station telephones:

- A centrex data link frame provided at the ESS central office
- A centrex console control cabinet installed at the centrex customer group premises.

These units are used to implement the data transmission between the centrex customer location and the central office.

2.11 Trunk circuits are assigned for the exclusive use of a particular centrex customer group or centrex complex. These circuits are used to connect the particular centrex group or complex to other switching systems. These circuits are terminated in the ESS central office in the same manner as other trunks; however, through the ESS stored memory, the system is aware that these trunks are to be used only by a particular centrex customer group or centrex complex.

2.12 A block diagram of a typical Centrex/ESSX-1 customer using data link hardware is shown in Fig. 1. Only one attendant console is shown, although on larger centrex installations additional consoles may be provided to handle greater attendant traffic. The centrex station telephones can be seen connecting directly to the line link network just as noncentrex subscribers are connected. The attendant trunk circuit is shown connected to the trunk link network for a talking path for the attendant. Only one talking path is provided for each attendant telephone console since an attendant can process only one call at a time. The data loop which is illustrated provides the 2-way data path. The system is controlled by the 2-wire No. 1 or 1A ESS central processor. Tie trunks and foreign exchange (FX) trunks through which a centrex customer group may have access to other switching systems are shown connected to the trunk link network.

B. Centrex Service Without Data Link Hardware

2.13 Centrex service can be provided without the use of data link hardware, either with or without attendant consoles. Either the 50A CPS or 50B CPS is used when attendant console facilities are required.

> ***Note:*** The 50B CPS is a direct replacement for the 50A CPS. The 50A CPS is rated additions and maintenance (A&M).

50A CPS

2.14 Figure 2 is a block diagram of a typical centrex customer using 50A CPS or 50B CPS attendant consoles. The console shown is typical and multi-attendant console operation is possible. For centrex groups without an attendant console, Figure 2 is correct except that a call director, keyset, or simple telephone would replace the 50A CPS or 50B CPS console as the attendant position.

2.15 The 50A CPS consists of attendant console(s) and modular panels located on the customer's premises that provide supervision and control of the attendant position.

2.16 Three types of 50A CPS attendant console that may be used with centrex service are as follows:

(a) 121-Type—Non Direct Station Selection (DSS)

(b) 131-Type—100 station attendant DSS with busy lamp field

(c) 151-Type—200 station attendant DSS with busy lamp field.

2.17 When attendant consoles are not required, the following positions may be used to handle the limited attendant functions:

(a) Call Director

(b) Telephone Keyset

(c) Simple Telephone.

2.18 In both cases, either with or without attendant consoles, all customer station lines are connected over outside plant facilities directly into the central office line link network. Conventional centrex data link hardware and therefore data loops are not required using the 50A CPS attendant consoles or the call director/telephone keyset/simple telephone. Instead, the attendant positions have direct line appearances (referred to as loops). The attendant position(s) utilizes the call transfer feature to complete attendant directed calls.

2.19 Call distribution is provided to spread the load evenly to all 50A CPS consoles or to call direc-

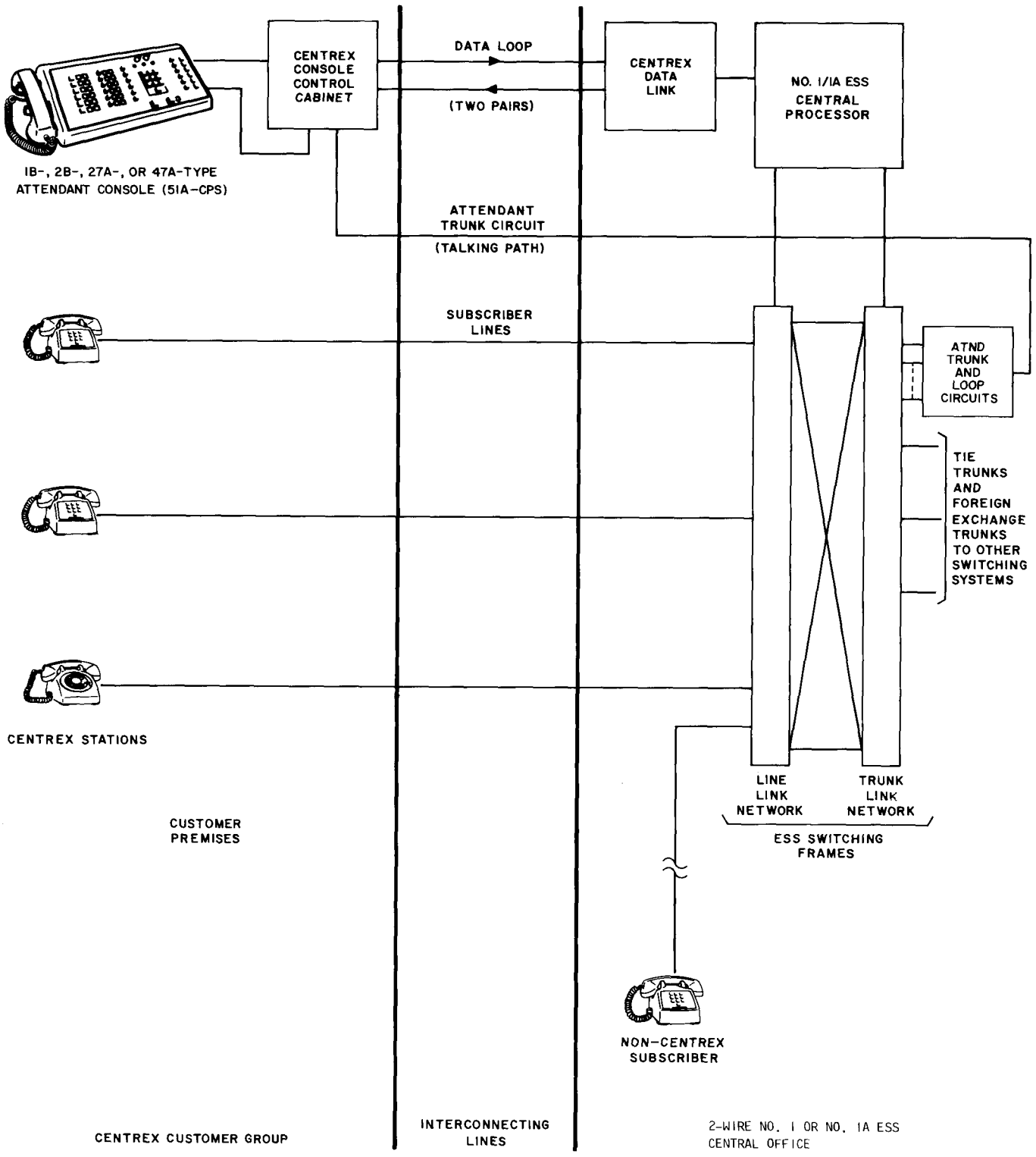


Fig. 1—Centrex/ESS-1 System With Centrex Data Link Hardware (51A CPS)

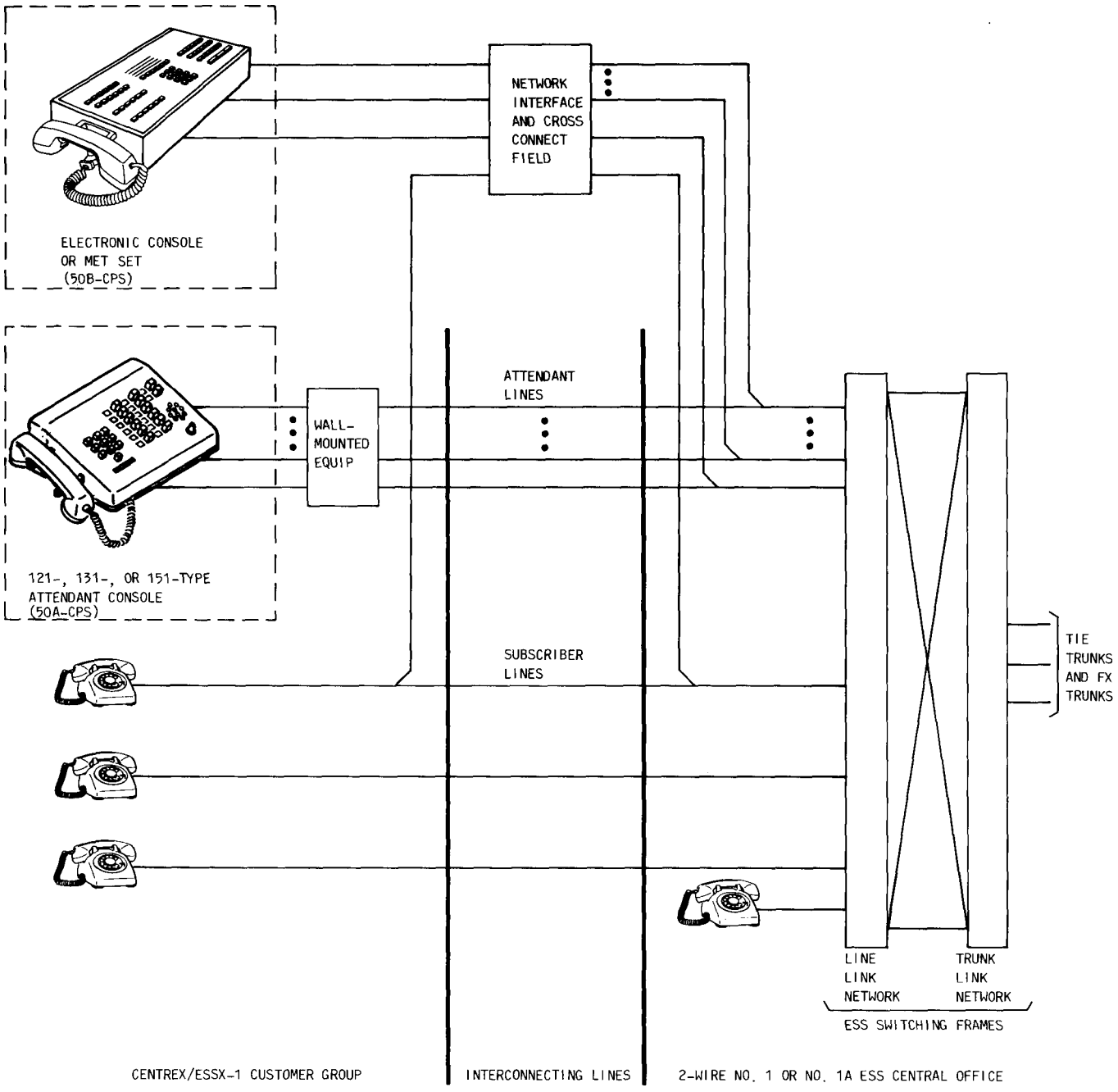


Fig. 2—Centrex/ESSX-1 System Without Centrex Data Link Hardware (50A CPS or 50B CPS)

tor, telephone keyset, or simple telephone attendant positions by utilizing the uniform call distribution feature. Uniform call distribution provides equal distribution of incoming traffic to the terminal numbers (attendant loops) in the multiline hunting group.

2.20 Trunk circuits can also be assigned for the exclusive use of a centrex customer as with 1B-, 2B-, 27A-, and 47A-type attendant console operation.

50B CPS

2.21 The 50B CPS provides attendant(s) facilities for Centrex/ESSX-1 service using either DIMENSION® type electronic console(s) or multibutton electronic telephone (MET) set(s).

2.22 The central office (CO) provides switching and translation for the 50B CPS loop circuits and for the customer stations which are external to the 50B CPS. One customer system may have up to four attendant positions with busy lamp field (BLF)/direct station selection (DSS) features or up to 16 attendant positions without BLF/DSS features. Attendant features available with the earlier 50A CPS are available with the 50B CPS, plus additional features. Each system is custom engineered for the desired features and traffic capability. A control unit provides a microprocessor controlled interface between the CO and system units. Any of three types of attendant consoles may be provided with more or fewer features to match the customer's requirements. If a console with BLF/DSS features is provided, scanner circuits monitor the customer station lines for busy status. Station busy status is displayed on the console.

2.23 The 50B CPS consists of the following equipment.

- Any of three types of attendant consoles [two electronic and one multibutton electronic telephone (MET) types]. All consoles used in one installation must be identical.
- One J59217A control unit per attendant console.
- One J59217B scanner unit per 300 station lines monitored for busy status (6 units maximum for 1800 station lines).

CENTREX-CU

2.24 Automatic identified outward dialing (AIOD) equipment allows automatic station identification on direct dialed [dial 9 or common control switching arrangement (CCSA) dial 8] outward calls from PBX, centrex-CU systems. This feature operates with the No. 1 or 1A ESS automatic message accounting (AMA) facilities to provide individual station billing or CCSA traffic sampling on a station basis. The basic configuration used to provide AIOD is illustrated in Fig. 3.

2.25 Automatic number identification (ANI) equipment at the customer location determines the station number originating the call, the trunk number of the trunk the call went out on, and transmits this data to the central office over a data link circuit. ANI information is transmitted to the central office on every outgoing call but is used by the central office only when an AMA record is required. No. 1 ESS AIOD is compatible with all private branch exchange (PBX) systems having ANI features including No. 101 ESS.

CENTREX COMPLEX

2.26 A centrex complex consists of two or more centrex groups sharing certain features such as tie trunks, FX trunks, console facilities, etc. In general, each group has a different dialing pattern and/or different features, yet they are united by the master centrex number.

CENTREX SATELLITE

NonRelease Link Operation

2.27 A centrex satellite system consists of two or more geographically separated switching machines grouped together to provide centrex service for a single customer. All attendant services are provided at the main location.

Release Link Operation

2.28 This feature provides attendant services for Centrex Satellites at the main location of the centrex through release link operations. This operation improves transmission and tie trunk usage by elimination of multiple trunking.

Common Control Switching Arrangement (CCSA) Access

2.29 CCSA service is a method of interconnecting various business locations of large customers

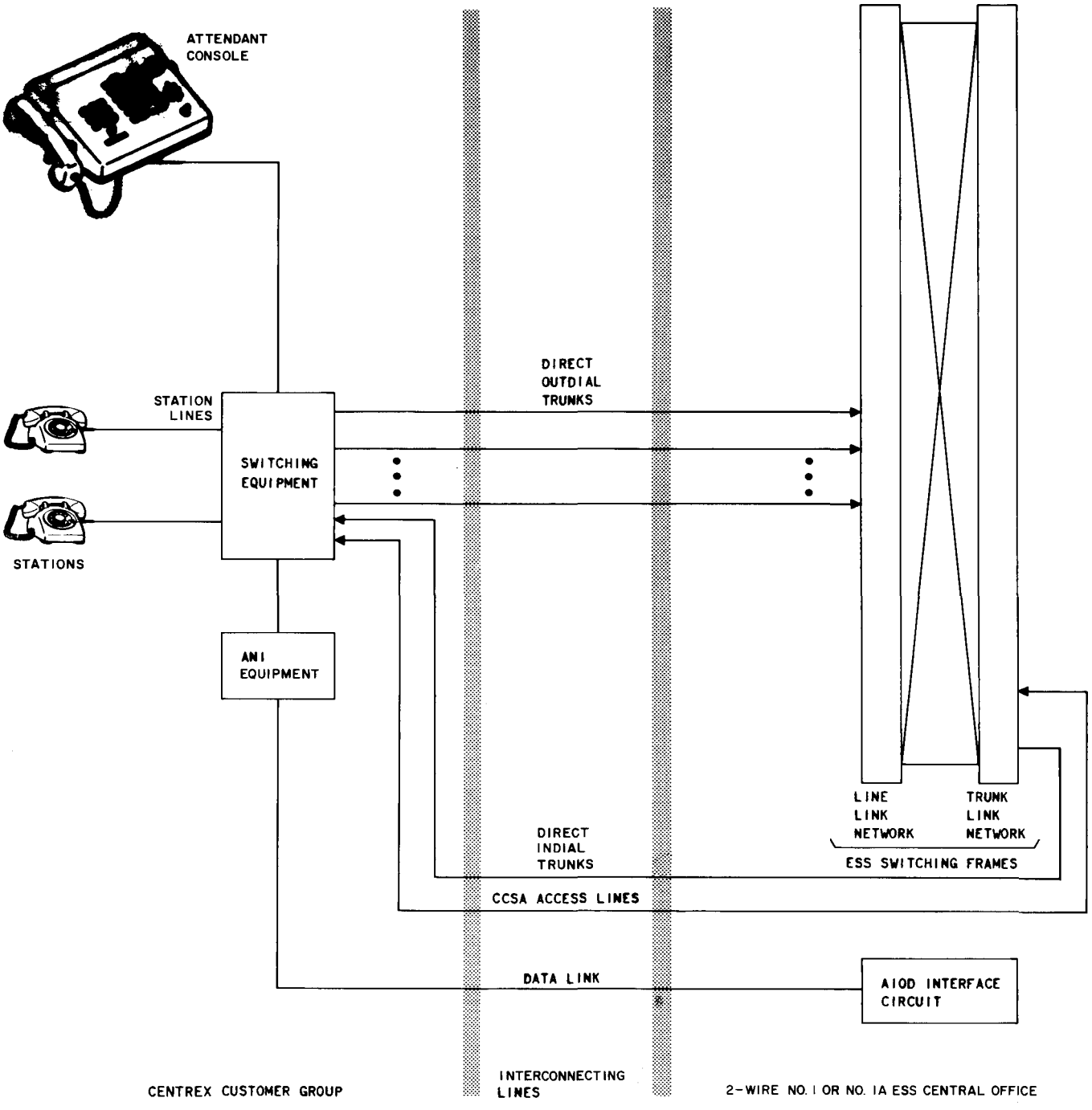


Fig. 3—Centrex-CU System (AIOD Configuration)

by means of a unique switching arrangement and dedicated facilities. This service provides an access line to a CCSA network for network direct inward dialing (DID) to a Centrex/ESSX-1 system, direct outward dialing (DDD) to the network, and other features similar to the exchange network.

3. CENTREX/ESSX-1 FEATURES

FEATURE DESCRIPTIONS

3.01 This part gives an alphanumeric listing of No. 1 or No. 1A ESS Centrex/ESSX-1 features. Table A lists these features and the generic program in which they were offered. The following text describes the features listed in Table A.

Abandoned Call Search

3.02 This is a search performed on incoming foreign exchange and tie trunks that have received delay announcement(s) before connection is made to an automatic call distribution (ACD) agent. This feature prevents an incoming ACD call from being connected to an agent when the calling party has disconnected subsequent to hearing the announcement(s).

Account Codes ETS

3.03 This feature is part of the electronic tandem switching (ETS) feature and allows a station user to optionally enter a 3- through 8-digit account code, which is recorded in the station message detail record. This code is dialed before the called number. The feature group required to provide account codes is ETS. This feature is available with 1E6/1AE6 and later generic programs.

ACD Interface With Coordinator CRT Terminal

3.04 ACD Phase 2—The coordinator cathode ray tube (CRT) terminal is used for ACD system reconfiguration, display, and control. Control and display of the system configuration are provided by the coordinator CRT terminal. This feature is available with 1E4/1AE4 and later generic programs.

ACD Interface With 12A Customer Information System (CIS)

3.05 ACD ESS Phase 2—This feature provides the ESS with the capability to operate with a Customer Premises Management Information System. The initial application of the 12A CIS is to collect and process ACD Phase 2 traffic data for output in predefined reports. It also inputs customer originated requests to the ACD to alter the parameters controlling the routing of traffic through the ACD. The 12A CIS provides features similar to the ACD-ESS Management Information System (AEMIS), but on a smaller scale. The 12A CIS provides basic call handling information on attendant positions and trunks for the under 150 position market.

ACD Interface With 60A CPS

3.06 ACD Phase 1—The 60A CPS comprises the customer premises equipment through which a large volume of calls are uniformly distributed to a group of service attendants (agents) and provide supervisory personnel with traffic and performance data to efficiently manage the call-handling operation.

ACD Interface With 60B CPS

3.07 ACD Phase 2—The 60B CPS comprises the customer premises equipment through which a large volume of calls are uniformly distributed to a group of service attendants (agents) and provide supervisory personnel with traffic and performance data to efficiently manage the call-handling operation. This feature is available with 1E4/1AE4 and later generic program.

ACD Interface With 90A CPS

3.08 ACD Phase 1—The 90A CPS is used for ACD system reconfiguration, display, and control. Control and display of the system configuration are provided by the 90A CPS display and control station.

ACD Multiline Group Hunting

3.09 This feature equitably distributes an ACD customer's terminating traffic among assigned agents. It also provides the capability for controlling the amount and direction of incoming traffic and adjusting the work force available for handling this traffic.

ACD Agent Log-in

3.10 This feature provides a means of identifying an agent's individual activity by maintaining

a data base in ESS to determine the agent associated with a particular terminal. This information is included in the ACD ESS Management Information System (AEMIS), thus giving AEMIS the capability of generating reports on individuals rather than on terminals. This feature is available with 1E7/1AE6 and later generic programs.

ACD Queueing and Call Distribution to Agents

3.11 This feature provides methods for retaining and ordering incoming calls and uniformly distributing the traffic load to each ACD agent. This feature is available with 1E6/1AE6 and later generic programs.

Advanced Private Line Termination

3.12 This is a tariff term which includes improved tandem tie line service (I1XX) and private network access line (PNAL) service. The feature groups required to provide advanced private line termination are I1XX and DPRP.

Attendant Call-Through Test on Centrex Trunks (ACTT)

3.13 This feature permits a business customer attendant in a 51A CPS environment to verify the operation of a selected trunk by making a test call.

Attendant Camp-On

3.14 This service feature allows an incoming exchange network or CCSA listed directory number call, which the attendant attempts to complete to a busy station, to be held waiting and then be automatically connected when the called station becomes idle. The called station is then automatically rung and connected to the call upon answer.

Attendant Conference

3.15 This feature allows a business customer attendant to connect a maximum of five parties not including the attendant to a conference facility in order that they may converse over a common talking path. These parties are added one at a time via the attendant.

Attendant Console

3.16 The attendant console is a small desk-top position from which the attendant handles calls by means of keys. Keys are provided for control function and for loops and other facilities which appear on the position. All calls placed by the attendant to trunks and station lines are made using the dial provided (rotary or TOUCH-TONE®) or via attendant DSS feature when available.

Attendant Control of Trunk Group Access

3.17 This feature is also known as attendant control of facilities (ACOF)—An attendant can restrict dial access of all stations to certain centrex trunk groups, simulated facilities, and special services by operating special keys. Calls to these facilities may be routed to the attendant for subsequent completion, to a recorded announcement, or to an intercept tone trunk.

Attendant Direct Station Selection With Busy Lamp Field (ADSS/BLF)

3.18 This feature allows a business customer attendant at a 50A/50B CPS attendant console to place calls to customer stations within the customer group by depressing a single pushbutton associated with the desired station number. Each pushbutton contains a lamp to indicate the busy or idle condition of the station.

Attendant Emergency Override (AEO)

3.19 This feature allows an attendant to dial an administrative control access code plus an extension number to override a terminating restriction imposed by the flexible incoming call restriction or customer controlled station restriction features. Specifically, make-busy conditions, call forwarding, and line hunting are ignored. The attendant terminates to the dialed individual station if the line is idle, or is routed to busy tone if the line is busy.

Attendant Position

3.20 The equipment, either switchboard or console, from which listed directory number and other calls requiring assistance can be answered and completed by the attendant.

Attendant Recall From Satellite

3.21 Stations located at two remote centrex locations without attendants but with the attendant transfer feature may, by flashing during an

incoming call, generate a recall to the main location attendant, who can then accomplish the transfer.

Automatic Call Distribution (ACD)

3.22 This feature is used to concentrate, queue, and equitably distribute incoming calls to agents with maximum efficiency. The three major types of ACD service that are available with the No. 1 and No. 1A ESS are as follows:

(a) Basic ACD Service—This feature requires very little equipment on customer's premises. Standard telephone sets and/or key telephone sets are used for agent position equipment.

(b) ACD Phase 1—This feature uses compact 20-button consoles (500A type telephone sets) for call processing by agents and desk-top display units for system control and traffic data reports for supervisors. ACD Phase 1 offers hands-free answer for agents, priority queueing of calls, trouble-report signaling, and a simplified Management Information System to name a few. The feature groups required to provide ACD Phase 1 are ACD, inquiry and response system (IRES), and selected traffic data to customer (CTRF).

(c) ACD Phase 2—This feature uses 600-type consoles for call processing by agents and supervisors. ACD Phase 2 offers all the features of ACD Phase 1 plus two major improvements. One is the sophisticated ACD-ESS Management Information System (AEMIS) that utilizes a minicomputer located on the customer's premises. The second improvement is usage of data link for a wide variety of applications requiring high-speed communications between the ESS and AEMIS minicomputer and between the ESS and 60B CPS. The feature groups required to provide ACD Phase 2 are ACD 2, data link input/output control (DLIO), IRES, and optionally data link sequencing (DLSQ). This feature is available with 1E4/1AE4 and later generic programs.

Automatic Callback Calling (ACBC)

3.23 This feature enables a calling party encountering a busy station within the business customer group to dial an activation code and be automatically called back when the called station becomes idle. The feature group required to provide automatic callback calling (ACBC) is ACBC. This feature is available with 1E6/1AE6 and later generic programs.

Automatic Identified Outward Dialing (AIOD)

3.24 AIOD is a centrex-CU feature which provides automatic identification of stations on outdialed calls for purposes of individual station billing.

Automatic Route Selection—Deluxe—ETS

3.25 This feature allows alternate routing of off-network calls when the first choice route is busy. Whether a call has access to all of the possible routes in the route list is a function of the facility restriction level associated with the call. This feature is available with 1E6/1AE6 and later generic programs.

Automatic Time-Out of Announcement and Tones (TATO)

3.26 This feature provides the capability to automatically take down a connection to a tone or announcement after a specified time-out interval. This feature is available with 1E5/1AE5 and later generic programs.

AUTOVON Customer Status

3.27 This feature provides the centrex attendant a visual indication of (1) the approximate number of automatic voice network (AUTOVON) priority calls waiting for service, (2) the routine or priority status of incoming calls and how they reached the attendant, and (3) the busy-verifiable state of trunks that could be preempted and the routine/priority status of calls on each trunk. This feature is available with 1E7/1AE7 and later generic programs.

AUTOVON Interface

3.28 This feature provides the capability for completing both routine and priority telecommunications between a business customer and the (AUTOVON) network. Two customer options are available to provide for completing incoming AUTOVON priority calls:

(a) Precedence Network In-Dialing (PNID)—This option provides basic centrex AUTOVON interface capability. ESS originating and terminating call handling capabilities for routine and

priority AUTOVON calls are provided using PNID. PNID also provides for trunk treatment required for preemptible and nonpreemptible trunks.

(b) Main-Satellite AUTOVON Compatibility (MSAC)—This option provides the following capabilities:

(1) Immediate Diversion Network In-Dialing (INID)—The INID option allows the ESS to intercept an incoming priority call from AUTOVON being directed to another switching machine (referred to as a satellite switcher) and reroute the incoming priority call to a customer specified directory number (DN).

(2) Precedence Network In-Dialing (PID)—PID permits priority calls from AUTOVON to reach a satellite office termination via dedicated tie trunks between the ESS and a satellite switcher or via the message network using remote call forwarding. However, if the priority call is not answered within a certain period of time (18 to 24 seconds), the priority call will be rerouted to a customer-specified DN which must lead to a centrex data link console served by the main ESS. The feature groups required to provide AUTOVON interface are MSAC and PNID.

Busy Verification of Centrex Trunks (BVT)

3.29 This feature allows the attendant to establish a "talking" connection to an apparently busy centrex trunk to determine if the centrex trunk is in working order. When the attendant is connected, periodic bursts of tone are applied to alert any talking parties of the attendant's presence.

Busy Verification of Station Lines (BVL)

3.30 This feature allows the attendant to establish a "talking" connection to an apparently busy station line to determine if the station line is in working order. When the attendant is connected, periodic bursts of tone are applied to alert any talking parties of the attendant's presence.

Call Forwarding Busy Line (CFBL)

3.31 This feature provides for forwarding of incoming calls to a business customer station (DID, CCSA, priority AUTOVON, or selected tie trunk) to a preselected station within the same centrex group or to the business customer attendants when the called station is busy. If the centrex group has the call forwarding unrestricted source feature, intracentrex calls as well as incoming calls are forwarded.

Call Forwarding Don't Answer (CFDA)

3.32 This feature provides for forwarding of incoming calls to a business customer station (DID, CCSA, priority AUTOVON or selected tie trunk) to a preselected station within the same centrex group or to the business customer attendants when the called station does not answer after a predetermined number of ringing cycles. If the centrex group has the call forwarding unrestricted source feature, intracentrex as well as incoming calls are forwarded.

Call Forwarding Don't Answer With Variable Timing (VCFDA)

3.33 This feature, when applied to the CFDA feature, allows business customers to select the number of ringing cycles that will occur before an unanswered call is forwarded.

Call Forwarding Inhibit Line Busy (CFILB)

3.34 This feature, when used with the CFBL feature inhibits CFBL when the called line is busy and routes the calls to busy or overflow tone. A make-busy key may be associated with this feature. When the make-busy key is operated CFBL is allowed.

Call Forwarding Inhibit Make Busy (CFIMB)

3.35 This feature, when used with CFBL, inhibits CFBL when a line with CFBL has been artificially made busy via a make-busy key and routes the call to busy or overflow tone. When the make-busy key is not operated, CFBL is allowed.

Call Forwarding Outside (CFO)

3.36 This feature, when used with call forwarding variable (CFV) permits calls to be forwarded to a party outside the business customer group.

Call Forwarding Over Private Facilities (CFPF)

3.37 This feature is used with the CFV feature. It permits the forwarding of calls over CCSA

(dial 8), WATS, FX, and senderized tie lines as well as DDD facilities. As an option, flexible route selection (FRS) can be used to select the customer's preferred route for forwarding the call. The feature group required to provide CFPF is CFPF. This feature is available with 1E6/1AE6 and later generic programs.

Call Forwarding Overflow (CFOV)

3.38 This feature, when associated with CFILB and CFIMB, causes calls which would normally be routed to busy tone, when line busy is encountered, to be routed to overflow tone.

Call Forwarding Unrestricted Source (CFUS)

3.39 This feature, when associated with CFBL and/or CFDA, permits intracentrex as well as incoming calls to be call forwarded.

Call Forwarding Variable (CFV)

3.40 This feature allows incoming calls to a business customer's station to be forwarded to a preselected party within the business customer group. When the CFO feature is associated with the CFV feature, the preselected party may be outside as well as within the business customer group.

Call Hold (CHD)

3.41 This feature allows a business customer station user to "hold" any call in progress by flashing and then dialing the "call hold" code, thereby freeing the line for the purpose of originating another call, answering a waiting call or returning to a held call. The held call cannot be added to another call.

Call Pickup (CPU)

3.42 This feature allows a business customer station user to answer any call within an associated preset pickup group. If more than one line within the pickup group has an unanswered call, the call that is answered is the one that has been ringing the longest.

Call Transfer—Attendant

3.43 This feature allows the called station user, while connected to an incoming exchange network, CCSA, or FX facility call, to signal (recall) the attendant by flashing the switchhook or by dialing attendant access code when call transfer individual, call hold or both are provided so that the attendant can transfer the call.

Call Transfer—Individual

3.44 This feature allows a station user to transfer only an incoming exchange network, CCSA, FX, or external tie line call to another station within the same PBX or centrex group without assistance of the attendant.

Call Transfer—Individual—All Calls

3.45 This feature allows a station user to transfer any established call to another station within or outside the PBX or centrex group without the assistance of the attendant. This is accomplished by flashing while on a two-party call, dialing the desired party, utilizing the consultation hold—all calls and/or add-on features, and hanging up. Only one party on the final connection can be outside the PBX or centrex group.

Call Transfer—Intercentrex Screening

3.46 This feature optionally restricts transfer of external calls to directory numbers (DNs) within the DN extension range of the flashing party's PBX or centrex group but which are not members of this group.

Call Transfer—Outside

3.47 This feature allows a station user to add on a dial 9, off-network (10-digit) CCSA, or WATS facility to an external call.

Call Transfer to Fully Restricted Stations

3.48 This feature permits a station user with call transfer—individual, who is on a direct inward dial (DID) call, to only consult with a fully restricted station. If on an intragroup call, the party can transfer the call to a fully restricted station within the same business customer group.

Call Transfer—Unlimited

3.49 This feature allows a station user to transfer any established call to another station within

the same customer group without assistance of the attendant.

Call Waiting—Intragroup (CWI)

3.50 feature is offered on a per-centrex group basis and allows those centrex stations with the call waiting terminating feature to be call waiting on intragroup calls. These calls include station to station, station to tie trunk, and station to attendant calls.

Call Waiting—Originating (CWO)

3.51 This feature offered on a per-line basis allows a centrex calling station with the feature to direct a call waiting tone toward a busy called station within the same centrex group. The busy called station can retrieve the calling station by hanging up and being rung back or by depressing the switchhook momentarily (flashing) to place the existing call on hold, and answering the waiting call.

Call Waiting—Terminating (CWT)

3.52 This feature allows a business customer who is engaged in a telephone conversation to be alerted via an audible tone that an incoming direct-inward dialing or common control switching arrangement call is attempting to reach the business customer. The busy called station can retrieve the calling station by hanging up and being rung back or by depressing the switchhook momentarily (flashing) to place the existing call on hold, and answering the waiting call.

Calls Waiting Lamps

3.53 This feature provides the business customer attendant(s) with a visual indication that calls are waiting in queue to be answered. As indication is also given as to the approximate number of calls waiting (for console queueing) or the length of time a customer has been waiting in queue (for line queueing).

Centralized Attendant Service (CAS)

3.54 The CAS service arrangement is provided when a multilocation business customer desires to concentrate attendant services for all locations at one location referred to as the main location.

Centrex

3.55 This is a business service package in which the individual stations have direct-inward-dialing and station identification on outgoing calls. Centrex is provided to stations connected with central office equipment by individual cable pairs. The attendant position is located on the customer's premises. (See ESSX-1.)

Centrex Station Rearrangements

3.56 This feature provides the following capabilities for centrex customers: the ability to activate/deactivate stations; the ability to exchange a station's number; and the ability to change centrex class of service, facility restriction level, call pickup group, and "hunt to" number for series completion, call forward busy line, and call forward don't answer. This feature is available with 1E7/1AE7 and later generic programs.

Circular Hunting

3.57 This is a type of line hunting in which the hunt for an idle line starts with the called line and proceeds in a prearranged order to test all lines in the group, completing the call to the first idle line encountered.

Code Calling

3.58 This feature allows attendants and station users to dial an access code and a called party code to activate signaling devices (bells, gongs, horns, etc.,) with a coded signal corresponding to the called code. The calling party can then be connected to the called party when the called party dials an answering code from any nonrestricted station within the business customer group.

Code Restriction

3.59 This feature denies selected station lines completion of dialed outgoing exchange network calls to selected office and area codes. The restricted calls are routed to the attendant, to an announcement, or to a tone.

Combined TOUCH-TONE and Dial Pulse on Incoming Tie Trunks

3.60 This feature gives the ESS the ability to receive station-generated TOUCH-TONE or dial pulse address signals on incoming tie trunks.

Common Control Switching Arrangement (CCSA)

3.61 This feature is an interstate or intrastate offering which provides interconnection between customer locations by means of private lines which are switched at ESS or No. 5 crossbar switching centers.

Conference Calling

3.62 This feature allows a business customer station user to establish conference connections involving up to six conferees (including the conference controller) without the aid of an attendant.

Consultation Hold

3.63 This feature allows a station user to hold incoming exchange network or CCSA calls and on the same line, originate a call to another station line or to the attendant within the same customer group for a private consultation.

Consultation Hold—All Calls

3.64 This feature permits a station user to hold any existing call and originate a call to another station line inside or outside the customer group or the attendant for private consultation.

Controlled Outward Restriction

3.65 This feature permits the attendant and/or certain administrative lines to control the restriction of direct dialed outgoing local central office and toll calls from selected station lines. When activated, restricted calls are routed to reorder.

Controlled Station-to-Station Restriction

3.66 This feature permits the attendant and/or certain administrative lines to prevent selected station lines from receiving station to station calls. When activated, the restricted calls are routed to a recorded intercept announcement.

Controlled Termination Restriction

3.67 This feature permits the attendant and/or certain administrative lines to prevent, on an individual or group basis, selected station lines from receiving any direct dialed calls. These same lines may receive calls from and through the attendant. When activated, the restricted calls are routed (depending upon option selected) either to a recorded intercept announcement, to an intercept tone, or to an attendant.

Controlled Total Restriction

3.68 This feature permits the attendant and/or certain administrative lines to prevent, on an individual or group basis, selected station lines from originating or receiving any calls. Optionally, these lines can originate calls to and receive calls through the attendant. When activated, the restricted calls are routed (depending upon option selected) either to a recorded intercept announcement, to an intercept tone, or to an attendant.

Customer Changeable Speed Calling

3.69 This feature allows subscribers to assign their own speed calling codes from their own telephones.

Customer Dialed Account Recording on AMA

3.70 This feature allows a business customer to associate a personal account number with a given call which is recorded on the AMA record. This feature is available with 1E5/1AE5 and later generic programs.

Customer Facility Groups (CFGs)

3.71 These groups have the capability to limit network access calls, intercommunications calls, and 3-port facility usage for ESSX-1 customers.

Customer Identification on AMA (CSAID)

3.72 This feature provides a means for customer identification to be included in automatic message accounting (AMA) records for common control switching arrangement (CCSA) sampling, wide area telephone service (WATS) with station billing, and any customer dialed account recording (CDAR) calls.

Data Link Input/Output (DLIO)

3.73 This feature provides a software interface between a data link and call processing and maintenance programs. The feature group required to provide DLIO is DLIO. This feature is available with 1E4/1AE4 and later generic programs.

Data Link Sequencing (DLSQ)

3.74 This feature maintains the integrity of the automatic call distribution Phase 2 ACD-ESS management information system (AEMIS) by ensuring that messages sent from the ESS to the AEMIS minicomputer over multiple data links arrive in the correct time sequence. The feature groups required to provide DLSQ are ACD2 and DLSQ. This feature is available with 1E5/1AE5 and later generic programs.

Delay Announcement Improved Billing

3.75 This feature provides that charging for a call (answer supervision to be returned) be controlled by connection to the delay announcement. This feature is available with 1E5/1AE5 and later generic programs.

Delayed Announcements

3.76 This feature provides audible announcements on calls directed to attendants to inform the calling party that there will be a delay in answering the call.

Deluxe Queueing—ETS

3.77 This feature provides the capability for ETS collocated stations and network trunks to queue for on-network and off-network facilities. Both off-hook and ringback (on-hook) queueing are provided. Ringback queueing is limited to collocated stations queueing for 1-way or simulated facilities. Priority treatment is given to incoming calls on trunks and access lines. Service protection provides the periodic service for calls from collocated stations. The feature group required to provide deluxe queueing is ETS. This feature is available with 1E6/1AE6 and later generic programs.

Dial Call Waiting (DCW)

3.78 This feature provides the ability for originating business customer stations to invoke call waiting service on selected intragroup calls by dialing the dial call waiting access code followed by the extension number of the station to be call waited.

Dial Pulse Dialing

3.79 This is the nominal 10 pulses per second from customer lines and incoming trunks.

Dial Repeating Tie Trunks (DRTT)

3.80 This feature provides terminations which offer significant advantages over previous arrangements in that the "clicks" are eliminated. This feature is available with 1E6/1AE6 and later generic programs.

Dial Transfer to Cut-Through Tie Lines

3.81 This feature allows a station user with call transfer—individual to transfer a call to a cut-through tandem tie line facility under the same conditions as a transfer to regular tie lines.

Different Route for Transferred Call (DRTC)

3.82 This feature provides the capability to route transferred calls to other locations within a multilocation group over a trunk group different than the trunk group used for ordinary directly dialed calls to the same destination.

Digit Timing Code Conflict

3.83 This feature provides the ability to use conflicting, variable-length codes in a business customer group dialing plan to reach similar or different facilities.

Direct Connect Service

3.84 This service provides the ability for stations to automatically place a call to a preassigned called number when the station user goes off-hook.

Direct Inward Dialing (DID)

3.85 This feature allows an incoming call from the exchange network (not FX or WATS) to reach a specific business customer station line (or group of lines if in a hunt group) without attendant assistance.

Direct Outward Dialing (DOD)

3.86 This feature allows a business customer station user to gain access to the exchange network without the assistance of the attendant by dialing an access code (generally "9") and receiving a second dial tone.

Directed Call Pickup With Barge-In (DPU)

3.87 This feature provides the ability for a call directed to a station line to be answered by any

other station user within the same centrex group or centrex complex by dialing a unique answer code and the extension number of the line to be answered. If the call has already been answered, a burst of tone is applied to alert the answering party of the impending presence of a third party. The third party is then bridged onto the existing talking connection.

Directed Call Pickup—Nonbarge-In (DPNB)

3.88 This feature provides the ability for a call directed to a station line to be answered by any other station user within the same customer group or customer complex by dialing a unique answer code and the extension number of the line to be answered. If the call has already been answered by the called station, the station user who dialed the access code receives busy tone.

Distinctive Ringing/Distinctive Call Waiting Tone (DRNG/DCWT)

3.89 This feature enables a station user to determine the source of a call incoming to the station. The station user is also able to determine the source of the call on call waiting and camp-on calls with the 50A/50B CPS. This is done by associating a distinctive ringing pattern or a distinctive call waiting tone pattern with the incoming call based on its source. The feature groups required to provide DRNG/DCWT are DRNG and MPTY. This feature is available with 1E6/1AE6 and later generic programs.

Electronic Tandem Switching (ETS)

3.90 ETS provides a group of large business customer features for improved tandem tie-trunk services. ETS enhances existing services by providing more efficient utilization of trunk facilities terminating on the services (ie, WATS, FX, DDD). The features provided are:

- Automatic Route Selection—Deluxe
- Automatic Alternate Routing
- Uniform Numbering
- Station Message Detail Recording to Customer
- Account Codes
- Authorization Codes
- Traveling Class Marks
- Traffic Data to Customer (Pollable)
- Facility Administration and Control
- Deluxe Queueing
- Selected Customer Control of Facilities.

The feature groups required to provide all the ETS features are ETS, selected traffic data to customer (CTRF), improved authorization codes (IAC), local and HILO TOUCH-TONE outpulsing, peripheral unit controller (PUC), PUC data link (PDL), selected customer control of facilities (SCOF), and traveling class mark (TCM). ETS is available with 1E6/1AE6 and later generic programs.

Emergency Manual Line Service

3.91 This feature provides for manual completion of both originating and terminating calls for selected critical customers when an emergency condition exists at an ESS such as a prolonged severe overload or when the switching machine is inoperative.

ESSX-1

3.92 This feature is an alternative to or replacement centrex service. It allows for distance sensitive and usage—reflecting pricing by limiting and measuring: (1) incoming and outgoing message network calls, (2) intercom calls, and (3) call using 3-port facilities. The feature group required to provide ESSX-1 is ESSX-1. This feature is available with 1E5/1AE5 and later generic programs.

Extended Ringing Cycle Option (ERCO)

3.93 This feature increases the available number of call forwarding don't answer with variable timing ring cycles from four to eight. This feature is available with 1E6/1AE6 and later generic programs.

Facility Administration and Control—ETS

3.94 This feature provides the ETS customer access to selected data elements in the ESS which control the operation of the customer's network. These data elements control calling privileges, routing, and queueing capabilities. The feature

groups required to provide facility administration and control are ETS, PUC, and PDL. This feature is available with 1E6/1AE6 and later generic programs.

Fixed Delay Announcement

3.95 This feature provides one through four prerecorded announcements be given to a calling party to indicate that there will be a delay before service can be provided. The customer can specify that, after each delay announcement has been given to the incoming call, the call be connected either to silence, a special tone, or to a customer-provided music source.

Flexible/Automatic Route Selection (FRS)

3.96 This feature directs outgoing business customer calls to the customer's most preferred available route. The customer may preselect a sequence of up to four private routes for each code point in the direct distance dialing (DDD) network for which a charge applies. The types of private routes include FX, CCSA, and WATS.

Flexible First Delay Announcement

3.97 This feature provides for initially connecting an incoming call to one of two possible delay announcements after being placed on queue. The selection is based upon the time that the longest queued call has been waiting to be serviced.

Flexible Incoming Call Restriction

3.98 This feature is a line arrangement through which an individual customer station or a functional group of individual stations can be temporarily prohibited from receiving calls. This service is also referred to as "do not disturb" service, hospital slumber service, and controlled termination restriction.

Foreign Exchange Service (FX)

3.99 This feature provides customer access to a distant central office by private (foreign exchange) trunks. Incoming foreign exchange calls are placed to the listed (foreign exchange) directory number and are answered by the attendant. Outgoing calls may be made on an attendant handled basis (via direct or dial access) and/or on a station user direct-dial basis (via direct or dial access) and/or on a station user direct-dial basis.

Group Make-Busy Keys (GMB)

3.100 This feature enables an entire group of lines in a multiline group to appear busy to incoming calls. When activated, no search for an idle line is conducted and the incoming call is given busy treatment.

Identified Outward Dialing

3.101 This feature provides either automatic or operator identification (AMI or ONI) of the calling station line number to permit individual station billing on toll calls.

Incoming Call Identification (ICI)

3.102 This feature allows an attendant, at a 50A or 51A CPS console position, to identify visually the type of service or trunk group associated with a call directed to the attendant.

Indication of Camp-On

3.103 This feature provides an audible burst of tone to the busy called station to indicate that an incoming call is camped on.

Individual Billing of Directory Number (IBDN)

3.104 This feature provides individual station billing identification on OUTWATS calls from a business-CO customer.

Inhibit Night Service

3.105 This feature inhibits normal night service in a particular centrex by preventing the transfer to a night directory number specified (in centrex common block). Inhibit night service has no effect on emergency night service (block failure) that will be indicated whenever all of the attendant 1B-, 2B-, 27A-, or 47A-type positions are out of service.

Interface With ACD-ESS Management Information Systems (AEMIS)

3.106 The ACD Phase 2 service provides an optional minicomputer based ACD-ESS (AEMIS). The minicomputer is located on the cus-

tomer premises and interfaces with the ESS via one or more data links. The AEMIS is a management tool that provides accurate, timely selected system behavior information to all levels of management. This feature is available with 1E4/1AE4 and later generic programs.

Interface With Common System Recorded Announcement Frame (CSRAF)

3.107 This feature provides the capability to operate a common systems recorded announcement frame with the ESS. Included as a part of the CSRAF feature is the capability to record announcements from the central office on the frame phone or a remotely located dedicated CALL DIRECTOR® phone or by remote business customer access on a dial up basis. This feature is available with 1E4/1AE4 and later generic programs.

Interface With Property Management System (ACMOS)

3.108 This feature also referred to as the automatic customer message outputting system (ACMOS), provides call data to a customer-provided hotel/motel property management system when the customer's telephone service is provided directly from the central office. Two functions are furnished by this feature.

(a) The hotel/motel message unit reporting function provides the capability to input billing information to the customer computer on all completed guest local message unit calls.

(b) The calling line identification function allows the customer to input any customer-selected data to the customer computer from any station belonging to that business customer.

The feature groups required to provide ACMOS are AMOS, IRES, and DLIO. This feature is available with 1E4/1AE4 and later generic programs.

Line—Denied Originating

3.109 This line is prohibited from originating any call.

Line—Denied Terminating

3.110 This line is prohibited from terminating any call.

Line—Flat Rate

3.111 This line has unlimited local call service for a fixed charge per month.

Line—Free Terminating

3.112 No charge is recorded or answer signal returned when this line is called.

Line—Individual

3.113 This is a residence or business line arranged to serve only one main station although additional stations may be connected to the line as extensions.

Line—Individual—Fully Restricted

3.114 This is the denial to a station of the capability to make any outgoing calls, or receive any incoming calls. Access to and from the attendant is not permitted.

Line—Individual—Nonrestricted

3.115 This is a line on which originating and terminating calls can be made.

Line—Message Rate

3.116 This is a procedure for billing each individual local call. Initial and overtime periods are defined in message units. Up to 16 conditions of variable initial and overtime periods may be required.

Line TWX—Teletypewriter Exchange

3.117 This is a form of teletypewriter service in which suitably arranged teletypewriter stations are provided with lines to a central office where, at the request of the customer, connections may be established between any such station and any other similar station.

Local Off-Network Access Line (LONAL)

3.118 This is a local exchange line terminated in the CCSA switcher and in a local central office. This arrangement permits direct dial connections between network telephones and off-network telephones with access to the entire DDD world or to restricted numbering plan areas (NPAs) or exchanges as desired.

Loudspeaker Paging

3.119 This feature allows business customer attendants and station users and nonbusiness customer station users to dial access loudspeaker paging equipment. Capabilities are provided to allow multizone paging where a separate access code or directory number is provided for each zone within a customer's location. Optional arrangements may be provided business customers to allow the paged party to be connected to the calling party by dialing an answering code from any station within the customer group.

Main-Satellite Service

3.120 This service is provided when a multilocation business customer desires to concentrate attendants at one location referred to as the main. Other locations do not have attendants and are referred to as satellites. Only one listed directory number (LDN) is provided (for the main location), and all incoming calls are routed to the main location. Incoming calls to the satellite locations are switched through the main, and all LDN calls are routed to the attendants at the main. Calls to the message network may be routed through the main location or may be completed directly to the message network from each satellite location. A coordinated numbering plan is used for all locations to simplify attendant operations and to minimize work time.

Manual Originating Line Service

3.121 This service provides station lines that are arranged to alert the attendant when the station user goes off-hook for service.

Multiline Groups—Hunting

3.122 This feature provides a group of lines with common terminating features that are grouped together to share translation data, thus saving program store and retaining their individual originating features. The hunting for an idle line in a multiline hunt group can be accomplished using several types of hunting arrangements.

Multiline Groups—No Hunting

3.123 This feature provides an efficient means of providing common terminating features for lines that are grouped together to share translations data, thus saving program store and retaining their individual originating features. Originating features are assigned on a per-line basis, and line hunting is not performed.

Multiple Call Forwarding (MCF)

3.124 This feature controls the number of sequential CFV, CFBL, and CFDA base station-to-remote station links which can occur on one call within a central office.

Multiple Position Hunt (MUPH)

3.125 This feature is a business customer line hunting arrangement that provides the ability to distribute calls over a group of up to 16 line-loop console positions, each of which can handle up to six types of calls. Incoming calls are routed only to idle positions with an idle loop for that call type.

Night Service

3.126 This feature provides arrangements to route incoming calls normally directed to the attendant to preselected station lines within the customer group.

Off-Network Access Line

3.127 This is an interexchange line terminating in a CCSA switcher and in a central office at the distant or foreign location. This arrangement permits direct dial connections between network telephones and off-network telephones with access to the entire DDD world or to restricted NPAs or exchanges as desired.

Outgoing Trunk Queueing (WATS Queueing)

3.128 This feature provides efficient usage of business customer private facilities by queueing individual station calls and providing a maximum time limit for a call to remain on queue before possible overflow to the direct distance dialing (DDD) network.

Override Attendant Access Restriction

3.129 This feature permits a business customer station user or attendant to use single digit codes to terminate an intragroup call regardless of the originator's class of service.

Power Failure Transfer—Attendant

3.130 This feature provides for routing of calls to a business customer attendant to a preassigned directory number during a commercial power failure at the customer's location. The power failure transfer-attendant feature is activated during a commercial power failure when battery reserve power is not provided or when battery reserve power is provided and the reserve power is depleted.

Preferential Hunting

3.131 Preferential hunting is a type of line hunting which permits a prehunt over a subset or preferential group of terminals before hunting through the multiline hunt group (MLHG). The hunt through the MLHG can be a regular or circular hunt.

Priority Queueing

3.132 This feature allows calls from specific trunk groups or to specific directory numbers to be placed on a queue for the multiline hunt group and answered by the first available attendant before other waiting calls that are nonpriority.

Private Network Access Line Service (PNAL)

3.133 A version of the Tandem Tie Trunk Service feature which allows access line service where the calling number is multifrequency outpulsed before nonsenderized operation begins. The feature group required to provide PNAL is dial pulse repeating diagnostics (DPRP). This feature is available with 1E6/1AE6 and later generic programs.

Queue Holding Register for Uniform Call Distribution (UCDs)

3.134 This feature provides an engineered number of queueing registers per line group to control the number of incoming calls queued for the line group.

Queueing for Trunks and Lines (QTL)

3.135 This feature provides a means for automatically queueing calls to a multiline hunt group or a group of trunks when all hunting group terminations are busy.

Radio Paging Access

3.136 This feature allows attendant, tie trunk, and station users dial-access to customer-provided radio paging equipment to selectively tone alert or voice page individuals carrying pocket radio receivers (or other devices).

Random Make-Busy (RMB) Keys

3.137 This feature enables a group of lines in a multiline group to be taken out of service by a key located at the customer's premise. When activated, the line/lines associated with the key are made busy and stay busy until deactivated by associated key. Only 10 random make-busy keys are allowed per group.

Recorded Telephone Dictation

3.138 This feature permits access to and control of customer-owned telephone dictating equipment by stations, tie trunks, and business customer attendants within the customer group.

Regular Hunting/Terminal Hunting

3.139 Regular hunting is a type of hunting in which the hunt for an idle line starts with the called station's line and ends with the last station's line in the prearranged group, completing the call to the first idle line encountered.

Release Link Satellite Operation

3.140 This feature improves transmission and tie trunk usage in main-satellite centrex complexes by elimination of multiple trunking on many interlocation calls. For example, on a DID call to a station in a satellite which is transferred by the attendant (at the main location) to another station at the satellite, the links to the attendant will be released upon completion of the transfer.

Remote Access to Common Systems Recorded Announcement Frame (CSRAF)

3.141 This feature provides business customers with the capability to record announcements on the CSRAF from the business customer location and/or the message telephone network. This feature is available with 1E4/1AE4 and later generic programs.

Ring Reminder (RNGR)

3.142 This optional feature provides an alerting signal at the base station to inform the call forwarding variable customer that a call has been forwarded. This feature is available with 1E6/1AE6 and later generic programs.

Satellite Attendant Transfer

3.143 This feature provides the same service as the call transfer-attendant to satellite location having no attendant. Satellite attendant transfer service can be provided over both tie trunk facilities and FX facilities for routing calls to an attendant at the main centrex.

Selected Customer Control of Facilities (SCCOF)

3.144 This feature provides the customer, under key control, with the ability to deny access to a trunk or simulated facility group. All calls are denied access to a particular facility group when this key is activated. The feature group required to provide SCCOF is SCOF. This feature is available with 1E6/1EA6 and later generic programs.

Selected Traffic Data to Customer (CTRF)

3.145 This feature collects and reports traffic counts related to a customer's agents, trunk groups, simulated facilities groups, and other miscellaneous counts. The counts are gathered at the ESS central office and are transmitted to the customer's premises where they are printed out or displayed.

Selective Delay Announcement

3.146 This feature provides the capability for giving different announcements to different calling parties when incoming calls not completed to a multiline hunt group are not serviced within a preset time interval. This feature is available with 1E4/1AE4 and later generic programs.

Semirestricted Centrex Station Class (SEMI)

3.147 This feature provides a terminating major class for centrex stations which restricts direct inward dialing (DID) access but permits access to these stations from intragroup stations, customer attendant, tie lines, and foreign exchange lines. In addition, call forwarding and call transfer of DID calls are permitted to these semirestricted stations.

Series Completion Line Hunting

3.148 This feature allows hunting to start with the called line and busy tests each line in the hunting group until either an idle line is found, the end of the hunting group is reached (terminal hunting) or the starting line is reached (circle hunting). The size of the series hunting group cannot exceed 16.

Service After Delay Announcement (SADA)

3.149 This feature provides for giving an incoming call to a multiline hunt group a complete announcement before the call is serviced.

Silence, Tone, or Audible Ringing (STAR)

3.150 This feature allows the originating party to receive silence, tone, audible ringing music or announcements on a call waiting originating, camp-on, or dial call waiting call. Call waiting originating cannot receive silence. This feature is available with 1E5/1AE5 and later generic programs.

Single Digit Dialing

3.151 This feature permits business customer station users to reach any of a preselected group of stations or other internal facilities by dialing single digit codes.

Source Billing of Attendant Handled Calls (SBAC)

3.152 This feature causes the attendant's billing directory number (BDN) to be replaced with the source party's BDN in all automatic message accounting (AMA) records which result from the centrex attendant extending a call. This change in BDNs in the AMA record only occurs if the source party belongs to the same master centrex complex as the attendant.

Special Tone Upon Queue Entry

3.153 This feature provides for a customer-provided special tone to be given to a calling party upon queue entry. This feature is available with 1E4/1AE4 and later generic programs.

Speed Calling

3.154 This feature allows station users to have abbreviated codes assigned to frequently

called numbers. This permits the dialing of selected numbers using fewer digits than normally required.

Station Message Detail Recording (SMDR)

3.155 This feature provides a record on magnetic tape of calls originated over FX, WATS, CCSA, and the message telecommunications service (MTS) network (Toll) by centrex stations. The recorded will include the calling station number, called number, date, time of day, length of call and type of facility used. In addition, for MTS calls, the charge incurred is recorded.

Station Message Detail Recording To Customer Premises—ETS

3.156 This feature allows ETS customers to receive station message detail records composed of call related data for cost allocation and telecommunications system management. The feature group required to provide station message detail recording to customer premises is ETS. This feature is available with 1E6/1AE6 and later generic programs.

Station Message Register Service (SMRS)

3.157 This feature provides message unit information to message registration equipment centrally-located on a customer's premises. This information is provided on a per-station-line basis for each completed outgoing local-service call made from the station.

Station-to-Station Dialing

3.158 This feature allows the station user to directly dial other stations within the same business customer group without the assistance of the attendant.

Tandem Tie Line Service

3.159 This is a No. 1/1A ESS large business customer feature that provides nonsenderized private line service. There are two versions as follows:

(a) Ordinary 1XX (1XX)—This version inherently has operating noise and sometimes, poor transmission quality.

(b) Improved 1XX (I1XX)—This version provides improved noise and transmission characteristics. The feature groups required to provide I1XX are I1XX and DPRP. This feature is available with 1E6/1AE6 and later generic programs.

Three-Way Calling/Add-On

3.160 This feature allows a station user to add a third party to any established call for a 3-party conference without the assistance of the attendant.

Through Dialing

3.161 This feature allows station users to complete dialing on other than station to station calls after the attendant selects the trunk facility on attendant-handled outgoing calls.

Tie Trunks

3.162 This feature provides one or more one- or 2-way circuits interconnecting two customer groups. The trunks can be either automatic or dial repeating. They are dial-selected by station users or attendants.

Tie Trunk—Nonsenderized

3.163 This is a switching method whereby a business customer user directly controls, in stages, the routing of an outgoing call over tie or foreign exchange trunk facilities through the originating, as well as any intermediate switches. A user is said to " cut-through" these offices.

Tie Trunk—Nontandem

3.164 This feature provides customer dedicated one-way or two-way trunks between two switching machines without any intermediate switching.

Tie Trunk—Senderized

3.165 This is a switching method whereby outpulsed signals are transmitted in response to information received from another part of the system.

Tie Trunk—Tandem

3.166 This feature provides a service arrangement that allows tie trunk-to-tie trunk connec-

tions through one or more switching systems to complete a business customer call requiring tandem tie trunk service.

Toll Diversion to Attendant (TOLD)

3.167 With this feature, a restricted toll call placed from a business customer station is intercepted and routed to the attendant.

Tone, Silence, or Music

3.168 This optional delay announcement capability provides for terminating a calling party to special tone, silence, or music between and following the delay announcements instead of normal audible ringing tone.

Tones and Announcements to ACD Agents

3.169 These are optional features which may be provided for a customer to allow increased call handling efficiency. The tones and announcements feature includes:

(a) Zip Tone—This feature is a 480-Hz signal that alerts the ACD agent that an incoming call is going to be terminated at that console.

(b) City-of-Origin Announcement—This feature provides an audible announcement to the ACD agent identifying the origin of the incoming trunk group.

(c) Audible Indication of Intraflowed or Interflowed Calls—This feature provides a distinctive audible signal, consisting of 0.1 second bursts of tone spaced 0.1 second apart for 0.5 ±0.1 seconds, and is applied to the agent headset in place of zip tone to indicate receipt of an intraflowed or interflowed call.

(d) Access to Daily Announcements—This feature allows an agent to dial access a customer-recorded announcement which is provided from customer-owned and customer-maintained equipment.

TOUCH TONE Dialing

3.170 This feature provides for dialing signals 0 through 9, *, and # using multifrequency signals. Any type of customer line may be equipped for this feature.

Traffic Data to Customer (Pollable)—ETS

3.171 This feature provides the electronic tandem network (ETN) customer with the ability to obtain, via a dialup data link facility, ETN facility traffic reports and nonusage and locked-up trunk scan (NUTS and LUTS) link. The feature groups required to provide traffic data to customer (pollable) are ETS, PUC, PDL, and CTRF. This feature is available with 1E6/1AE6 and later generic programs.

Traveling Class Mark (TCM)—ETS

3.172 This feature allows for carrying class of service information along with the called number through an ETS or EPSCS private customer network. The TCM feature is used to provide information for downstream routing and screening. The feature groups required to provide TCM are TCM and (ETS). This feature is available with 1E6/1AE6 and later generic programs.

Trunk Answer From Any Station (TAS)

3.173 Incoming calls, normally directed to the attendant, activate a common alerting signal on the customer's premises when the attendant positions are in night service and night stations are not assigned or are all busy. These calls may then be answered by any station user in the system who dials a special code from any nonrestricted station.

Trunk Dial Transfer

3.174 This feature provides the ability to give call transfer—individual to centrex tie trunks.

Trunk Group Busy Lamp (TGBL)

3.175 This feature provides a console attendant with a visual indication when all trunks in a trunk group are busy. The trunk groups that may be equipped with this feature on a selective basis are exchange network, simulated facilities groups, tie trunks, and common control switching arrangement.

Uniform Call Distribution (UCD)

3.176 UCD is a type of hunting which provides for an even distribution of incoming calls among the available members of a hunt group.

User Dialed Authorization Codes—ETS

3.177 This feature provides code numbers dialed by the originating party for cost accounting and

call routing purposes. This feature is available with 1E6/1AE6 and later generic programs.

Variable Length Delay Announcement

3.178 This feature provides for variable delay announcements that may vary in length from 4 to 48 seconds. This feature is available with 1E4/1AE4 and later generic programs.

Variable Trigger for Calls Waiting Lamp

3.179 This feature triggers calls waiting lamp as a function of the number of active consoles and calls waiting for an attendant, thereby relating lamp indications to speed of answer.

WATS Administration (WTAD)

3.180 This feature provides a unique identification number for each individual line (trunk) in a WATS simulated facilities group (SFG). This feature is available with 1E5/1AE5 and later generic programs.

Wide Area Telecommunications Service (WATS)

3.181 This feature provides a customer with service to a predetermined area or areas at a rate based on expected usage. WATS is divided into two distinct and separate service offerings.

(a) Outward WATS—This feature provides direct distance dialing access to lines arranged for outward service between the customer's line and specified service areas.

(b) 800 Service—(Formerly INWATS)—This feature allows customers to receive calls from the message network with the charges for the call being billed to the called party instead of the calling party.

50A CPS Attendant Position

3.182 This feature provides a telephone console from which listed directory numbers, dial "0", and other calls of a business customer requiring assistance can be served by the attendant. It is designed to serve business customers requiring a minimum of special attendant-provided services.

50B CPS Attendant Position

3.183 The 50B CPS can utilize a multibutton electronic telephone (MET) set or a DIMENSION® type console. It can provide all of the features of 50A CPS plus most of the capabilities of the 51A CPS. Each system is custom engineered for the desired features and traffic capabilities.

51A CPS Attendant Position

3.184 This feature provides a telephone console from which listed directory numbers, dial "0", and other types of calls requiring assistance can be served by the attendant. The 51A CPS provides for one or more attendant positions equipped with telephone consoles which use data link and switched loop facilities of the serving central office.

STATION RESTRICTIONS

3.185 Various restrictions may be assigned as options to centrex stations or trunks. These restrictions are as follows:

NonRestricted (Originating)

3.186 A station may originate calls to intragroup stations, tie lines, FX lines, local switching network lines, and to the attendant. These stations may be limited to certain points through the use of line class codes and chart columns.

Semirestricted (Originating)

3.187 A station may originate calls to intragroup stations, tie lines, FX lines, and to the attendant.

Fully Restricted (Originating)

3.188 A station may originate calls to intragroup stations, tie lines, and FX lines but ***can not*** call the attendant or use the call transfer feature.

Denied Origination

3.189 A station is not allowed to originate any calls.

Manual

3.190 Calls originating at the station or certain tie lines and FX lines are routed to the attendant for handling.

Nonrestricted (Terminating)

3.191 A station may receive calls from intragroup stations, the attendant, tie lines, FX lines,

TABLE A

CENTREX/ESSX-1 FEATURES

FEATURES	APPLICABLE GENERIC PROGRAM
Abandoned Call Search	All
Account Codes—ETS	1E6/1AE6 and later
ACD Interface with Coordinator CRT Terminal	1E4/1AE4 and later
ACD Interface with 12A CIS	1E4/1AE4 and later
ACD Interface with 60A CPS	All
ACD Interface with 60B CPS	All
ACD Interface with 90A CPS	All
ACD Multiline Group Hunting	All
ACD Agent Log-in	1E7/1AE6 and later
ACD Queueing and Call Distribution to Agents	All
Advanced Private Line Termination	1E6/1AE6 and later
Attendant Call-Through Test on Centrex Trunks (ACTT)	All
Attendant Camp-On	All
Attendant Conference	All
Attendant Console	All
Attendant Control of Trunk Group Access (ACOF)	All
Attendant Direct Station Selection with Busy Lamp Field (ADSS/BLF)	All
Attendant Emergency Override (AEO)	All
Attendant Position	All
Attendant Recall from Satellite	All
Automatic Call Distribution (ACD) Basic ACD Service ACD Phase 1 ACD Phase 2	 All All 1E4/1AE4 and later
Automatic Callback Calling (ACBC)	1E6/1AE6 and later
Automatic Identified Outward Dialing (AIOD)	All

TABLE A (Contd)

CENTREX/ESSX-1 FEATURES

FEATURES	APPLICABLE GENERIC PROGRAM
Automatic Route Selection—Deluxe—ETS	1E6/1AE6 and later
Automatic Time-Out of Announcement and Tone (TATO)	1E5/1AE5 and later
AUTOVON Customer Status	1E7/1AE7 and later
AUTOVON Interface	All
Busy Verification of Centrex Trunks (BVT)	All
Busy Verification of Station Lines (BVL)	All
Call Forwarding Busy Line (CFBL)	All
Call Forwarding Don't Answer (CFDA)	All
Call Forwarding Don't Answer with Variable Timing (VCFDA)	All
Call Forwarding Inhibit Line Busy (CFILB)	All
Call Forwarding Inhibit Make Busy (CFIMB)	All
Call Forwarding Outside (CFO)	All
Call Forwarding Over Private Facilities (CFPF)	1E6/1AE6 and later
Call Forwarding Overflow (CFOV)	All
Call Forwarding Unrestricted Source (CFUS)	All
Call Forwarding Variable (CFV)	All
Call Hold (CHD)	All
Call Pickup (CPU)	All
Call Transfer—Attendant	All
Call Transfer—Individual	All
Call Transfer—Individual—All Calls	All
Call Transfer—Intercentrex Screening	All
Call Transfer—Outside	All
Call Transfer to Fully Restricted Stations	All
Call Transfer—Unlimited	All

TABLE A (Contd)

CENTREX/ESSX-1 FEATURES

FEATURES	APPLICABLE GENERIC PROGRAM
Call Waiting—Initiating (CWI)	All
Call Waiting—Originating (CWO)	All
Call Waiting—Terminating (CWT)	All
Calls Waiting Lamps	All
Centralized Attendant Service (CAS)	All
Centrex	All
Centrex Station Rearrangements	1E7/1AE7 and later
Circular Hunting	All
Code Calling	All
Code Restriction	All
Combined TOUCH-TONE and Dial Pulse on Incoming Tie Trunks	All
Common Control Switching Arrangement (CCSA)	All
Conference Calling	All
Consultation Hold	All
Consultation Hold—All Calls	All
Controlled Outward Restriction	All
Controlled Station-to-Station Restriction	All
Controlled Termination Restriction	All
Controlled Total Restriction	All
Customer Changeable Speed Calling	All
Customer Dialed Account Recording on AMA	All
Customer Facility Groups (CFGs)	1E5/1AE5 and later
Customer Identification on AMA (CSAID)	All
Data Link Input/Output (DLIO)	1E4/1AE4 and later

TABLE A (Contd)

CENTREX/ESSX-1 FEATURES

FEATURES	APPLICABLE GENERIC PROGRAM
Data Link Sequencing (DLSQ)	1E5/1AE5 and later
Delay Announcement Improved Billing	All
Delayed Announcements	All
Deluxe Queueing—ETS	1E6/1AE6 and later
Dial Call Waiting (DCW)	All
Dial Pulse Dialing	All
Dial Repeating Tie Trunks (DRTT)	1E6/1AE6 and later
Dial Transfer to Cut-Through Tie Lines	All
Different Route for Transferred Call (DRTC)	All
Digit Timing Code Conflict	All
Direct Connect Service	All
Direct Inward Dialing (DIP)	All
Direct Outward Dialing (DOD)	All
Directed Call Pickup with Barge-In (DPU)	All
Directed Call Pickup-Nonbarge-In (DPNB)	All
Distinctive Ringing/Distinctive Call Waiting Tone (DRNG/DCWT)	1E6/1AE6 and later
Electronic Tandem Switching (ETS)	1E6/1AE6 and later
Emergency Manual Line Service	All
ESSX-1	1E5/1AE5 and later
Extended Ringing Cycle Option (ERCO)	1E6/1AE6 and later
Facility Administration and Conrol	1E6/1AE6 and later
Fixed Delay Announcement	All
Flexible/Automatic Route Selection (FRS)	All
Flexible First Delay Announcement	All
Flexible Incoming Call Restriction	All

TABLE A (Contd)

CENTREX/ESSX-1 FEATURES

FEATURES	APPLICABLE GENERIC PROGRAM
Foreign Exchange Service (FX)	All
Group Make-Busy Keys (GMB)	All
Identified Outward Dialing	All
Incoming Call Identification (ICI)	All
Indication of Camp-On	All
Individual Billing of Directory Number (IBDN)	All
Inhibit Night Service	All
Interface With ACD-ESS Management Information Systems (AEMIS)	1E4/1AE4 and later
Interface With Common System Recorded Announcement Frame (CSRAF)	1E4/1AE4 and later
Interface With Property Management System (ACMOS)	All
Line-Denied Originating	All
Line-Denied Terminating	All
Line-Flat Rate	All
Line-Free Terminating	All
Line-Individual	All
Line-Individual-Fully Restricted	All
Line-Individual-Nonrestricted	All
Line-Message Rate	All
Line TWX-Teletypewriter Exchange	All
Local Off-Network Access Line (LONAL)	All
Loudspeaker Paging	All
Main-Satellite Service	All
Manual Originating Line Service	All
Multiline Groups-Hunting	All
Multiline Groups-No Hunting	All

TABLE A (Contd)

CENTREX/ESSX-1 FEATURES

FEATURES	APPLICABLE GENERIC PROGRAM
Multiple Call Forwarding (MCF)	All
Multiple Position Hunt (MUPH)	All
Night Service	All
Off-Network Access Line	All
Outgoing Trunk Queueing (WATS Queueing)	All
Override Attendant Access Restriction	All
Power Failure Transfer-Attendant	All
Preferential Hunting	All
Priority Queueing	All
Private Network Access Line Service (PNAL)	1E6/1AE6 and later
Queue Holding Register for Unit on Call Distributions (UCDs)	All
Queueing for Trunks and Lines (QTL)	All
Random Make-Busy (RMB) Keys	All
Recorded Telephone Dictation	All
Regular Hunting/Terminal Hunting	All
Release Link Satellite Operation	All
Remote Access to Common Systems Recorded Announcement Frame (CSRAF)	1E4/1AE4 and later
Ring Reminder (RNGR)	1E6/1AE6 and later
Satellite Attendant Transfer	All
Selected Customer Control of Facilities (SCCOF)	1E6/1AE6 and later
Selected Traffic Data To Customer (CTRF)	All
Selective Delay Announcement	1E4/1AE4 and later
Semirestricted Centrex Station Class (SEMI)	All
Series Completion Line Hunting	All
Service After Delay Announcement (SADA)	All

TABLE A (Contd)

CENTREX/ESSX-1 FEATURES

FEATURES	APPLICABLE GENERIC PROGRAM
Silence, Tone, or Audible Ringing (STAR)	1E5/1AE5 and later
Single Digit Dialing	All
Source Billing of Attendant Handled Calls (SBAC)	All
Special Tone Upon Queue Entry	1E4/1AE4 and later
Speed Calling	All
Station Message Detail Recording (SMDR)	All
Station Message Detail Recording To Customer Premises	1E6/1AE6 and later
Station Message Register Service (SMRS)	All
Station-to-Station Dialing	All
Tandem Tie Line Service	All
Three-Way Calling/Add-On	1E6/1AE6 and later
Through Dialing	All
Tie Trunks	All
Tie Trunk-Nonsenderized	All
Tie Trunk-Nontandem	All
Tie Trunk-Senderized	All
Tie Trunk-Tandem	All
Toll Diversion to Attendant (TOLD)	All
Tone, Silence, or Music	All
Tones and Announcements to ACD Agents	All
TOUCH-TONE Dialing	All
Traffic Data to Customer (Pollable)	1E6/1AE6 and later
Traveling Class Mark (TCM)—ETS	1E6/1AE6 and later
Trunk Answer from any Station (TAS)	All
Trunk Dial Transfer	All

TABLE A (Contd)

CENTREX/ESSX-1 FEATURES

FEATURES	APPLICABLE GENERIC PROGRAM
Trunk Group Busy Lamp (TGBL)	All
Uniform Call Distribution (UCD)	All
User Dialed Authorization Codes—ETS	1E5/1AE6 and later
Variable Length Delay Announcement	1E4/1AE4 and later
Variable Trigger for Calls Waiting Lamp	All
WATS Administration (WTAD)	All
Wide Area Telecommunications Service (WATS)	1E5/1AE5 and later
50A CPS Attendant Position	All
50B CPS Attendant Position	All
51A CPS Attendant Position	All

and the local switching network (also DDD network). (Calls from FX lines are via attendant.)

Semirestricted (Terminating)

3.192 A station may receive calls from intragroup stations, tie lines, FX lines, and the attendant.

Fully Restricted (Terminating)

3.193 The station may receive calls from intragroup stations and tie lines. All calls from the local switching network and DDD network to these stations are routed to central office intercept. Calls from the attendant to these stations result in a 120-ipm indication at the attendant console.

Denied Terminating

3.194 A station is not allowed to receive calls. All calls to this station are routed to intercept.

Centrex Access Treatment Code Restrictions

3.195 A centrex access treatment code allows or denies a station the use of certain services, such as access to tie lines, FX lines, dial dictation and paging equipment, WATS lines, etc.

CCSA DESCRIPTION

3.196 Common control switching arrangements (CCSA) service is a method of interconnecting various business locations of large customers by means of a unique switching arrangement and dedicated facilities. It is primarily a package-type service offering which uses special hardware (CCSA trunks, access lines, switchers, etc) to complete calls on a special switching network.

3.197 Limited CCSA feature are provided with the No. 1 and No. 1A ESS centrex generic programs. These features are as follows:

(a) ***Uniform Numbering Plan:*** A uniform numbering plan is used in CCSA service so that stations which are a part of the CCSA network (on-network) are reached by dialing seven digits (NXX-XXXX). Stations that are not part of the CCSA network (off-network) are reached by dialing the 10-digit POTS code (NPA + NXX + XXXX). The NXX code assigned for CCSA switching purposes has no relationship to central office codes assigned for regular message network service. The CCSA 4-digit station number, however, is the same as the message network station digits. A single digit 8 has been designated as the standard access code of centrex/ESSX-1. A typical station would dial 8 plus the 7- or 10-digit station address. Directly terminated CCSA stations (direct access) are not required to dial an access code.

(b) ***Off-Network Calls Using CCSA Network:*** A service arrangement to permit interconnection of a CCSA network to regular message network facilities is provided. After dialing 8, the station user dials a 10-digit DDD address. The call is routed through the CCSA network to either a local off-network access line (LONAL) or off-network access line (ONAL) group used as the entry point to the message network. If the customer has several ONAL groups, the group terminating closest to the off-network station is usually selected. Upon reaching the appropriate LONAL or ONAL, the call enters the regular message network over which it completes to the desired off-network station. The call is billed from the point at which it left the CCSA network (LONAL or ONAL termination) and entered the message network.

(c) ***Off-Network Access Lines (ONALs):*** These lines provide the necessary access from the CCSA network to the message network as described in subparagraph (b). ONALs are provided on a 2-way basis; however, if the ESS CCSA switcher is not collocated with a Centrex/ESSX-1, the ESS switcher handles only the outgoing calls (CCSA to message network). Incoming calls on the ONAL terminate at a Centrex/ESSX-1 attendant facility that is not directly associated with the ESS. FX or tie trunk hardware is used to provide ONAL service in the ESS.

(d) ***Incoming ONAL to Centrex Attendant:*** If the CCSA is collocated with a centrex-CO, 2-way ONAL service is provided by the ESS. In this case, the incoming ONAL call will function on a manual basis, terminating at an attendant console. The attendant may extend the call to a centrex station or back to the CCSA network as desired.

(e) ***PBX Access to CCSA Without AIOD:*** PBXs or centrex(es) may have access lines ter-

minating at the CCSA switcher; however, the initial generic programs will not allow station identification on an AIOD basis.

(f) ***100 Percent AMA Sampling:*** Calls from CCSA stations or access lines will be sampled on a 100-percent sample basis. Later programs may allow sampling on a 20-percent basis.

(g) ***Individual CCSA Stations:*** Individual CCSA station facilities are terminated as lines on the ESS line link network and are assigned unique 7-digit telephone numbers. Calls originating from a CCSA station do not require an access code 8 and are treated the same as those from a direct CCSA access line. Calls terminating to individual stations are treated the same as calls to regular customer lines.

Types of CCSA Service

3.198 If a No. 1 or 1A ESS is to provide CCSA service, it must be equipped with any of the centrex-type generic programs. Each program is capable of providing three main classifications of CCSA service as follows:

(a) A No. 1 or 1A ESS serving Centrex/ESSX-1 customers and having access to a CCSA switching office.

(b) A No. 1 or 1A ESS serving as a CCSA switching office.

(c) A No. 1 or 1A ESS serving as a CCSA switching office in addition to serving Centrex/ESSX-1 customers (collocated).

3.199 ***Centrex/ESSX-1 with Access to a CCSA Office:*** The characteristics and basic operations of a No. 1 or 1A ESS serving a Centrex/ESSX-1 customer group that has access to a switching office are as follows:

(a) The ESS connects to the CCSA switching office by means of access lines (2-way trunks) which appear on the trunk link network.

(b) Centrex/ESSX-1 stations which are permitted access to a CCSA switching network dial digit 8 plus seven or ten digits on outgoing calls. Second dial tone after the access digit 8 is optional.

(c) The access digit 8 is used only for translations; only the remaining seven or ten digits are outpulsed to the CCSA switching office over the access line.

(d) On incoming calls to Centrex/ESSX-1 stations and the attendant, the CCSA switcher sends a fixed number of digits (0, 2, 3, 4, or 5, usually depending on the intragroup dialing pattern). The same number of digits are sent on all calls to be given access line group. Calls to the attendant require that network (answer, disconnect) supervision is maintained on the call as long as it is held on the attendant console loop.

3.200 ***CCSA Switching Office:*** When the No. 1 or 1A ESS serves as a CCSA switching office, it may be connected to the following:

(a) ***Other CCSA Switching Offices:*** The ESS is interconnected with other CCSA switching offices by means of 2-way CCSA network trunks which appear on the trunk link network. Only 7- or 10-digit calls are acceptable over these network trunks. The incoming network trunk group is assigned to a screening line equipment number (LEN) which simulates an ESS origination. Thus, the 3- or 6-digit translators can be utilized to determine the route that the call will take out of the ESS office. Alternate routing can be arranged on the outgoing route and normally the seven or ten digits would be outpulsed without alteration. Calls received from network trunks do not require AMA sampling and no AMA record is required on the call at this point.

(b) ***Access Lines:*** Access lines may connect the No. 1 or 1A ESS with either Centrex/ESSX-1 or direct access stations. In each case, the ESS would accept the seven or ten digits as dialed by the originating station and translate on a 3- or 6-digit basis to determine the route the call will take out of the No. 1 ESS CCSA office.

(1) Access lines from Centrex/ESSX-1 may appear on either the line link network (LLN) or the trunk link network (TLN) of the No. 1 or 1A ESS CCSA switching office.

- TLN appearance—If the incoming access lines have a TLN appearance, the incoming trunk group is assigned a screening LEN. The 7-digit telephone number associated with the screening LEN which is assigned per trunk group is used for AMA sampling of calls.

- LLN appearance—If the incoming access line appears on the LLN, each line is assigned a

7-digit telephone number for AMA sampling and call processing. Access lines may be terminated on the LLN only if loop signaling is used.

(2) Access lines from direct access CCSA stations appear on the LLN; each line is assigned a 7-digit telephone number used for AMA sampling and identity in the network.

(c) ***Off-Network Access Line (ONAL)***—ONALs are used to connect the CCSA switching machine to foreign central offices for completing calls to stations that are not part of the CCSA network (off-net stations). ONALs are connected to the TLN and can only be used on a 1-way (outgoing) basis from the CCSA switching office. The ONAL is connected to the line link side of the foreign central office and is assigned a directory number for completing to off-net stations. If a non-CCSA station calls the directory number assigned to the ONAL at the local central office, the call is routed to central office intercept. Since the noncollocated ESS CCSA cannot complete to an attendant, incoming ONALs to the ESS CCSA are not provided at this time.

(d) ***Local Off-Network Access Line*** (LONAL)—A LONAL is required to provide access from the CCSA network to the local exchange network.

Generic programs provide for the use of simulated facilities in lieu of actual trunk hardware to provide LONAL and WATS features. A record is maintained in the call store of the number of LONAL and/or WATS calls each customer group has up at any time. The central control will check with the call store prior to setting up any LONAL or WATS call to assure that the customer will not exceed the number of calls (circuits) to which he is entitled.

3.201 ***Collocated Centrex/ESSX-1 and CCSA:*** A No. 1 or 1A ESS is capable of serving as a CCSA switching office in addition to serving centrex and noncentrex customers. In this case, the ESS CCSA is said to be collocated. The characteristics assumed by a collocated ESS CCSA are similar to those of a noncollocated office as covered previously. The collocated ESS CCSA is able to connect to the following:

(a) ***Other CCSA Switching Offices:*** Interconnection between collocated CCSA switching offices is the same as a noncollocated switching office with no exceptions.

(b) ***Access Lines:*** Access lines from Centrex/ESSX-1 and direct access CCSA stations are connected to the collocated office. CCSA access from Centrex/ESSX-1 stations does not require physical access lines to enter the CCSA switching network. However, a restriction on the number of simultaneous originating and terminating centrex CCSA calls must be implemented for tariff purposes. This restriction is achieved by assigning the theoretical access line group to simulated facilities registers in the call store. On calls to the CCSA network from Centrex/ESSX-1 stations, translation of the access digit 8 will direct the call to the CCSA network. Second dial tone will be returned (optionally) and an AMA sample will be made.

(c) ***Off-Network Access Lines:*** Noncollocated characteristics apply in regard to ONALs except that incoming ONALs can be used to complete calls to the centrex attendant on a manual basis. This is permissible in offices where the attendant is located in the same office as the CCSA. In this case, the incoming ONAL trunk group would be assigned a screening LEN with a manual service class for completion to the attendant.

(d) ***Local Off-Network Access Line (LONAL):*** The collocated ESS CCSA connects to LONALs in the same way as in noncollocated offices. There is one additional feature available with a collocated office—a LONAL may be used to complete CCSA calls to an attendant console in the same manner as with incoming ONALs.

CENTREX SATELLITE DESCRIPTION

3.202 A centrex satellite system contains two or more geographically separated switching machines grouped together to provide centrex service to a single customer. All attendant services are provided at the main centrex location.

3.203 The following paragraphs describe how the centrex satellite system operates for station to station calls, dial 0 calls, listed directory number calls, and call transfer-attendant type calls (release link and nonrelease link operation).

Station to Station Calls

3.204 Station to station calls between satellites or between satellite and the main are routed over tie trunks or the local trunking network. The extension number dialed in the centrex satellite is translated to a route index via the centrex satellite's digit interpreter tables. The route index selects the trunk facility which is used to outpulse from two to seven digits to the main centrex.

Dial 0 Satellite Calls

3.205 Dial 0 calls from the satellite stations are routed via tie trunks to the attendant located at the main centrex. When 0 is dialed by a satellite station, it is translated to a route index via centrex digit interpreter tables. The route index directs the call to the appropriate trunk group for proper routing.

Satellite Call Transfer-Attendant

3.206 Direct inward dialing calls to a satellite station requiring transfer are handled on a call transfer-attendant basis via satellite transfer directory number or route index. A satellite attendant call transfer request occurs when a flash is received at the satellite centrex office having centrex I attendant call transfer service.

3.207 In the satellite centrex central office, when a flash is recognized, both parties are switched to a 3-port conference circuit (Fig. 4). The satellite transfer directory number (STDN) is extracted from the centrex common block translation data and then the line associated with this directory number is rung. This line is actually an FX tie trunk that terminates as an incoming manual trunk at the main location. When the attendant answers the incoming FX call, the call can be transferred to any other location.

3.208 In addition to the FX operation, satellite transfer may be handled in the satellite CO by translating a satellite route index for CO trunks instead of a satellite transfer directory number (Fig. 5). When a flash is recognized, the satellite route index is translated which identifies an appropriate trunk group and from zero to seven digits to be ***outpulsed.*** Any 2-way or outgoing trunk currently used for centrex tie trunk operation can be specified in the satellite transfer directory number route index expansion. The outpulsed digits (in any) received at the main centrex are interpreted as an incoming call to the attendant console. When the attendant answers the incoming call, the call can be transferred to any other location.

Release Link Satellite Attendant Feature

3.209 The release link attendant feature permits improved transmission and trunk facility usage on satellite calls which require the main centrex attendant assistance.

3.210 The release link satellite feature is described in paragraphs 3.212 and 3.213 by comparing nonrelease link and release link operation on listed directory number and call transfer-attendant type calls.

Nonrelease Link: LDN Call

3.211 Figure 6 illustrates a nonrelease link satellite listed directory number (LDN) call where the attendant answers the incoming call and transfers it to a station back at the satellite. Note that after the attendant is released from the call, two centrex trunks are used between the satellite and the main even though both parties are on the same switching machine.

Release Link: LDN Call

3.212 Figure 7 shows the same listed directory number call situation as described in paragraph 3.211 (nonrelease link). Note that release link operation does not result in the use of trunks between the main and satellite locations after the attendant releases the listed directory number call.

3.213 When a plain old telephone service (POTS) line or incoming trunk dials the satellite LDN, the call is routed over a tie trunk to the attendant exactly as was done for nonrelease link handling except that a specially marked release link trunking facility is used. When the attendant operates the console keys instead of starting a new call on the destination port, special flash (timed on-hook) signals are sent out over the incoming trunk to request dial tone and switching actions at the satellite. When the attendant releases the call, the call is dropped from the 3-port circuit to a normal talking connection and the trunk from the satellite to the main is idled.

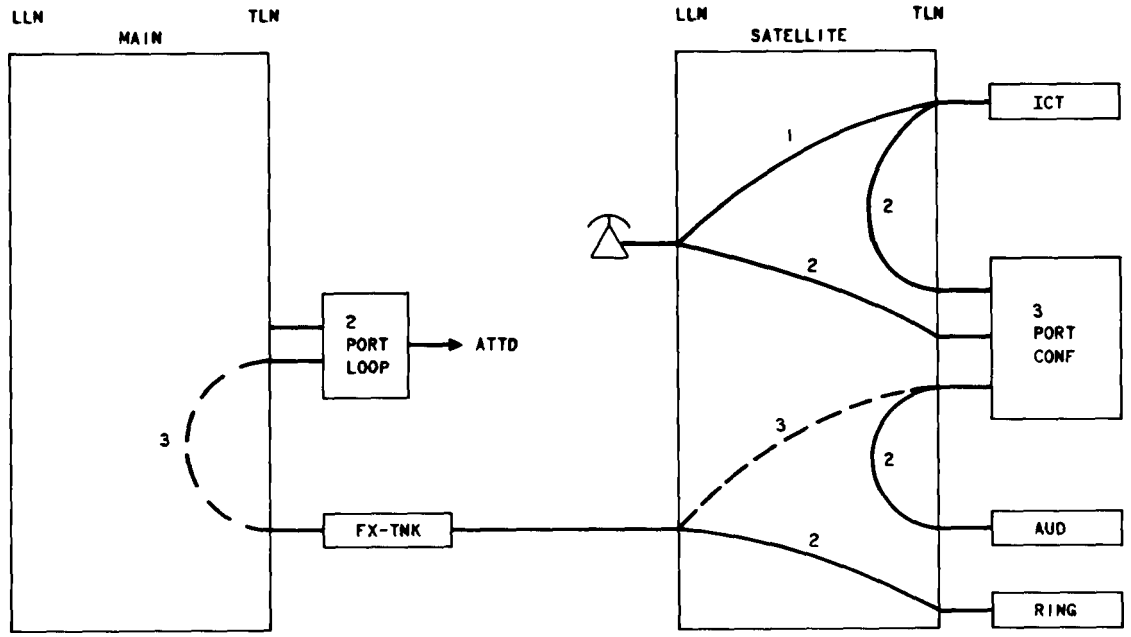


Fig. 4—Satellite Call Transfer — Attendant (Using FX Trunk)

Nonrelease Link: Call Transfer-Attendant

3.214 Figure 8 shows a nonrelease link attendant transfer call where the attendant answers the transfer call and extends it back to a different station at the same satellite. Note that after the attendant is released from the call, two centrex trunks are used between the satellite and the main even though the parties are all in the same satellite.

Release Link: Call Transfer-Attendant

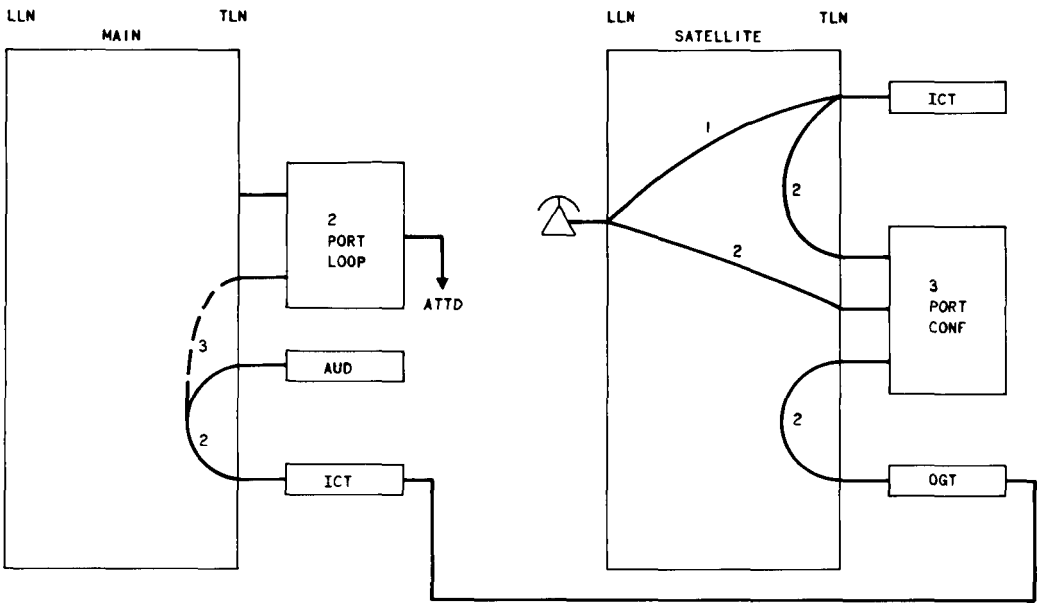
3.215 Figure 9 shows a release link satellite attendant transfer call. Just as for nonrelease link operation, the satellite transfer flash request from the satellite station moves the call up to a 3-port conference circuit but a specially marked release link trunking facility is seized to the attendant (in the main). When the attendant answers the call and operates the RLS DEST key, the 3-port conference circuit is dropped at the satellite CO, thereby removing the controlling centrex station from the call. When the attendant operates the console keys instead of starting a new call on the destination port, special flash (timed on-hook) signals are sent out over the incoming trunk to request dial tone and switching actions at the satellite. The attendant dials (TOUCH-TONE only) directly into the receiver at the satellite and the desired station is added to a 3-port conference circuit at the satellite. The attendant may then release and the call is dropped from the 3-port circuit to a normal talking connection and the trunk from satellite to main is idled.

4. HARDWARE DESCRIPTIONS

CENTREX/ESSX-1 (WITH DATA LINK HARDWARE)

A. Attendant 1B-, 2B-, 27A-, and 47A-Type 51A CPS Consoles

4.01 Attendants are normally provided with a 1B-, 2B-, 27A-, or 47A-type universal telephone



PATH 1 ORIGINAL INCOMING CALL TO SATELLITE STATION
PATH 2 SATELLITE TRANSFER SET UP-MAIN ATTD SIGNALED BY OUTPULSING ON OGT. NOTE, AUDIBLE NOW RETURNED FROM MAIN
PATH 3 MAIN ATTENDANT ANSWER

Fig. 5—Satellite Call Transfer — Attendant (Using CO or Tie Trunk)

console (Fig. 10 and 11). A maximum of four 1B- (27A-) or three 2B- (47A-) type consoles may be operated in conjunction with the first data loop circuit. A maximum of four consoles may be operated in conjunction with each additional data loop circuit. Each console is equipped with a number of lamps and keys, a TOUCH-TONE key set, and an audible signal. The lamps and the audible signal indicate service requests or supervisory signals needed for the attendant to serve the centrex installation. The keys depressed indicate requests by the attendant for actions at the central office. For method of attendant console operations, refer to Section 533-110-101, Attendant and Station Equipment—Method of Operation—No. 1 and No. 1A Electronic Switching Systems.

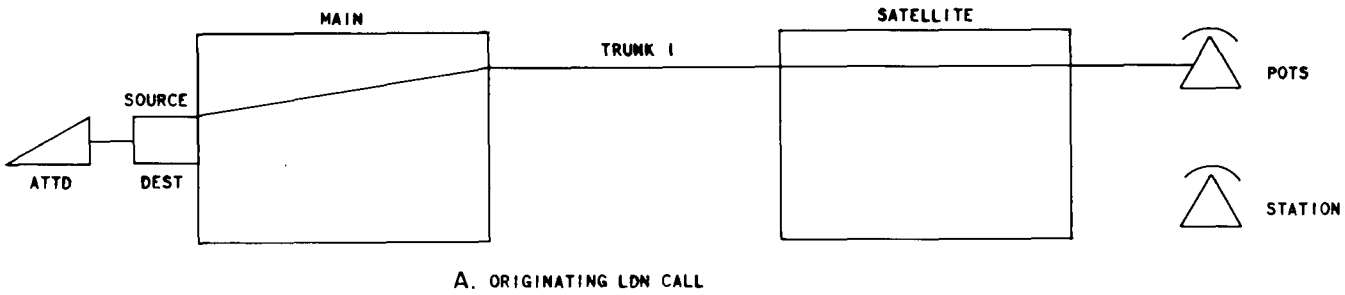
4.02 No switching occurs on the centrex premises as a result of operating keys on the attendant console. Depressing these keys causes a data message to be encoded and transmitted via a data loop circuit to the ESS office to which the Centrex customer group is connected. At the ESS office, this data message is interpreted and any switching actions requested are performed.

Console Lamps and Audible Signal

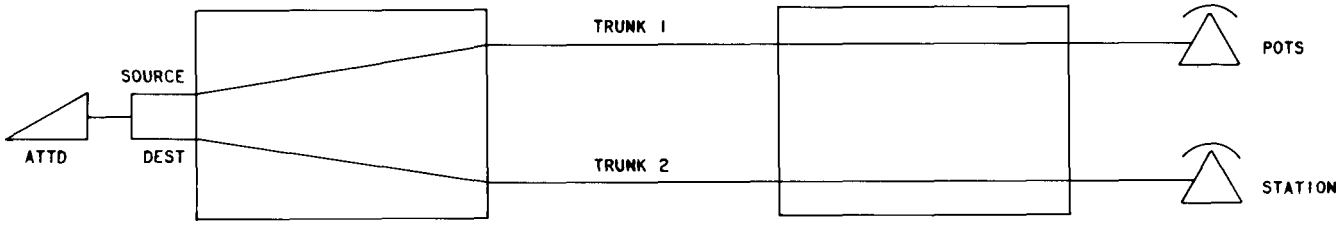
4.03 These lamps and the audible signal indicate service requests or supervisory states of loops and trunks to the attendant. Some lamps have an appearance on a single console in a customer group and others appear on all consoles in the group. The audible signal is controlled in the same manner as the lamps.

The states in which the lamps may appear are as follows:

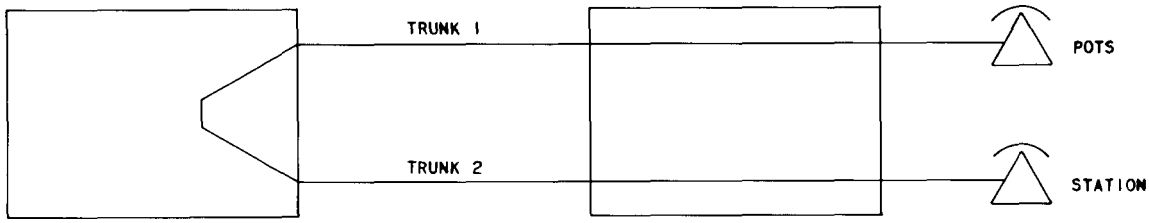
- DARK—Lamp continuously off (inactive—not in use)
- STEADY—Lamp continuously on (active—in use)



A. ORIGINATING LDN CALL



B. ATTD EXTEND CALL TO STATION



C. ATTD RELEASED

Fig. 6— Satellite LDN Call (Nonrelease Link)

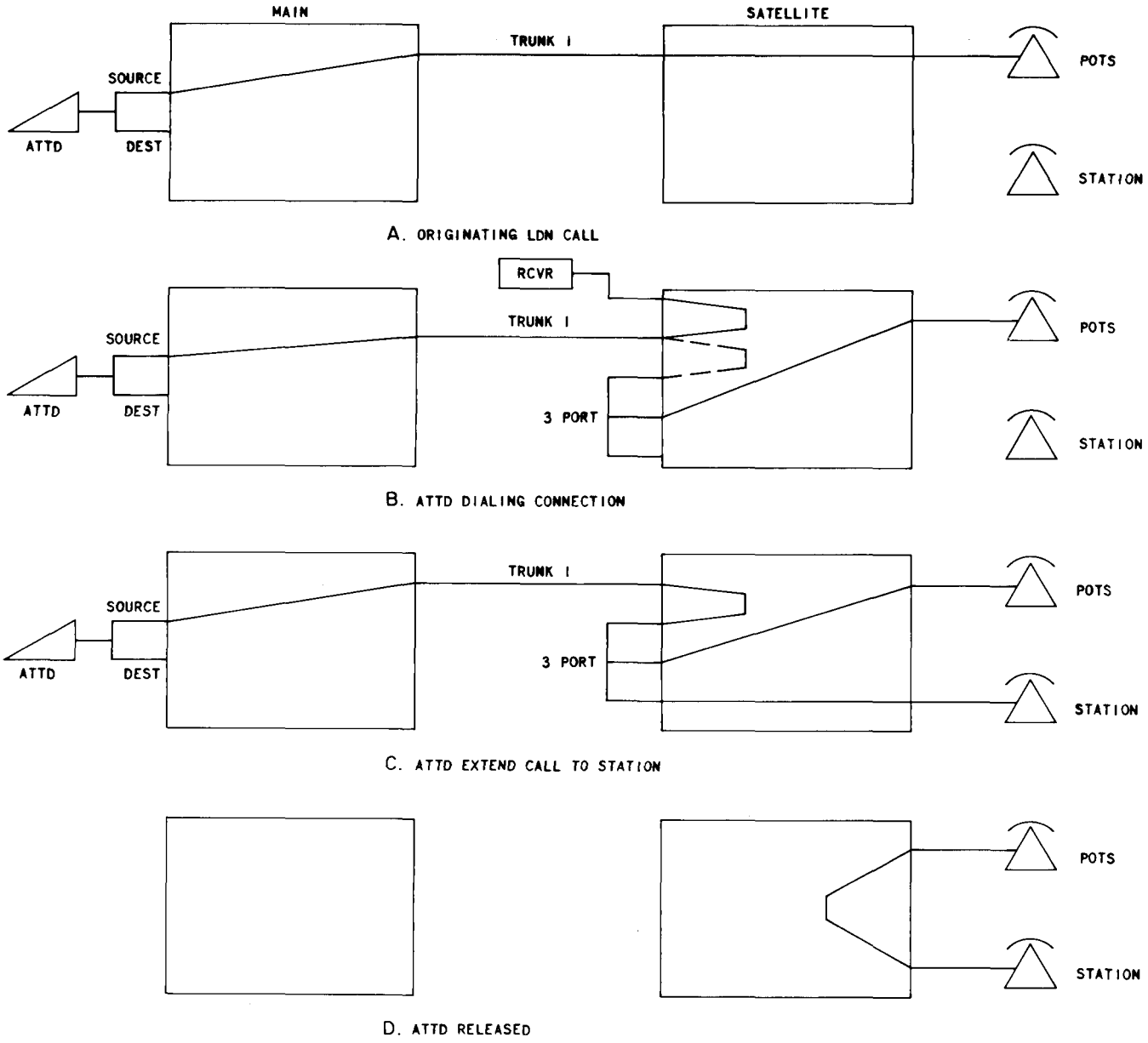


Fig. 7— Release Link Satellite LDN Call

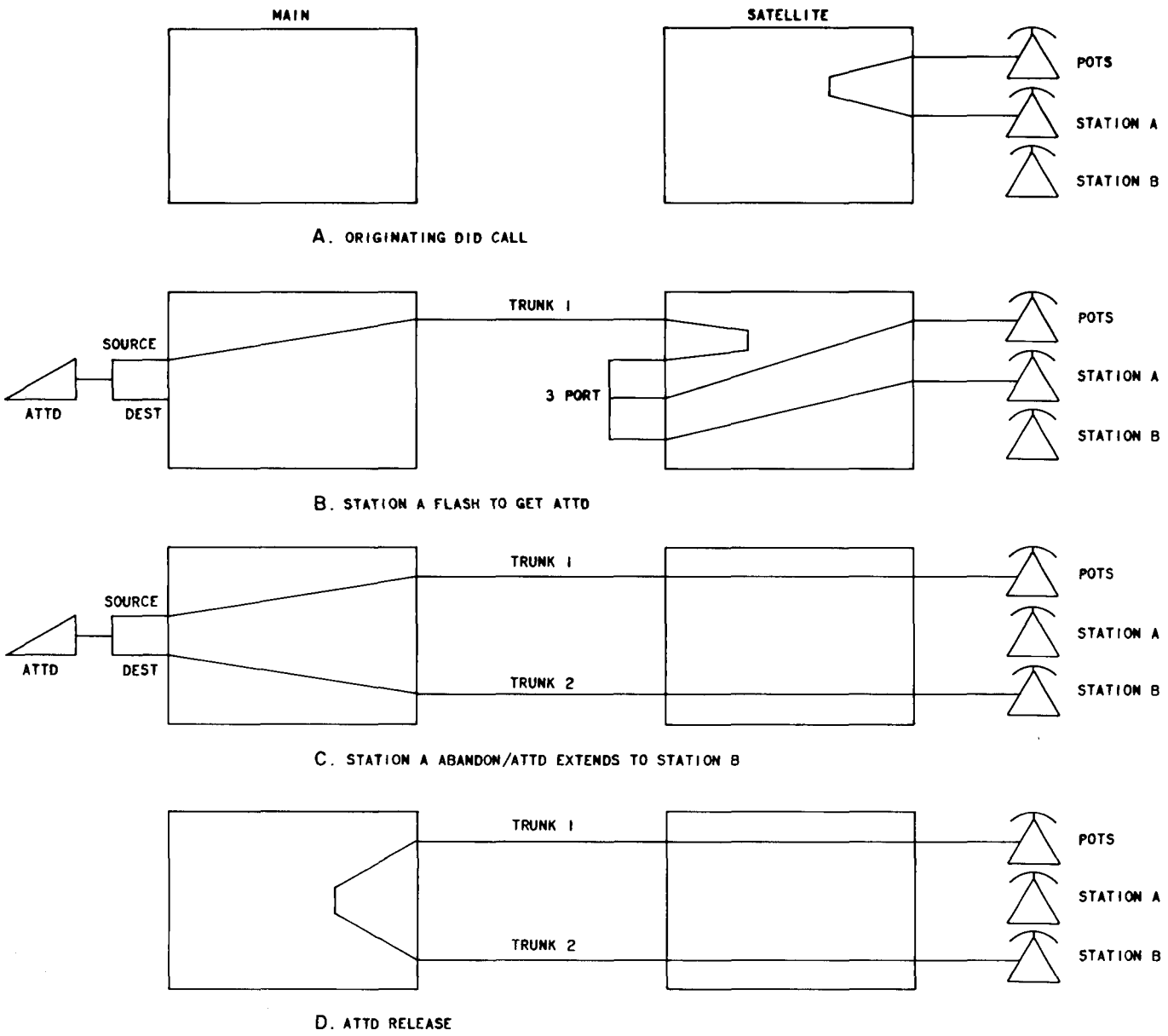


Fig. 8—Satellite Call Transfer — Attendant (Nonrelease Link)

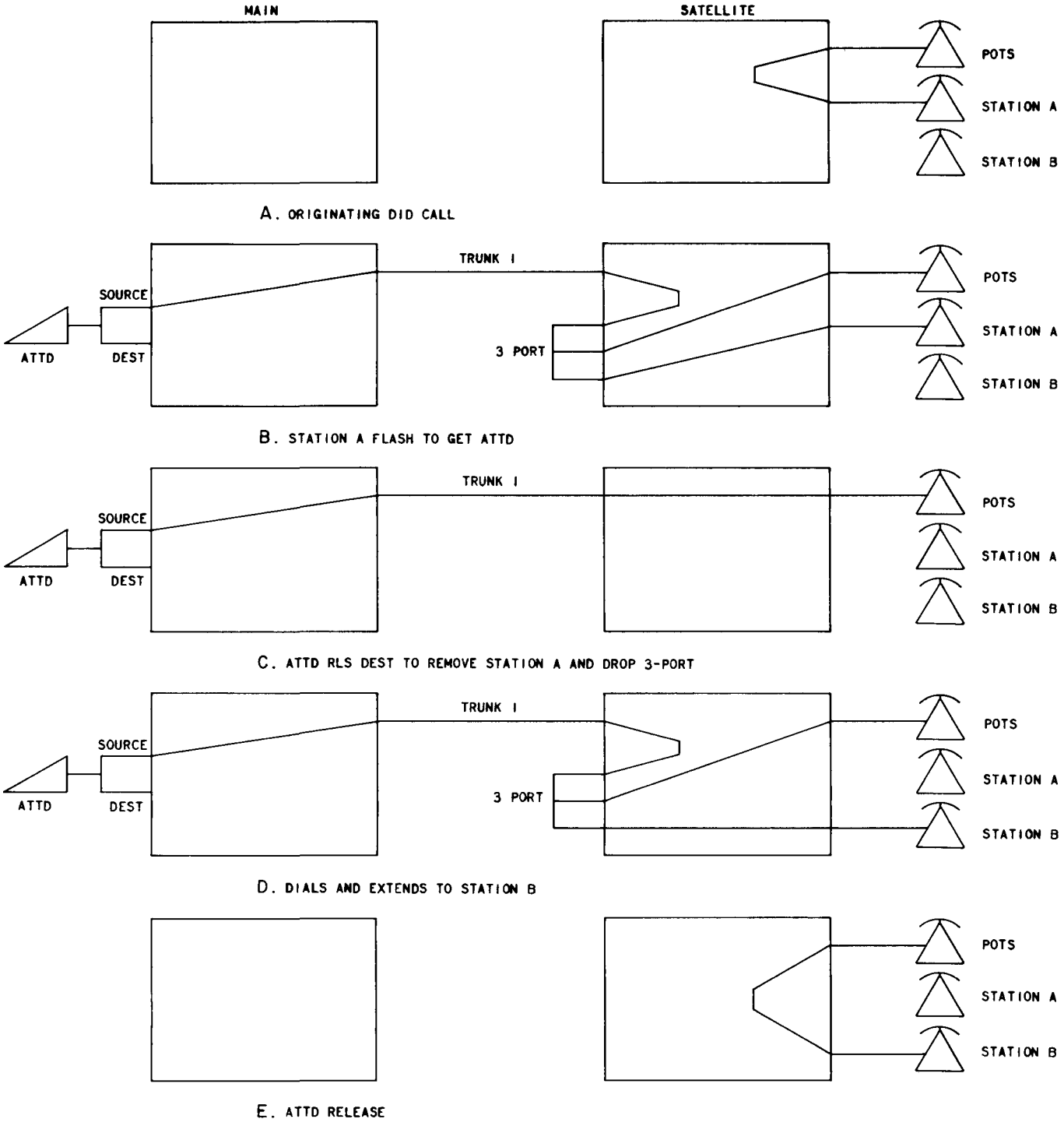
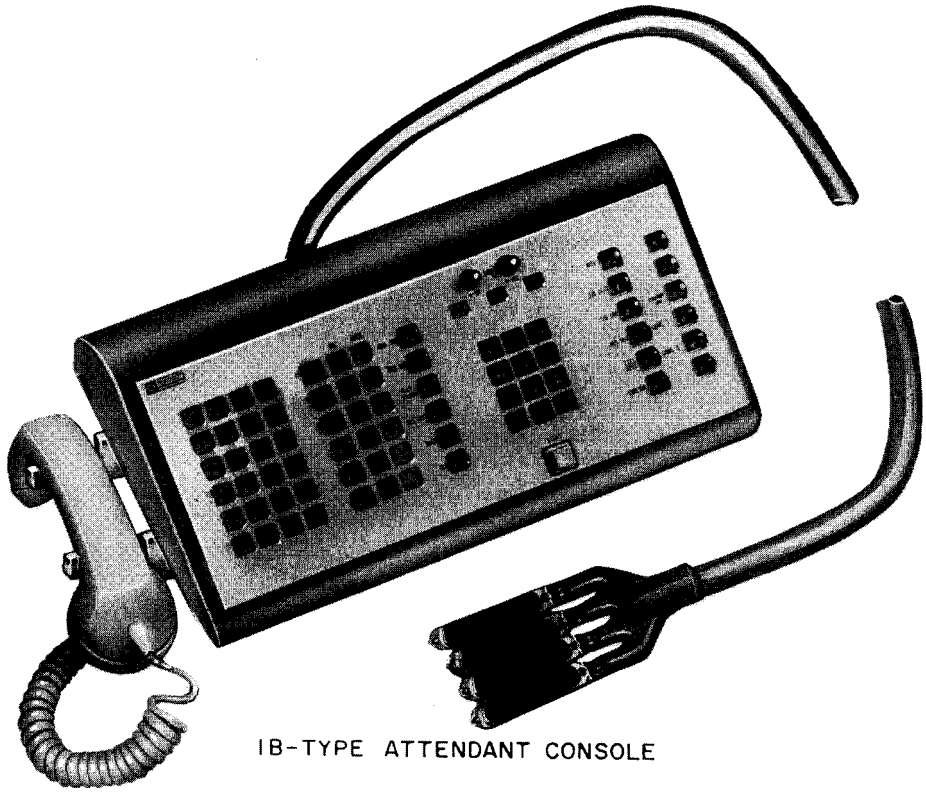
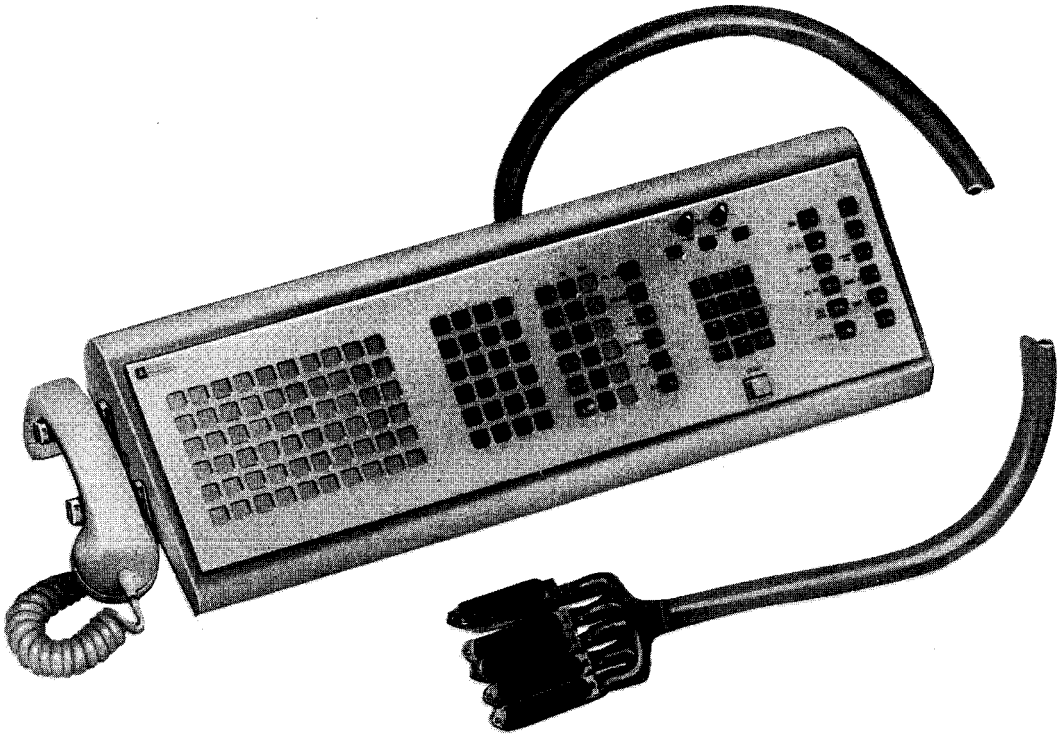


Fig. 9—Satellite Call Transfer—Attendant (Release Link)

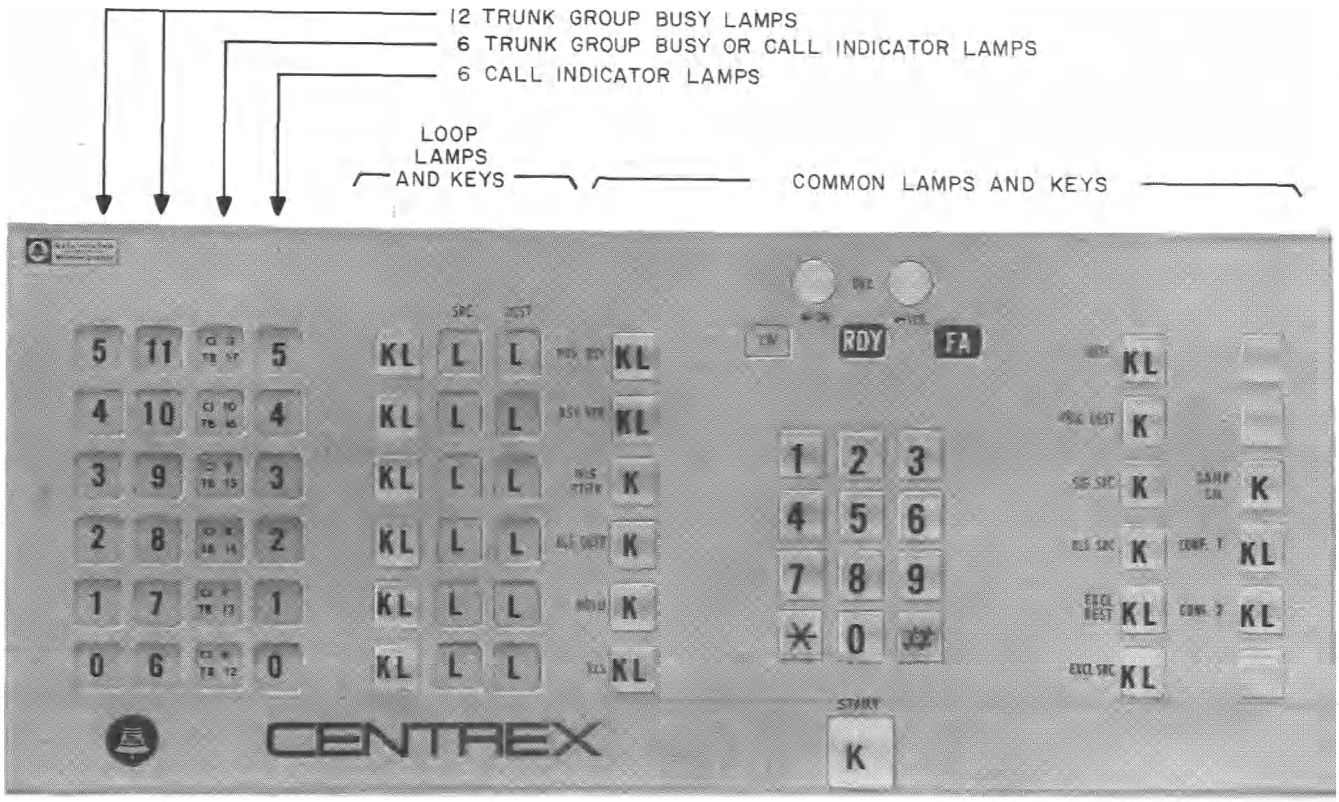


1B-TYPE ATTENDANT CONSOLE

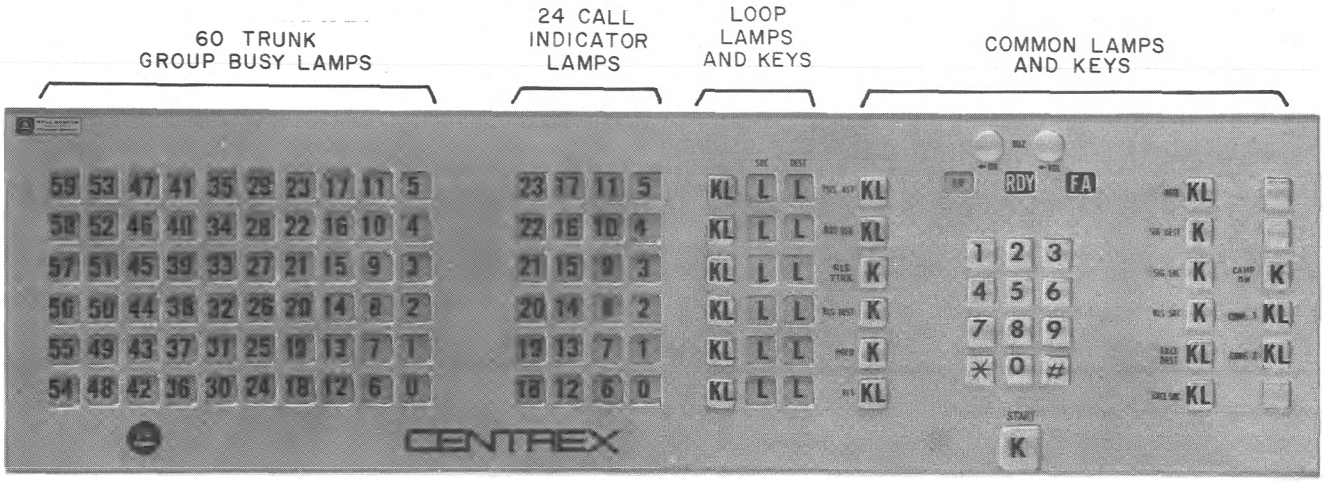


2B-TYPE ATTENDANT CONSOLE

Fig. 10—Telephone Console



1B TYPE ATTENDANT CONSOLE



2B TYPE ATTENDANT CONSOLE

K-KEY
L-LAMP
KL-KEY AND LAMP COMBINATION

Fig. 11—Telephone Console Lamp and Key Arrangements

- WINK—Lamp on 1.75 seconds and then off 0.25 seconds (on hold or ringing)

- 60 ipm (interruptions per minute)—Lamp flashes once per second (incoming call or busy)

- 120 ipm—Lamp flashes twice per second (intracentrex call or recall)

4.04 Some lamps may appear in one of several states while others may only appear in either the steady or the dark state.

4.05 The audible signal operates as a lamp. It is sounded whenever a new call is switched to the console or whenever a party on the established call recalls the attendant.

Console Keys

4.06 Console keys, when depressed by an attendant, indicate requests for specific actions at the central office.

4.07 Console keys may be described in three basic functional groups.

(a) ***Loop keys (lighted keys):*** These keys affect the attendant's relation to the loop circuits. For example, they provide access to a calling or called party already on an attendant loop position.

(b) ***State keys:*** These keys affect the overall state of the console (such as, by initiating the night-service condition, by causing a console to appear busy, etc).

(c) ***Call processing keys:*** These keys are used in normal call processing functions (such as requests for dial tone in order for an attendant to dial).

Console Lamp and Key Arrangement

4.08 Figures 12 and 13 illustrate the physical arrangement of the lamps and keys on the 1B-, 2B-, and the 27A-, 47A-type consoles. The lamps and keys are arranged into four groups: the loop lamps and keys, the common lamps and keys, the optional trunk group busy lamps, and the optional call indicator lamps.

Loop Lamp and Key Functions

4.09 The loop lamps indicate to the attendant the state of a call on a console which is presently associated with the particular loops. This group contains the key lamps (lighted keys), the source lamps, and the destination lamps.

4.10 ***Loop Keys:*** The loop keys, when momentarily operated, cause the attendant circuit to become connected to the loop indicated and thus to the call, if any, on that loop circuit.

4.11 ***Key Lamps:*** The key lamps, contained within the loop keys, indicate how an attendant is presently associated with calls. These lamps may be operated to either of two active states. When a key lamp is in the steady state, the attendant is connected to that particular loop. When a key lamp is in the wink state, this indicates to the attendant that a call is being held on this loop but the attendant is not connected.

4.12 ***Source (SRC) Lamps:*** The SRC lamps indicate the status of the calling party. These lamps may be operated to one of four active states: steady, wink, 60 ipm, and 120 ipm. Each of these states is interpreted by an attendant as a service request or as a supervisory state of the calling party.

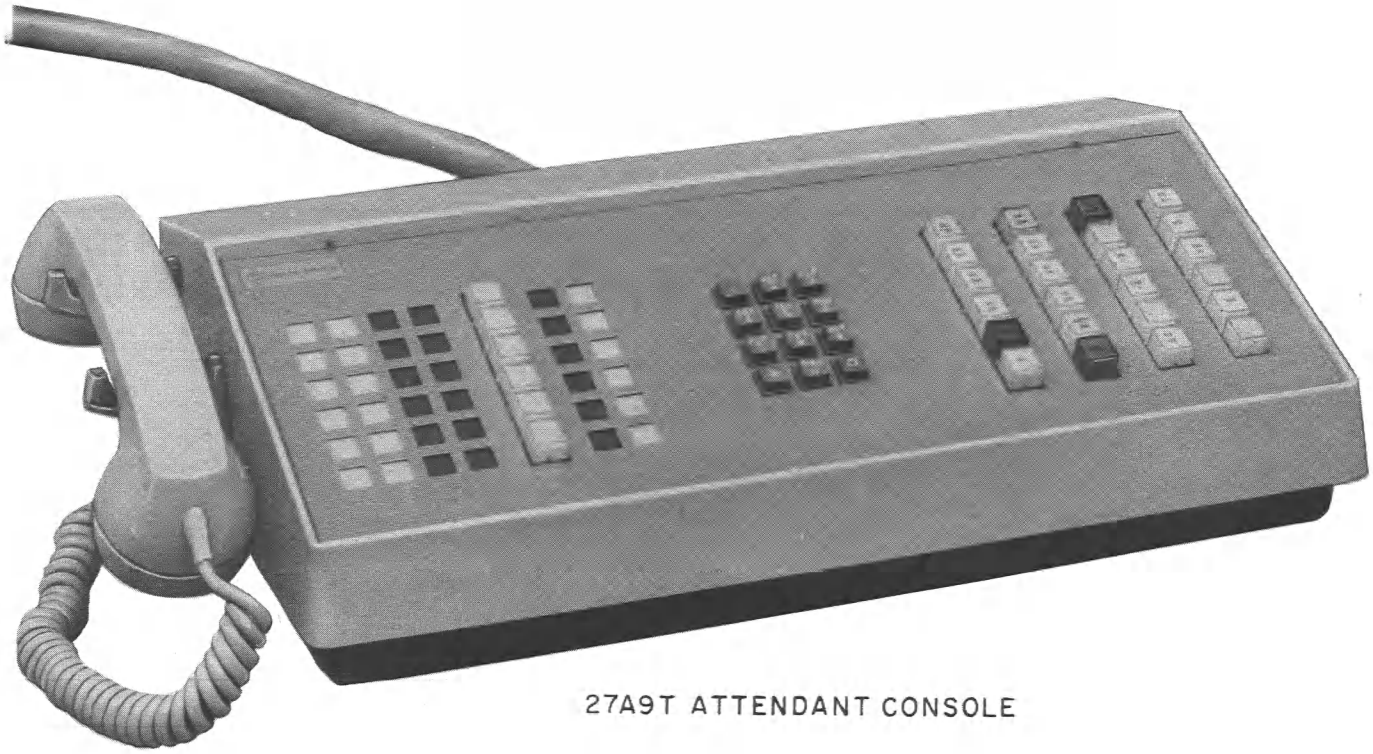
4.13 ***Destination (DEST) Lamps:*** The DEST lamps indicate the status of the called party. These lamps may also be operated to one of four active states.

Common Lamp and Key Functions

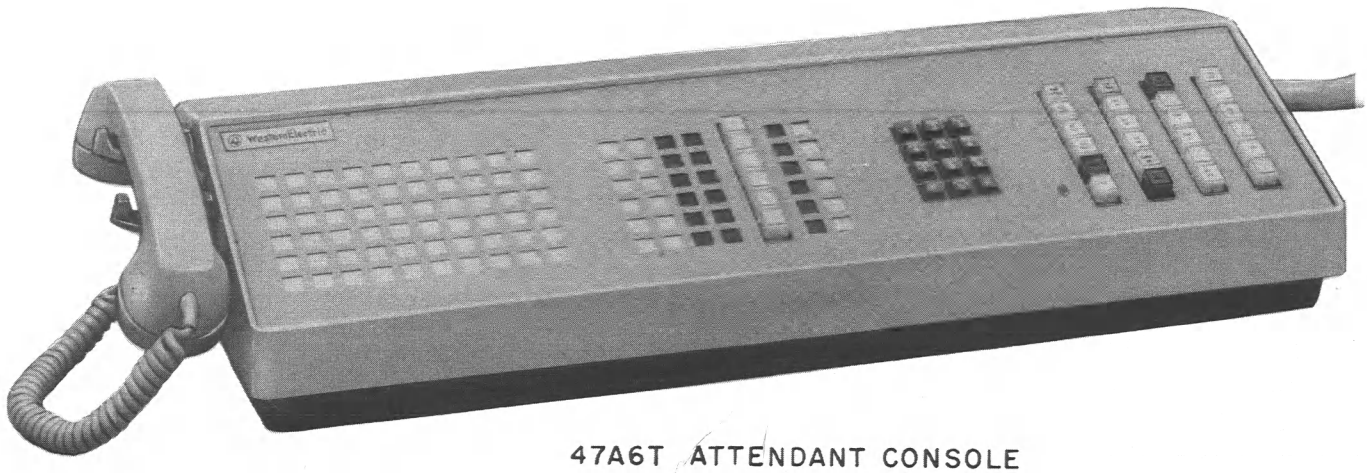
4.14 The common keys are used in call processing functions common to all calls. The common lamps indicate the overall state of the console to the attendant and provide supervisory information common to all calls.

4.15 ***Audible Signal:*** The audible signal is also a part of the common lamp and key group. It is sounded whenever a new call is switched to the console or whenever a party on an established call recalls the attendant. The buzzer-on (BUZ ON) key controls the operation of this signal, and the buzzer volume (BUZ VOL) control adjusts its volume.

4.16 ***Busy Verification (BSY VER) Key:*** The busy verification feature allows the attendant



27A9T ATTENDANT CONSOLE



47A6T ATTENDANT CONSOLE

Fig. 12—27A- and 47A-Type Consoles

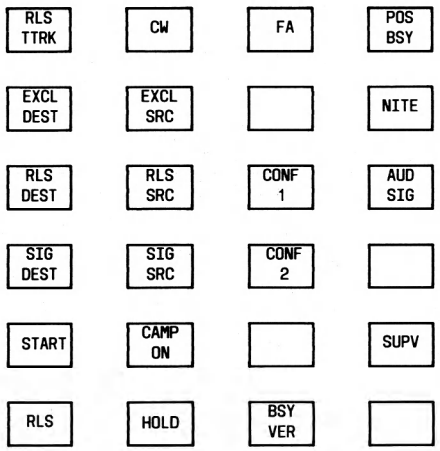


Fig. 13—Common Key Designations and Positions for 27A- and 47A-Type Consoles

to connect to any busy line to verify that it is actually busy. Another party cannot be connected to the busy connection. When the attendant interrupts a busy call, the talking parties are alerted to the attendant's presence by an interrupted 440 cycle tone.

4.17 ***Calls Waiting (CW) Lamp:*** The CW lamp lights to inform the attendant that one or more calls are waiting to be answered when the console becomes available for another call. The CW lamp is multipled to all consoles in the customer group.

4.18 ***Camp On (CAMP ON) Key:*** The CAMP ON key is used to place a call in a waiting condition on a line which is busy and so notify the called line. Upon the completion of the call in progress, the camped-on call is connected automatically.

4.19 ***Conference (CONF 1 and 2) Key:*** The CONF 1 key is used to seize a conference circuit and switch the originating party onto the attendant's loop and to switch the attendant onto two ports of the conference circuit. If a station is not originating a conference, the attendant may seize the conference circuit and originate a conference call. After the conference circuit is seized, the attendant may dial additional conferees and connect them to the conference circuit. The CONF 2 key may be used in the same manner.

4.20 ***Exclude Destination (EXCL DEST) Key:*** The EXCL DEST key is used to implement the 2-way splitting feature. When momentarily operated, this key causes the connection to be split and enables the attendant to talk with only the calling party (source). The lamp within this key is lighted when this feature is in effect.

4.21 ***Exclude Source (EXCL SRC) Key:*** The EXCL SRC key is also used to implement the 2-way splitting feature. When momentarily operated, this key causes the connection to be split and enables the attendant to talk with only the called party (destination). The lamp within this key is lighted when this feature is in effect.

4.22 ***Fuse Alarm (FA) Lamp:*** This lamp is not presently used with the 2-wire No. 1 ESS centrex service.

4.23 ***Hold (HOLD) Key:*** The HOLD key, when momentarily operated, releases the attendant from the loop but holds the call on the console as long as at least one party remains on the call. To make the console available for new calls, the attendant must follow the operation of the HOLD key with the operation of the RLS key. The attendant may reconnect to a held loop by again operating the loop key.

4.24 ***Night (NITE) Key:*** The NITE key activates the night operation feature. Only one NITE key is provided per customer group. The operation of the NITE key will not affect the handling of direct inward dialing calls.

4.25 ***Position Busy (POS BSY) Key:*** When this key is operated on the console, the console appears busy to all new incoming calls. Its operation, however, does not prevent the attendant from completing calls already on the console. Unplugging the attendant headset from the console also makes a console appear busy to new calls. Removal of the headset removes power from the console.

4.26 ***Ready (RDY) Lamp:*** This lamp is not presently used with the 2-wire No. 1 ESS centrex service.

4.27 ***Release (RLS) Key:*** When the RLS key is momentarily operated, it releases the atten-

dant from the loop to which the attendant has been connected. The lamp within this key is lighted when the console is ready to receive a new incoming call.

4.28 ***Release Destination (RLS DEST) Key:*** The RLS DEST key is used to clear the equipment on the destination side of a connection. The occasion may be a keying error made by the attendant, the need to release a station on a request to transfer a call, or the need to release an extension-busy signal.

4.29 ***Release Source (RLS SRC) Key:*** The RLS SRC key is used to clear the equipment on the source side of the connection when, for example, a call party fails to disconnect or when an attendant wishes to clear troubles on the source side.

4.30 ***Release Tie Trunk (RLS TTRK) Key:*** The RLS TTRK key is used to release from console control, a tie trunk connection which is known not to return answer or disconnect signal.

4.31 ***Signal Destination (SIG DEST) Key:*** The SIG DEST key provides the attendant with signaling facilities which can signal the party on the destination side of the connection. This signal may be either a flash to recall a central office operator or a regular ringing current for station telephones.

4.32 ***Signal Source (SIG SRC) Key:*** The SIG SRC key enables the attendant to signal the party on the source side of a connection. The signal may be either a flash for signaling a central office or may be regular ringing current for station telephones.

4.33 ***Start (START) Key:*** The START key is used to request dial tone for the attendant in order for the attendant to key (dial) a number.

4.34 ***Supervisor (SUPV) Key:*** Some consoles are arranged so that an attendant may signal the supervisor if the need arises. This key lamp remains lighted until the supervisor plugs a telephone set into the right side of the attendant console.

4.35 ***TOUCH-TONE Key Set:*** The keys of the TOUCH-TONE key set are for keying the digits of the called number. They may be used when dial tone is received.

Trunk Group Busy Lamps

4.36 These lamps are available as an optional feature. They indicate whether or not all trunks in a particular trunk group assigned to a centrex customer are busy. These lamps are multipled to all consoles in the customer group. Figure 11 illustrates the number and the placement of these lamps on the consoles.

Call Indicator Lamps

4.37 These lamps are available as an optional feature. They may be assigned to indicate either the type of call (listed directory number, dial 0, recall, etc) or its source (such as a particular tie trunk). When a call is routed to a console equipped with call indicator lamps, a single lamp in the call indicator lamp field lights. This indication remains on the console as long as the attendant is connected to the loop. Figure 11 illustrates the number and the placement of these lamps on the consoles.

B. Centrex Data Link Unit

4.38 The centrex data link is mounted on the data link frame which is located in the No. 1 ESS control office (Fig. 14). The data link acts as an interface between the data loop and the central office control circuitry. Each data link contains a key signal receiver, a lamp data transmitter circuit, and connections to the data link frame controller.

C. Centrex Data Link Frame

4.39 The centrex data link frame (Fig. 14) is equipped with a data link controller and up to eight data links. The controller appears as a peripheral unit on the system peripheral bus and is used to steer messages from central control to the appropriate data link. Centrex data link frames and data links can presently be added to a working No. 1 or 1A ESS office. Each No. 1 or 1A ESS control group can accommodate a maximum of eight data link frames (32-data links) per control group.

D. Centrex Console Control Cabinet

4.40 The centrex console control cabinet (Fig. 15) is located at the customer's premise end of the data loop. The console control cabinet provides the interface between the data loop and the attendant consoles and performs the following functions:

(a) Encodes attendant console key signals

(b) Transmits key signals as data to the central office

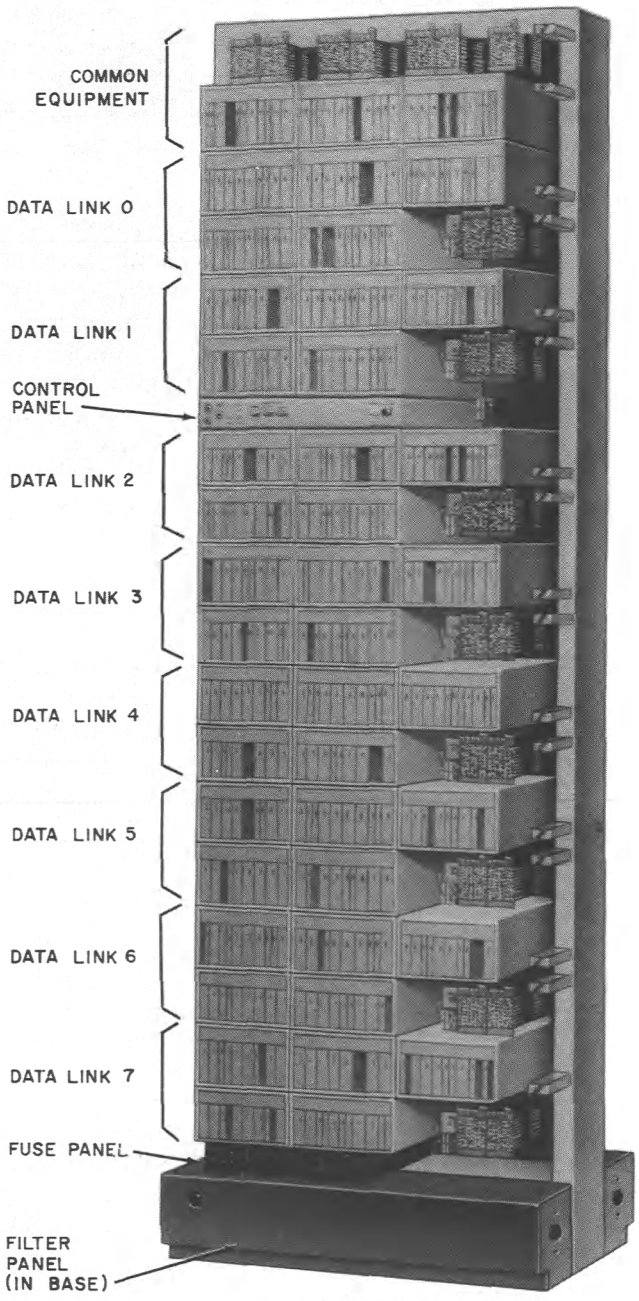


Fig. 14—ESS Centrex Data Link Frame

(c) Receives lamp data from the central office

(d) Decodes lamp data received from the central office

(e) Furnishes local power (requires 117-volt ac supply)

(f) Provides the lamp interrupter circuitry

(g) Contains the lamp state memory

(h) Contains a pulser circuit for controlling ferreeds in the lamp state memory.

E. Sharing of Centrex Console Control Cabinets

Console Control Cabinet and Data Loop Equipment

4.41 A centrex console control cabinet and its associated data loop circuitry has the capacity to control a total of four consoles. The first data loop can control up to three 2B-type consoles; subsequent data loops associated with the first data loop can control up to four 2B-type consoles. Any of the data loops can control up to four 1B-type consoles.

4.42 When a centrex customer group is provided with a console control cabinet and the busy hour traffic at that location does not require the full complement of attendant telephone consoles, the vacant control positions may, under certain limiting conditions, be used by other nearby centrex customer groups.

4.43 Restrictions on sharing a centrex console control cabinet are imposed by the available lamp state memory space and the common bussing arrangements in the console control cabinet. The distance between centrex customer groups desiring to share the facilities of a console control cabinet is also a limiting factor. Customer groups may not be further than 1000 feet from the console control cabinet. They may be up to 2000 feet apart if the console control cabinet is located centrally between the two customer groups.

Methods of Sharing

4.44 A single console customer group is defined as a centrex customer group which uses only one 1B- or 27A-type console.

4.45 A multiconsole customer group is defined as a centrex customer group which uses either more than one 1B- or 27A-type console or one or more 2B- or 47A-type consoles.

4.46 A multiconsole customer may not share a link with another multiconsole customer.

4.47 If a multiconsole customer does not occupy all the console positions of one console control

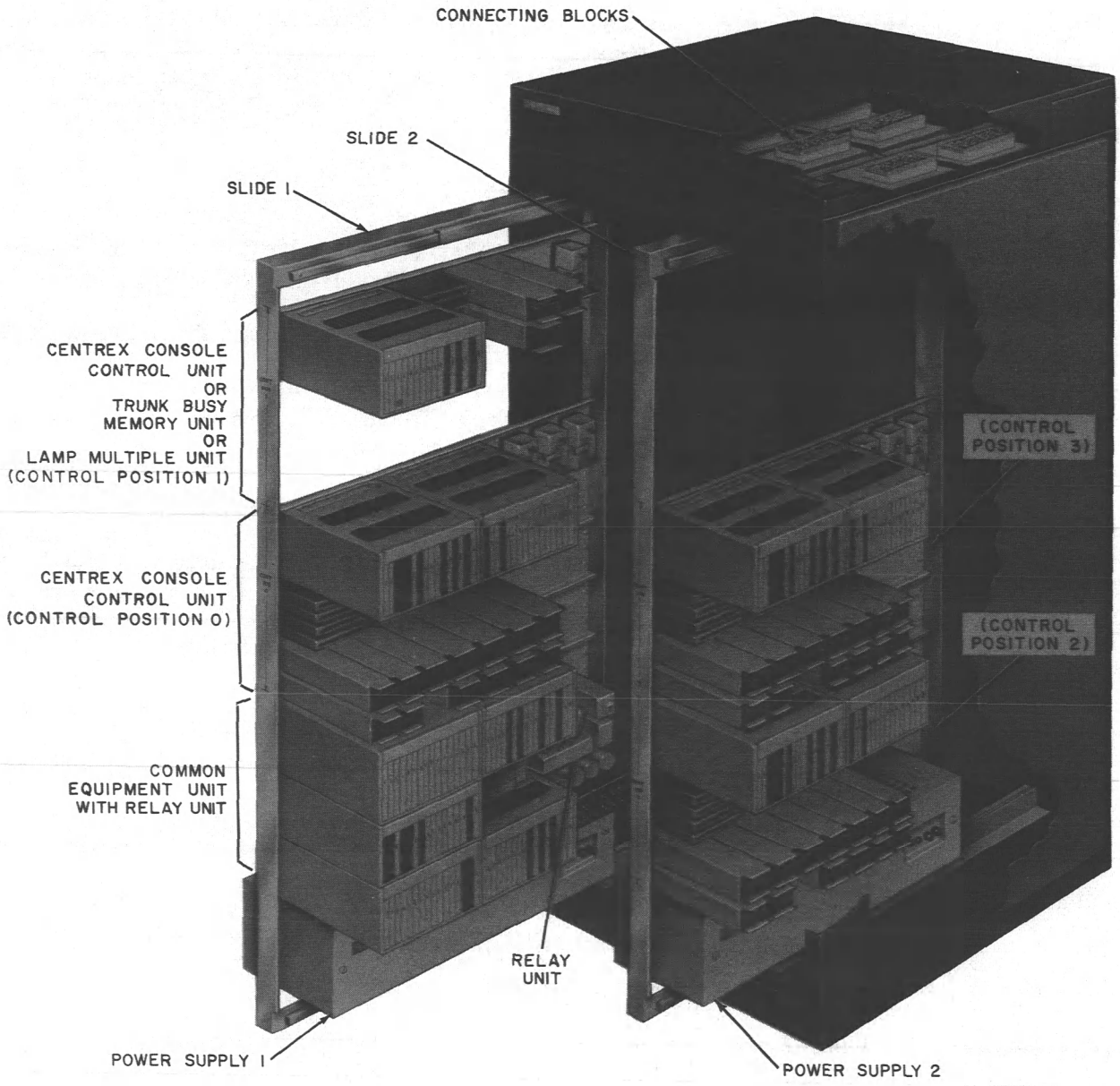


Fig. 15—ESS Centrex Console Control Cabinet

cabinet, the customer must be given adjacent positions starting with the first console position. The positions left vacant may be assigned to control single console customers until all such vacancies have been filled.

4.48 When a multiconsole customer requires all four console positions available in a console control cabinet but not all the control positions of an additional console control cabinet, the customer may occupy any of the control positions of the additional console cabinet. Any remaining vacancies may be assigned to control single console customers.

4.49 Since a centrex customer group using a single 2B- or 47A-type console is considered a multiconsole customer regardless of the number of consoles employed, a centrex customer group with a 2B- or 47A-type console can not share a console control cabinet with another customer using a 2B- or 47A-type console.

4.50 A centrex customer group requiring only a single 1B- or 27A-type console never requires a console control cabinet to be installed if there is a console control cabinet in the vicinity with a single vacant control position.

4.51 All the previously explained methods of sharing may be accomplished by changes in plug-in units within the centrex console control cabinet. No wiring changes are necessary.

4.52 One trunk busy memory is required for each customer group equipped with 2B- or 47A-type consoles. It always occupies control position 1 (the second control position) of the first cabinet associated with the customer group.

CENTREX/ESSX-1 (WITHOUT DATA LINK HARDWARE)

A. Attendant 121-, 131-, and 151-Type 50A CPS Consoles

4.53 Centrex/ESSX-1 customers may be provided with 121-, 131-, or 151-type attendant consoles. These attendant consoles, together with wall-mounted customer premises (CPS) equipment, make up the 50A CPS. The 50A CPS provides supervision and control of the attendant's position(s). Each console is equipped with a number of lamps and keys, a TOUCH-TONE key set, and an audible signal. The lamps and audible signal indicate service requests or supervisory signals needed for the attendant to serve the Centrex/ESSX-1 installation. The keys depressed indicate requests by the attendant for actions at the central office. For method of attendant console operations, refer to Section 540-580-301—Attendant and Station Equipment Method of Operation 50A CPS.

4.54 Three versions of the attendant consoles are available (Fig. 16).

(a) 121-Type — Non-Direct Station Selection (DSS)

(b) 131-Type — 100 Station attendant DSS with busy lamp field

(c) 151-Type — 200 Station attendant DSS with busy lamp field

Figure 17 illustrates the basic console (without DSS) field and a typical key arrangement.

4.55 No switching occurs at the centrex premises as a result of operating keys on the attendant console. Depressing these keys causes actions to be taken either at the console or at the central office.

Console Lamps and Audible Signals

4.56 These lamps and the audible signal indicate service requests or supervisory states of lines and trunks to the attendant. The audible signal is controlled in the same manner as the lamps.

The states in which the lamps may appear are as follows:

- DARK—Lamp continuously off
- STEADY—Lamp continuously on
- Flutter—Lamp fluttering at high rate
- 60 ipm—Lamp flashes once per second.
- 120 ipm—Lamp flashes twice per second.

The 121-, 131-, and 151-type consoles are equipped with the following keys (illustrated in Fig. 17):

(a) ***Incoming Loop Keys (1 through 14):*** These locking, releasing, illuminating keys are used to supervise visually the progress of a call.

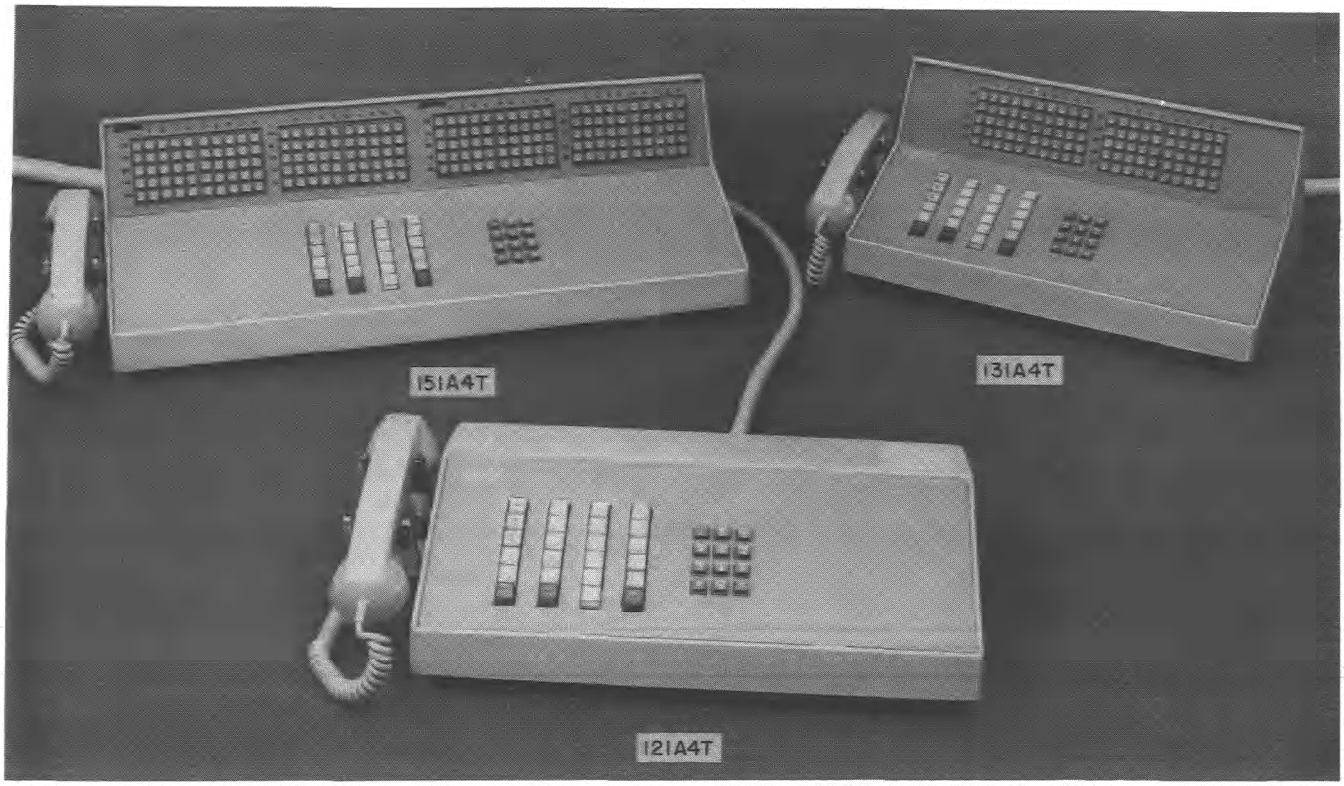


Fig. 16—50A CPS Attendant Consoles

When operated, an incoming loop key connects an incoming line to the attendant's telephone circuit.

(b) ***Attendant Dial 0 Loop Keys:*** These locking, releasing, illuminating keys are used to supervise visually the progress of Dial 0 calls. When operated, a Dial 0 look key connects an incoming line to the attendant headset.

(c) ***Release (RLS) Key:*** This locking, releasing, nonilluminating key is used to disconnect the attendant telephone circuit from a loop and place a soft (temporary) hold on a call until the subsequent called party answers.

(d) ***Hold (HOLD) Key:*** This locking, releasing, nonilluminating key is used to disconnect the attendant telephone circuit from a loop and place a hard (permanent) hold on a call until the attendant releases it, or until the call disconnects.

(e) ***Disconnect (DISC) Key:*** This nonlocking, releasing, nonilluminating key is used to disconnect the attendant telephone circuit from a loop and sends an immediate disconnect signal to the central office.

(f) ***Call Control (CC) Key:*** This nonlocking, nonilluminating key provides a 500 ms measured flash indication at the central office to advance the call to the next step (call transfer, 3-way calling, consultation hold request).

(g) ***Split (SPLIT) Key:*** This nonlocking, nonreleasing, nonilluminating key, when operated before dialing, excludes the incoming calling party while the attendant announces the incoming call to the called station. When required, this key function may be performed by operating the asterisk (*) key on the console TOUCH-TONE dial. For the asterisk key to perform this function, strapping is required in the attendant console (this key cancels the automatic unsplit feature).

(h) ***Night (NITE) Key:*** This push-to-operate, push-to-release, nonilluminating key, when

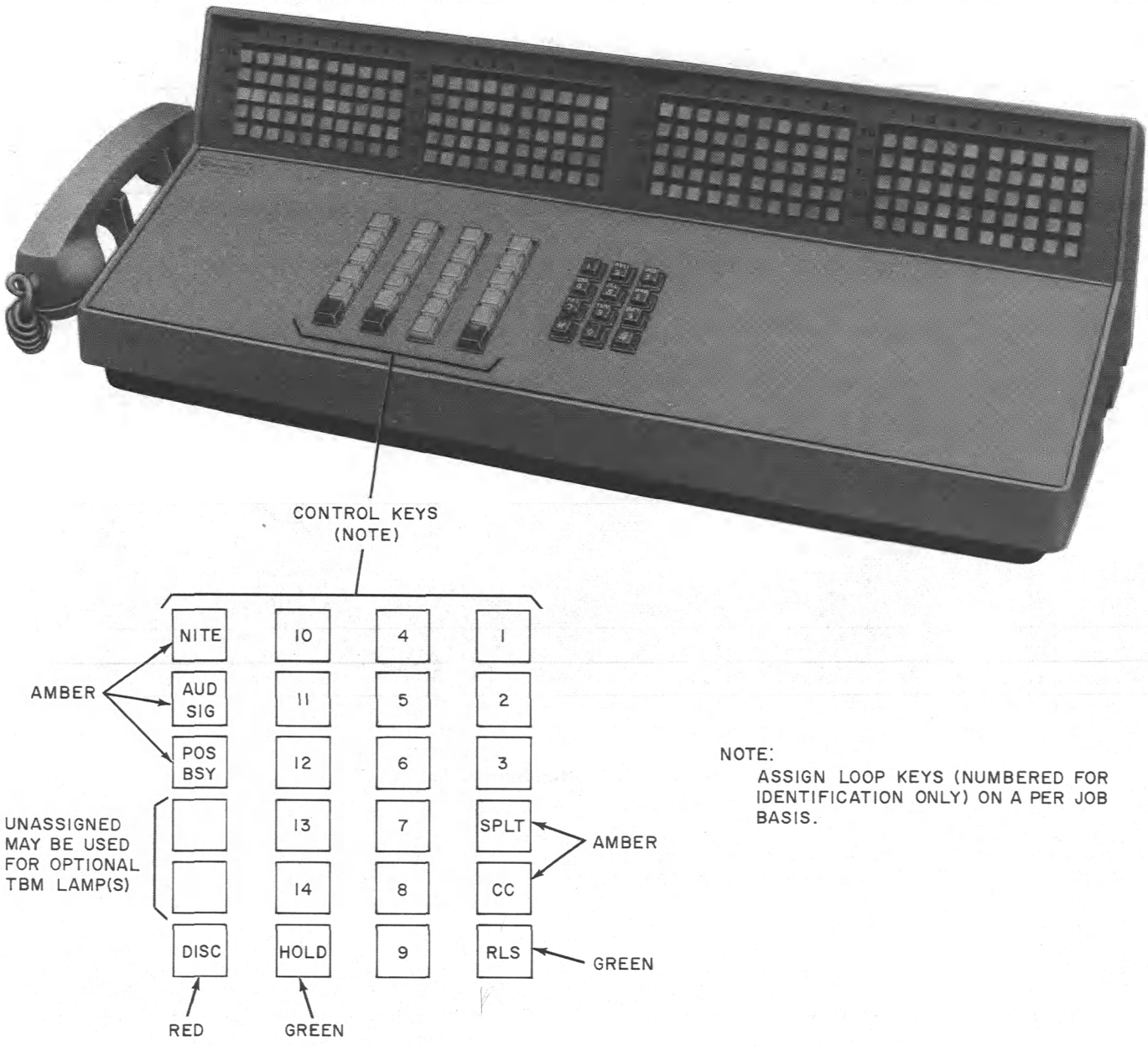


Fig. 17—Control Keys for 151-Type Attendant Console

operated, sends a signal to the central office to put the customer into night service. Only one night key per customer is provided and a separate cable pair is required between the attendant console and the central office.

(i) ***Audible Signal (AUD SIG) Key:*** This push-to-operate, push-to-release, nonilluminating key, when operated, enables the console audible signal. Release of this key cuts off the audible signal (the audible signal sounds when there is an unanswered incoming call and the AUD SIG key is operated).

(j) ***Position Busy (POS BSY):*** This push-to-operate, push-to-release, nonilluminating key, when operated, makes all the loops on this particular console busy to further incoming calls. This key is needed only for two or more console operations. A single console should never be made busy. A separate cable pair is needed between each POS BSY key on an attendant console and the central office.

B. Electronic Console(s) or MET Set Type 50B CPS Consoles

4.57 The 50B CPS is located on customer premises and provides an efficient means of handling and transferring calls. The system meets all present registration requirements. The 50B CPS consists of the following equipment.

Control Unit (J59217A)

4.58 The control unit (Fig. 18) provides the interface for CO lines and an electronic console or a MET set. These lines consist of 16 loops maximum.

4.59 One control unit is required per console. There is a maximum of four control units per system if direct station selection (DSS) and busy lamp field (BLF) features are provided. Without DSS/BLF features, the system can have a maximum of 16 control units and consoles.

Scanner Unit (J59217B)

4.60 This unit (Fig. 19) tests (scans) for busy lines and relays this information via data link to the control unit. The control unit lights the appropriate lamps on the console busy lamp field. The scanner unit is required when the DSS/BLF features are used.

4.61 Each scanner unit provides the capability to scan a maximum of 300 lines, and six units may be used per system to provide a busy lamp field for 1800 lines. Six scanner units may be connected to a control unit.

Consoles

4.62 The system may contain up to 16 AAK-04AF-03 consoles if the DSS/BLF features are not implemented and up to 4 AGK-04AF-03 consoles if the DSS/BLF features are provided. Each console requires a control unit equipped for that type of console.

Electronic Console(s)

4.63 Consoles may or may not be provided with DSS and BLF (DSS/BLF) features and may be arranged to provide customer dialed account recording (CDAR) operation.

4.64 The AGK-04AF-03 electronic console (Fig. 20) provides attendant features as described below.

- Repertory dialer for 1-button auto-dialing of trunk group access codes and frequently dialed extension numbers, local numbers, or long distance numbers.
- Trunk group busy indicators for up to four trunk groups.
- Call control buttons to answer, originate, and control basic call processing.
- Feature control buttons to provide special functions, such as hold, splitting, and night service.
- A 12-button dial which can be used in programming the repertory dialer in addition to normal manual dialing.
- Loop buttons and indicators. While only one loop may be serviced (active) at one time, the call status of up to 6 loops (out of 16) may be displayed at once and the attendant may switch from loop to loop as required.
- Busy Lamp Field (BLF) provides a display of the busy idle status of any 100 stations at a time.
- Hundreds group select buttons select 1 of 18 hundreds groups for display on the BLF and for direct station selection (DSS).

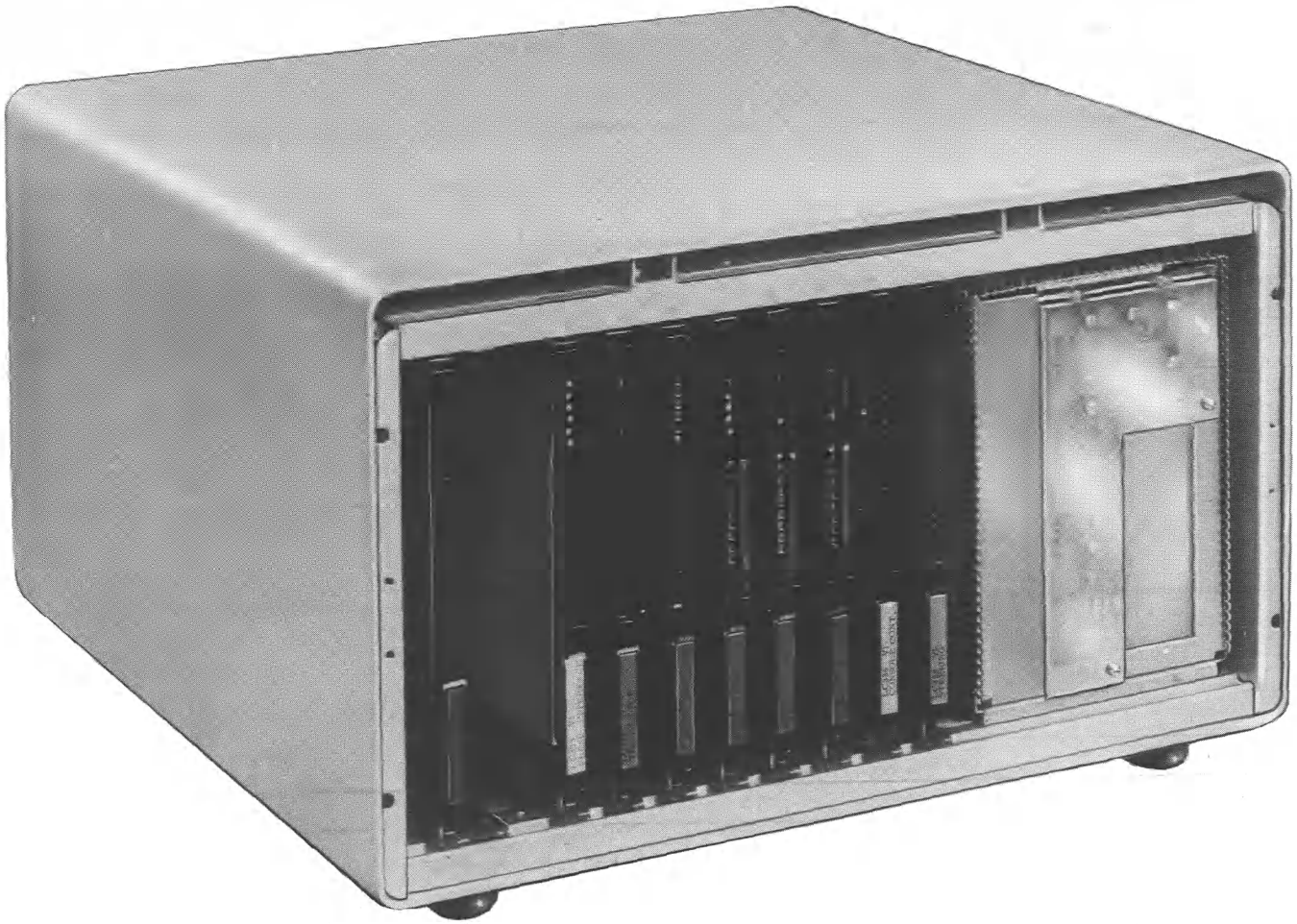


Fig. 18—50B CPS Console Unit With Front Cover Removed

- DSS buttons provide 1-button auto-dialing of station extension numbers.
- Alphanumeric display for incoming call identification (ICI), time of day (TOD), and traffic data. Four characters are displayed for incoming call identification and time of day. Traffic data requires eight characters.
- Jacks for connection of headsets or handsets.
- Tone ringer with variable volume to indicate incoming calls or timed reminders.

4.65 The AAK-04AF-03 electronic console (Fig. 21) provides features similar to the "AGK" console but no BLF/DSS features are provided.

4.66 All buttons are nonlocking, and all indicators are red light emitting diode (LED) type lamps. More detailed descriptions of each control and indicator are provided in Tables B, C, and D. Locations and designations are shown in Fig. 22.

Multibutton Electronic Telephone (MET) Set

4.67 The 2993C01 MET set (Fig. 23) is called a "30-button" set and is used as an attendant console. Dial and R (release) buttons are provided in addition to the three rows of ten buttons. Two indicators are associated with each of the 30 nonlocking buttons, 1 green LED, and 1 red LED. The general functions are listed below.

- Loop and call control buttons to answer, originate, or control basic call processing. Up to 16 loops may be provided. Only one loop may be active at one time, but the status of each is displayed continuously.

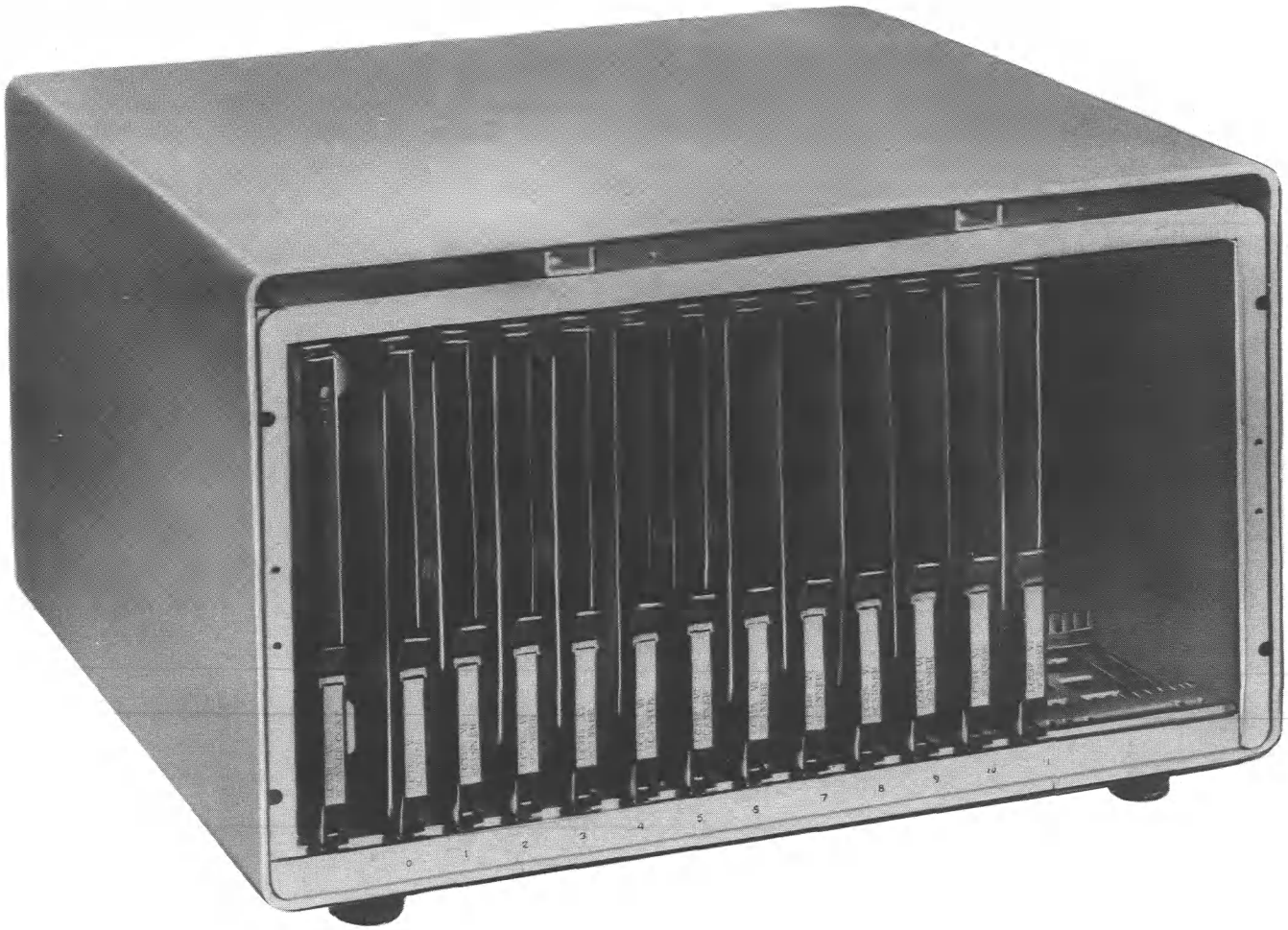


Fig. 19—50B CPS Scanner Unit With Front Cover Removed

- Trunk group busy indicators for up to four trunk groups.
- Feature control buttons for special functions, such as hold, splitting, and night service.
- A 12-button dial pad. All dialing is manual.
- A tone ringer with variable volume to indicate incoming calls or timed reminders.
- A handset provided with every console.
- An optional headset adapter (Fig. 24) may be separately provided.

4.68 Detailed descriptions of each control and indicator are provided in Tables B, C, and D. Locations and designations are shown in Fig. 25.

4.69 For additional 50A CPS feature descriptions, refer to Section 533-101-100, 50B Customer Premises System (CPS) Theory of Operation and Description Information. For method of attendant console operation, refer to Section 533-100-101, Attendant and Station Equipment—Method of Operation—50A.

CENTREX-CU HARDWARE

A. AIOD Interface Circuit

4.70 An AIOD Interface Circuit (AIODIC) is essentially a data link terminating set. It consists of all the hardware associated with AIOD operation: relays, data receivers, check circuits, shift registers,

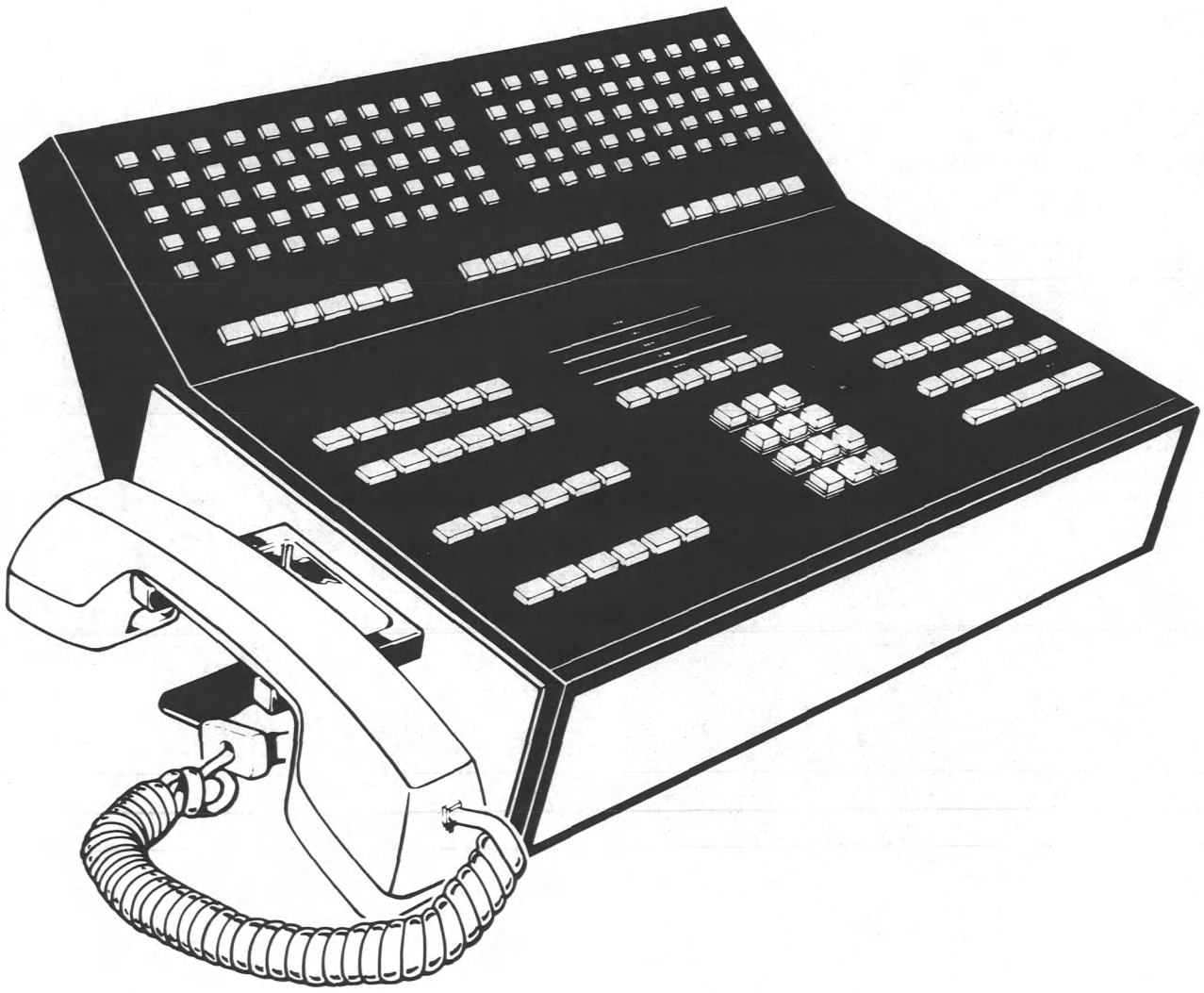


Fig. 20—50B CPS Electronic Console With DSS/BLF

and test transmitters. A single AIODIC is required per No. 1 or 1A ESS control group (maximum one per control group). This unit will terminate up to 60 data links, serving up to 2000 outdial and/or CCSA trunks and 30,000 busy-hour calls.

B. ANI Connecting Unit

4.71 ANI Connecting Units are circuits used to terminate data links from each PBX ANI. ANI connecting units mount six per 2-inch mounting plate on the AIODIC. The basic AIODIC is equipped with six ANI connecting units but may be equipped with a maximum of 60, ordered in increments of 6. One ANI connecting unit is required per data link and may serve up to 210 outdial and/or CCSA trunks. If 210 ANI trunks are exceeded, a second data link and ANI connecting unit may be used. It is suggested that a back-up ANI connecting unit and data link be ordered for service protection for each working data link.

5. SYSTEM ORGANIZATION DESCRIPTION FOR CENTREX/ESSX-1 WITH DATA LINK HARDWARE

5.01 Figure 26 is a block diagram of a centrex system equipped with an attendant console and centrex data link hardware. The data loop used for the transmission of key signals and lamp data is shown.

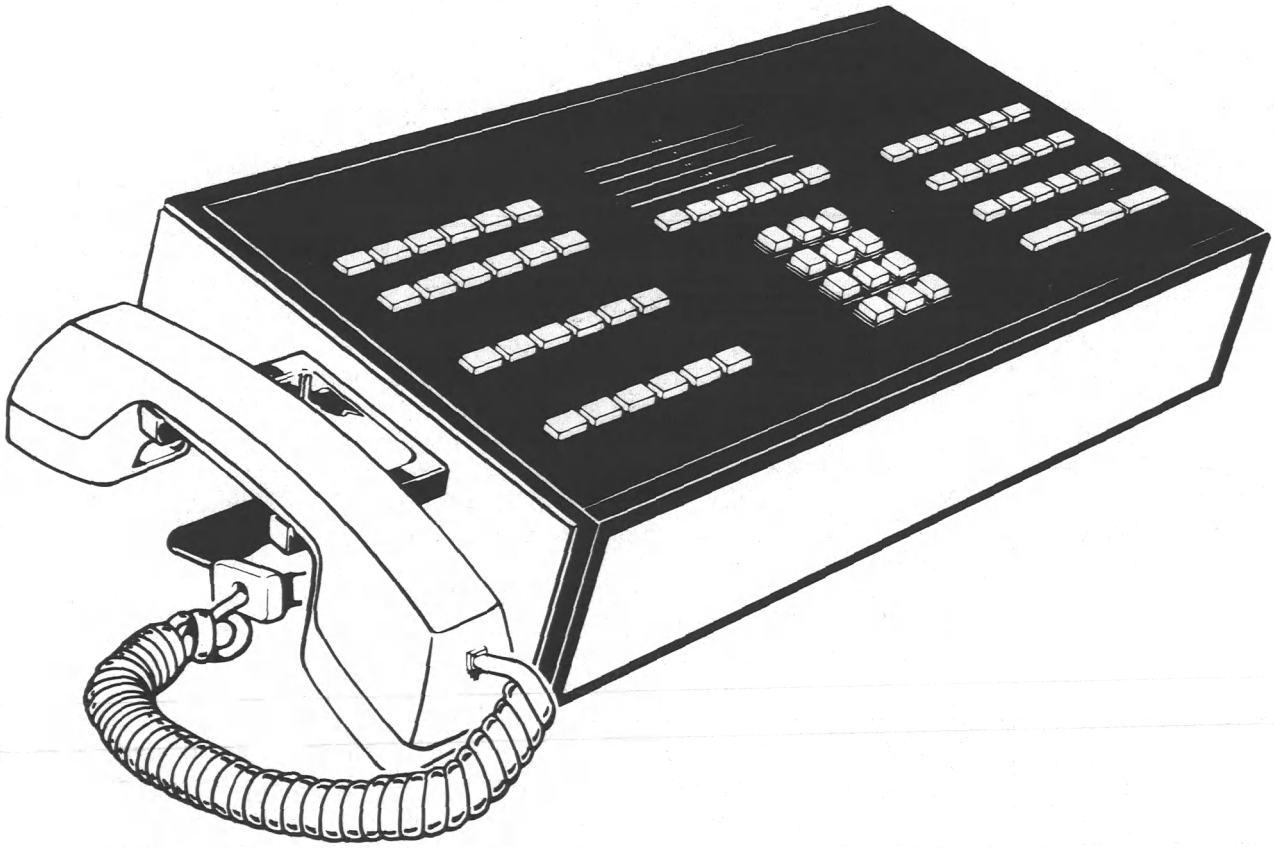


Fig. 21—50B CPS Electronic Console Without DSS/BLF

5.02 Centrex operation is under control of the central control or the signal processor in an ESS central office. Portions of the existing call store and program store are assigned for the use of each customer group. Scan points, signal distributor points, duplicated central pulse distributor points, and connections to the duplicated peripheral bus are supplied for centrex operation.

5.03 A centrex data link frame, which provides the interface between the central office and the data loop, is shown located in the ESS central office. One data link unit is used in conjunction with each data loop. Eight data links and one data link controller are mounted in each frame. Each data link contains a key signal receiver circuit, a lamp data transmitter circuit, and connections to the common control equipment.

5.04 The data link controller appears as a peripheral unit on the system peripheral unit bus. The main function of this controller is to receive data messages from central control and to steer them to the proper data link.

5.05 A centrex console control cabinet is shown located at the customer premises. This cabinet provides the interface between the consoles and the data loop. Connections are shown to only one attendant console; however, up to four consoles may be controlled by one console control cabinet. As additional consoles are added, a console control unit is added for each console. In addition to the console control units, each console control cabinet contains a transmitter, a receiver, and a lamp control circuit, all of which are common to all consoles connected to the console control cabinet.

5.06 If a customer group is to be equipped with more than four 1B- or 27A-type or more than four 2B- or 47A-type consoles, additional console control cabinets must be installed.

TABLE B

50B CPS CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
—	ACCT	Account Number — A button which causes the account number (dialed and stored while setting up a CDAR call) to be displayed. If the account number exceeds eight digits, the remaining digits are displayed by a second depression of the button. If depressed after PROG, the length of the account number can be preprogrammed using the sequence: PROG, ACCT, two dialed digits (01 through 14), PROG. Dialed digits are displayed.
ALM (ALM TEST CW)	ALM	Alarm — A green LED (MET) or red LED (electronic) which winks to indicate a system fault condition.
	Alphanumeric Display	An array of LEDs which display eight characters on electronic or CDAR electronic consoles. Displays include ICI, TOD, traffic statistics, CDAR access codes, account numbers, and telephone numbers described elsewhere in this table.
—	ANSWER	A large button used on new calls only to connect the attendant to an unanswered call on the loop. Button cannot be used to reenter an established or held call. Loop LEDs respond per Table C†.
AUD OFF [green]*	AUD OFF	Audible Signal Off — A button which disables and enables the console tone ringer. A red LED indicates the disabled state.†
Audible Signal Volume	AUDIBLE SIGNAL VOLUME	A small knob which controls console tone ringer volume (at the side of the MET set or front of the electronic console behind the swing-down panel).
—	AWT	Average Attendant Work Time — A button which causes display of the average time required to service a call. Work time is incremented whenever the attendant is connected to a loop. Total work time, since NCH was last zeroed, is divided by the number of calls handled. Time for progress reports is included.
BUSY (xxxx) [yellow]*	BUSY (xxxx)	Trunk Group Busy — One to four red LEDs at the left side of the electronic console which are lighted when all trunks in the designated customer trunk group are busy. The location is at the top of the MET sets. Designation (xxxx) may be trunk access digits, trunk far-end location, etc.
—	Busy Lamp Field	A Busy Lamp Field (BLF) of 100 LEDs indicates which stations are busy. One hundreds group (of 18) is displayed. (See Hundreds Group Select also.) The last two digits of the station extension number are engraved on the DSS button to the right of each LED.

See footnotes at end of table.

TABLE B (Contd)

50B CPS CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
—	CAC1 or CAC2	CDAR Access — A button used to enter the CDAR mode. The preprogrammed access code associated with the button selected is fetched from storage and displayed. A red LED indicates which button was depressed to cause the display. An example programming sequence is: PROG, CAC(x), (up to five dialed digits displayed), PROG. The button can be depressed at any time for display and possible editing of the access code. See CURSR.
CAMP [yellow]*	CAMP	A button which releases the attendant from the active loop. The calling party is left "camped on" the busy called party line. Tone heard by attendant depends on CO options. The called party is alerted by a single call-waiting tone. The call is completed when the called party flashes or hangs up. Loop LEDs respond per Table C.† On MET set only, CAMP LED will flash in 30 seconds as a timed reminder; then CAMP button is depressed to pick up call.
CANCL [green]*	CANCL	Cancel — A button which releases the called station or trunk from the active loop. Used when wrong number, busy tone, or no answer is encountered by attendant. Attendant is reconnected to calling party. In console program mode, it cancels previous programming of button or clears error or zeroes traffic data.†
—	CURSR	CDAR Cursor Control — A button which controls the editing process for any CDAR numbers displayed. The button is depressed once to cause the first digit to blink, twice to cause the second digit to blink, etc. Any blinking digit can be changed by dialing the desired digit. Cursor position is reset to the left on display of a new number.
—	Customer-Designated Lamps	Two undesignated LEDs (left of dial) can be wired to an external customer or telephone company circuit such as a reserve supply power alarm.
CW (ALM TEST CW)	CW	Calls Waiting — A lighted LED indicates calls waiting in queue. Calls are queued at CO or locally on loops. A winking CW LED indicates more than three calls are waiting.
Dial	Dial	A 12-button dial providing TOUCH-TONE® dialing. Electronic consoles provide digital outputs for programming.

See footnotes at end of table.

TABLE B (Contd)

50B CPS CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
—	Direct Station Selection (DSS)	The DSS buttons cause a station extension number to be autodialed. (START is not required.) The first two digits are determined by the hundreds group selected, and the last two extension digits are engraved on the DSS buttons (00 through 99).
Headset On-Off Hook	—	A rocker-type switch on the headset adapter (See Fig. 24.) connected to the MET set. Depressed at the top to put the headset in service (off-hook) or at the bottom to put the headset out of sevice (on-hook). The handset can be used only when the headset is on-hook.
HOLD [red]*	HOLD	A button which releases the attendant from the active loop and puts the loop in the local (permanent) hold state. The call is held on the console until all parties disconnect or the attendant operates the loop button. Call can progress from ring or camp-on states to the talk (answered) state during hold, but call is still held on console. Loop LEDs respond per Table C†.
—	Hundreds Group Select	Buttons under the BLF and DSS fields which select 1 of 18 hundreds groups of stations. A lighted red LED indicates the group selected (with status displayed on the BLF). Buttons are designated (or reserved for growth) for any 2 to 18 "consecutive hundreds groups" with none skipped.
—	Incoming Call Identification (ICI) on Alphanumeric Display	An array of LEDs which display four characters identifying the type of call. Each of up to 16 loops may be programmed for 1 of 31 ICI indications to be associated with a call on the loop. Each console is limited to 16 unique ICI displays (Table D). See TOD also.
—	LAST NO.	Last Number Dialed — A button which causes the last number "manually dialed" on an active loop to be repeated. Dialed numbers are automatically stored for each loop and overwritten when a new number is dialed on the same loop. Access, account, and telephone numbers are repeated if the last call on the loop was made via CDAR features on the console. Attendant-originated call numbers are stored in a special register not associated with one loop.

See footnotes at end of table.

TABLE B (Contd)

50B CPS CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
Loop Buttons and LEDs	—	A button per loop designated per ICI (Table D) and associated with particular types of incoming calls. The buttons connect the attendant to a loop. Since only one loop can be active (serviced by attendant) at one time, depressing a second loop button will connect the attendant to the second loop and release the first. This shortcut should not be used if a called station is ringing or camped on. Limit is 16 loops. Loop LEDs respond per Table C.
—	Loop Buttons 1 Through 6 and LEDs	Six buttons, any of which can connect the attendant to any loop (16 maximum). Loop buttons are interlocked as for MET loops above. Loop LEDs respond per Table C. Only six loops can have the call state displayed at one time, and only one loop can be active. See ICI also.
—	NCH	Number of Calls Handled — A button which causes the number of attendant-answered calls to be displayed on the alphanumeric display. A red LED is lighted when NCH is displayed. NCH is zeroed by depressing a sequence of buttons: PROG, NCH, CANCL, and PROG. When NCH is zeroed, the accumulated work time is also zeroed.
NIGHT [green]*	NIGHT	Night Service — A button which enables or disables fixed night service or enables the bell provided with TAAS night service. A red LED is lighted when night service is enabled. After enabling night service, the headset must be unjacked (electronic) or the console cord disconnected (MET). ***Note:*** Only one console can control night service. Power failure also activates night service, but all console LEDs are off.†
—	PA	Position Available — A red LED which indicates no incoming call is waiting and the attendant is not active on a loop.
POS BUSY [green]*	POS BUSY	Position Busy — A button which signals the CO to stop incoming calls. A second depression of the button enables incoming calls. A red LED indicates the busy (disabled) state.† (Used only if two or more consoles are provided. Also activated by power failure.)
—	PROG	Program — A button which enables and disables the button programming mode. A red LED is lighted when programming is enabled. See Repertory Dialer.

See footnotes at end of table.

TABLE B (Contd)

50B CPS CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
—	Repertory Dialer Buttons	Any buttons on left side of console with no fixed function can be programmed to auto-dial codes for trunk group access or frequently dialed numbers (local or long distance). Auto-dialing of less than 3 or more than 15 consecutive digits is not recommended. More than 15 digits are allowed if separated by a wait for dial tone. Up to 30 digits can be programmed with wait periods counted as digits. See WAIT if additional dial tone is required. Example programming for two buttons: PROG, (button x), 9, WAIT, 555-2368 (button y), 8, WAIT, 233, PROG. Auto-dialed tones are heard by the attendant (muted). Spare buttons on the right side can be similarly programmed for special features.
R	RLS	Release — A button used to unconditionally release the call and attendant from the active loop with no temporary (soft) hold. Station call states (after ringing state) are not changed. The attendant cannot reenter a call after unconditional release. Also used for forced release to clear trouble condition on loop.†
RING [yellow]*	RING	A button which releases the attendant from the active loop, while the called station is ringing. The call is held on the console (soft-hold) until the called party answers. Loop LEDs respond per Table C. On MET set only, RING LED will flash in 30 seconds as a timed reminder; then RING button is depressed to pick up the call.
SPLIT	SPLIT	A button which causes the calling party to be kept split away after the called party answers (in addition to automatic splitting after START below). SPLIT must be operated before dialing the called party. A second operation of SPLIT causes unsplit (3-way) connection. A red LED is lighted in the split state.
START [green]*	START	A button depressed to get dial tone before manual dialing to extend a call. A calling party is automatically split away until the ring state is established or until the attendant releases from the loop. See SPLIT button. Also used to output stored digits (in tone format) to CO at the beginning of each CDAR call.
—	TEL	Telephone Number — A button which causes the telephone number (stored while setting up a CDAR call) to be displayed for verification or editing. See CURSR. If the number exceeds eight digits, another depression of the button causes the display of the remaining digits.

See footnotes at end of table.

TABLE B (Contd)

50B CPS CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
TEST (ALM TEST CW)	TEST	A button (MET) or toggle switch (electronic-located behind swing-down front panel) which causes all console LEDs to be lighted and tone ringer to sound. The alphanumeric display normally shows LAMP TEST but can also indicate a trouble number if loop trouble is detected.
—	Time-of-Day Display (in hours and minutes)	Four digits showing 12-hour time are displayed at all times when CDAR data is not displayed. TOD is also displayed on demand. (See TOD button.)
—	TOD	Time of Day — A button which causes the time to be displayed for 3 seconds. The time can be reset; for example, the sequence for 10:15 AM/PM is: PROG, TOD, 1015, PROG.
—	Trunk Group Access Buttons	Any of the Repertory Dialer buttons at the left side can be used, preferably starting with the bottom row. Programmed code may include area code and any other numbers required to access trunk groups or exchanges. See WAIT below.
—	WAIT	A button which causes a programmed pause for detection of dial tone before the programmed dialing sequence is resumed. Several dial tones may be detected in a dialing sequence. Typically used to wait for "outside dial tone" after "9" is dialed. WAIT is used while programming the repertory dialer or account number. The WAIT lamp is lighted, while the repertory dialer is waiting for dial tone to be detected. If dial tone is not detected (WAIT LED stays on), depression of WAIT button will force resumption of auto-dialing.

* ["color"] indicates color of tab in button; all others are white.

† On the MET set only, the associated green LED is lighted while the specified button is depressed to confirm response of button, data link, processor, and LED.

TABLE C

50B CPS CONSOLE LOOP LIGHT EMITTING DIODE (LED) INDICATIONS

MET SET STATE	ELECTRONIC CSL STATE	STATUS OF CALL ON LOOP
Dark	Dark	No call — loop idle.
Flashing green (60 ipm)	ATND flashing (60 ipm)	Incoming call to attendant. LED flashes until attendant is connected to call or call is abandoned. (See ANSWER and loop buttons, Table B.)
Lighted green (steady)	ATND lighted (steady)	Attendant is active on loop, either serving a calling party or originating a call. Only one loop can be "active" at a time.
Winking green (120 ipm)	HOLD lighted (steady	Call is on local (permanent) hold because HOLD button was operated. Attendant is released from loop. Hold state continues until attendant reenters call or all parties disconnect. Two parties can be held, but attendant cannot be recalled.
Fluttering green (300 ipm)	CAMP lighted (steady)	Call on loop is in soft (temporary) hold, while call is camped on a busy line. Attendant has released from loop using the CAMP button. Camp-on state continues until called party hangs up, flashes, calling party disconnects, or attendant reenters call.
	RING lighted (steady)	Called station is ringing, LED remains lighted until party answers, attendant releases loop, or call is abandoned. Attendant was released from loop using R or RELEASE button.
Lighted red (steady)	ANS lighted (steady)	Call has been held on console (because attendant remained on loop or depressed HOLD button) and called party (third party) has answered. LED will remain lighted until all parties disconnect or attendant releases loop. ***Note:*** Not lighted when 2-party (attendant originated) call is answered.
*	Flashing HOLD, CAMP, or RING (60 ipm)	Timed Reminder (Accompanied by single ring on tone ringer) — Call has been left in hold, camp-on, or ring state for over 30 seconds. Timing is reset each time attendant reenters the call on loop. On MET sets the normal hold, camp-on, or ring status indication remains.

* Timed reminders on the MET set consist of flashing green CAMP or RING LED and single-ring tone. No timed reminder on hold state. Multiple timed reminders are queued.

TABLE D

INCOMING CALL IDENTIFICATION (ICI)

CATEGORY OF CALL ON ATTENDANT LOOP	ICI CHARACTERS
Station dialing attendant	ATND
Manual line	MAN
Corporate network (via common control switching arrangement)	CNET
Restricted station dialing 9	OUTG
Attendant recall	RCL
Intercepted call	ICPT
Interposition call	ATAT
Call forwarding — don't answer	CFDA
Call forwarding — busy line	CFBL
Foreign exchange trunk group(s)	FX1 through FX5
Tie-trunk group(s)	TIE1 through TIE8
800 service (INWATS)	WATA through WATE
Listed directory number (LDN)	INC1 through INC4

CENTREX DATA LOOP DESCRIPTION

5.07 The centrex data loop is a peripheral unit that provides 2-way data communications between the ESS central office and the remotely located attendant telephone consoles. A data loop consists of two separate 2-wire unidirectional data links. These data links are interconnected at the central office end and at the remote centrex end by means of transmitting and receiving circuitry in such a way that the two links form a complete loop.

5.08 The ESS transmits attendant console lamp state changes via the data link to the remote centrex location and receives key signals from the attendant via the data link. These key signals are interpreted as requests for specific actions concerning calls that are associated with the console.

5.09 Reference should be made to Section 231-037-000 for a detailed description of the centrex data loop and console control system.

ATTENDANT LOOP CIRCUITS

5.10 Each attendant telephone console is equipped with up to six loop circuits (Fig. 27). These loop circuits give the attendant voice access to calls associated with the consoles. The loop circuits are located on the miscellaneous trunk frame at the ESS office to which the customer group is connected. Each loop has two appearances on the trunk link network. When the two ports are interconnected, the loop circuit acts as a junctor. At the attendant's request the two paths may be split and connected through to the attendant trunk circuit. Here the attendant may be connected to either the calling or the called party individually, excluding the other, or a 3-way connection may exist. The attendant excludes either the calling or called party from a connection by operating either the exclude destination (EXCL DEST) key or the source (EXCL SRC) key. This feature is an option available with the console.

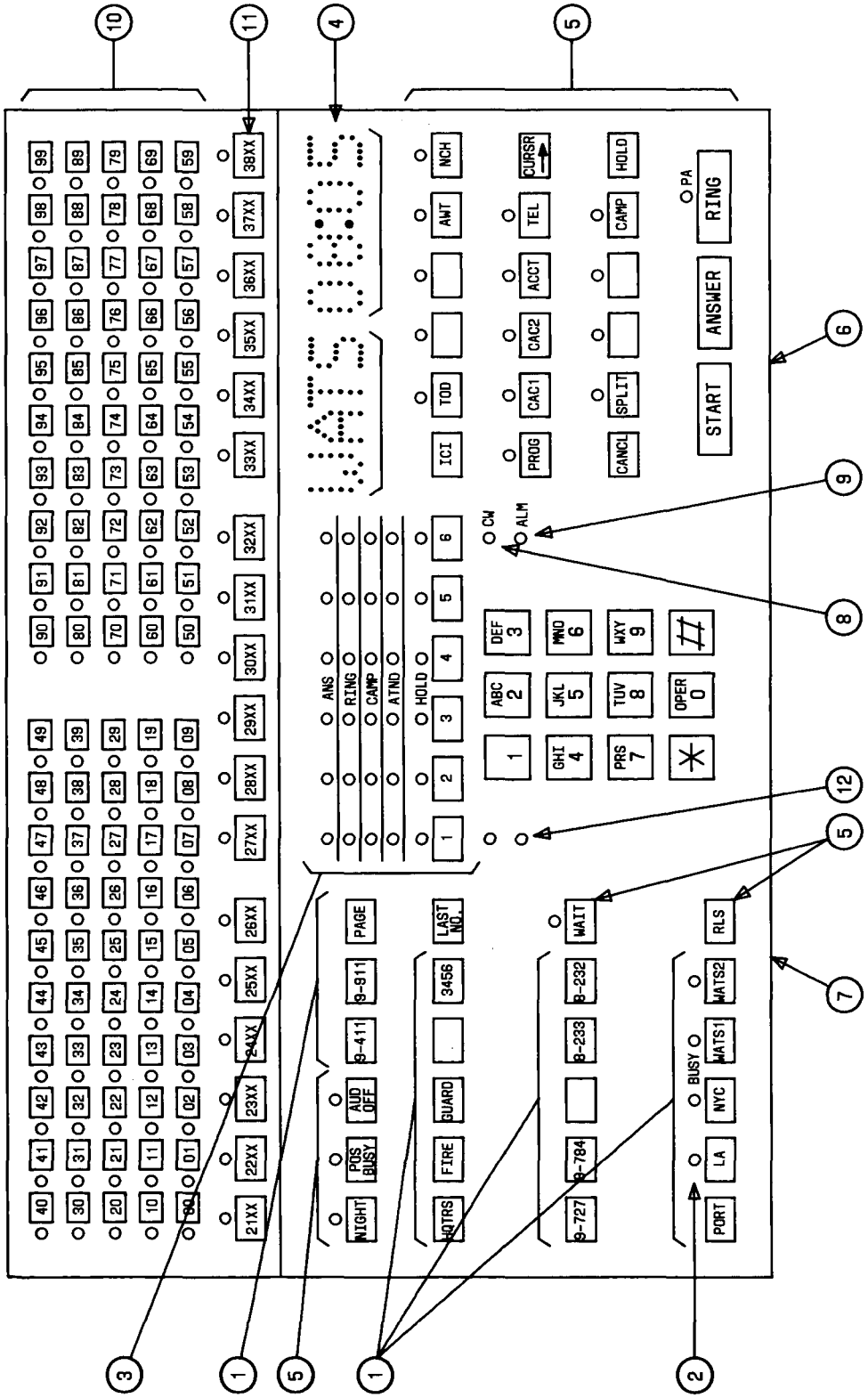


Fig. 22—50B CPS Electronic Console—Controls and Indicators

Fig. 23—50B CPS Multibutton Electronic Telephone (MET) Set

5.11 No particular loop circuit is confined to any one source. A call from any source (station, tie line, etc) requiring attendant service may appear on any of the loop circuits on the attendant console.

5.12 All calls requiring attendant actions are handled on a switched loop basis; that is, call information is displayed on a console only as long as the attendant requires this information.

ATTENDANT TRUNK CIRCUIT

5.13 An attendant trunk circuit (Fig. 27) is provided as a speech path for each attendant telephone console. This circuit is basically a 3-port conference circuit. One port connects to the console talking pair. The other two ports connect to the associated attendant loop circuits. By means of a relay tree, these two ports are connected to cut through to only one loop circuit at a time. The two ports are used during the progress of a call for connecting the attendant to stations, trunks, etc.

5.14 ***4-Wire Attendant Trunk Circuit:*** A 4-wire attendant trunk circuit is optionally available for customer groups having long-haul tie trunks which may be used in tandem operation. The 4-wire path is used in such cases to prevent excessive line losses. This circuit replaces the 2-wire attendant trunk circuit which may be used.

5.15 Each attendant trunk circuit and attendant loop circuit is equipped with scan points for supervision.

5.16 The attendant may work on only one call at a time; therefore, only one attendant trunk circuit is provided.

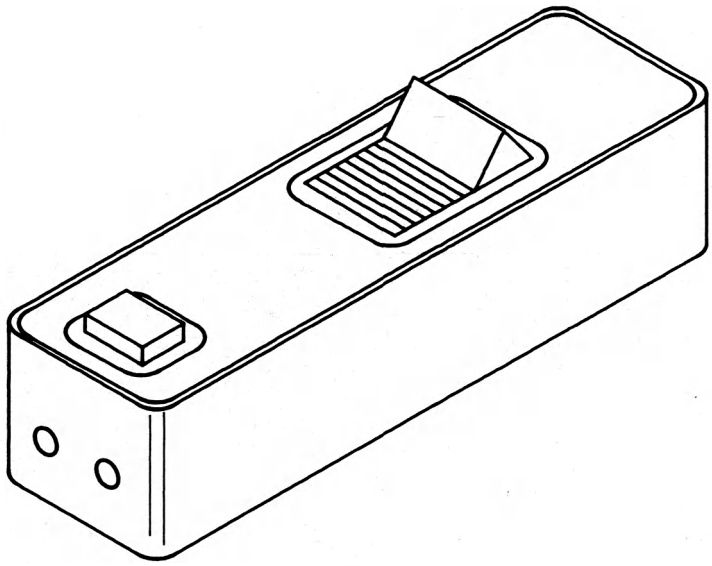


Fig. 24—Headset Adapter

CENTREX SWITCHING OPERATIONS

5.17 Figure 28 is a block diagram illustrating the connections between centrex customer groups and a No. 1 or 1A ESS switching network. Two customer groups are shown. Both groups are shown equipped with attendant telephone consoles, and one of these groups is also shown equipped with the optional features for machine dictation, paging, and code calling. Calls which do not require attendant services, such as direct inward dialing, direct outward dialing, and station-to-station calls, are switched directly through the network with no appearance on an attendant console. The associated data circuit is not involved with such calls.

5.18 The attendant trunk can be seen terminating on the trunk link side of the switching network. Attendant trunks have multiple appearances on the trunk link network via attendant loop circuits.

5.19 The centrex data loop circuits can be seen connecting through the distributing frames to the centrex data link frame. These circuits are not switched and have no appearance on the switching network.

CENTREX TRUNK FEATURES

5.20 Trunk circuits may be assigned for the exclusive use of each centrex customer group. These trunks are used to interconnect the centrex customer group with other switching systems.

5.21 Tie trunks are provided to interconnect a centrex customer group with other local centrex systems, dial central offices, etc. Foreign exchange trunks are provided to interconnect the centrex group with distant switching systems. Special trunk circuits are provided for the optional code calling, paging, and dial dictation features.

5.22 Since centrex customer groups may be interconnected with such a variety of switching systems, a wide variety of trunk circuits and trunk treatments are necessary.

5.23 Translation memory is used to specify the particular treatment for each trunk circuit. The controlling program directs the trunk operations through the use of this memory.

5.24 The following is a list of the various types of trunk services available for centrex use:

- Two-Way Dial
- Outgoing Dial—Incoming Manual
- Outgoing Manual—Incoming Dial
- Two-Way Manual

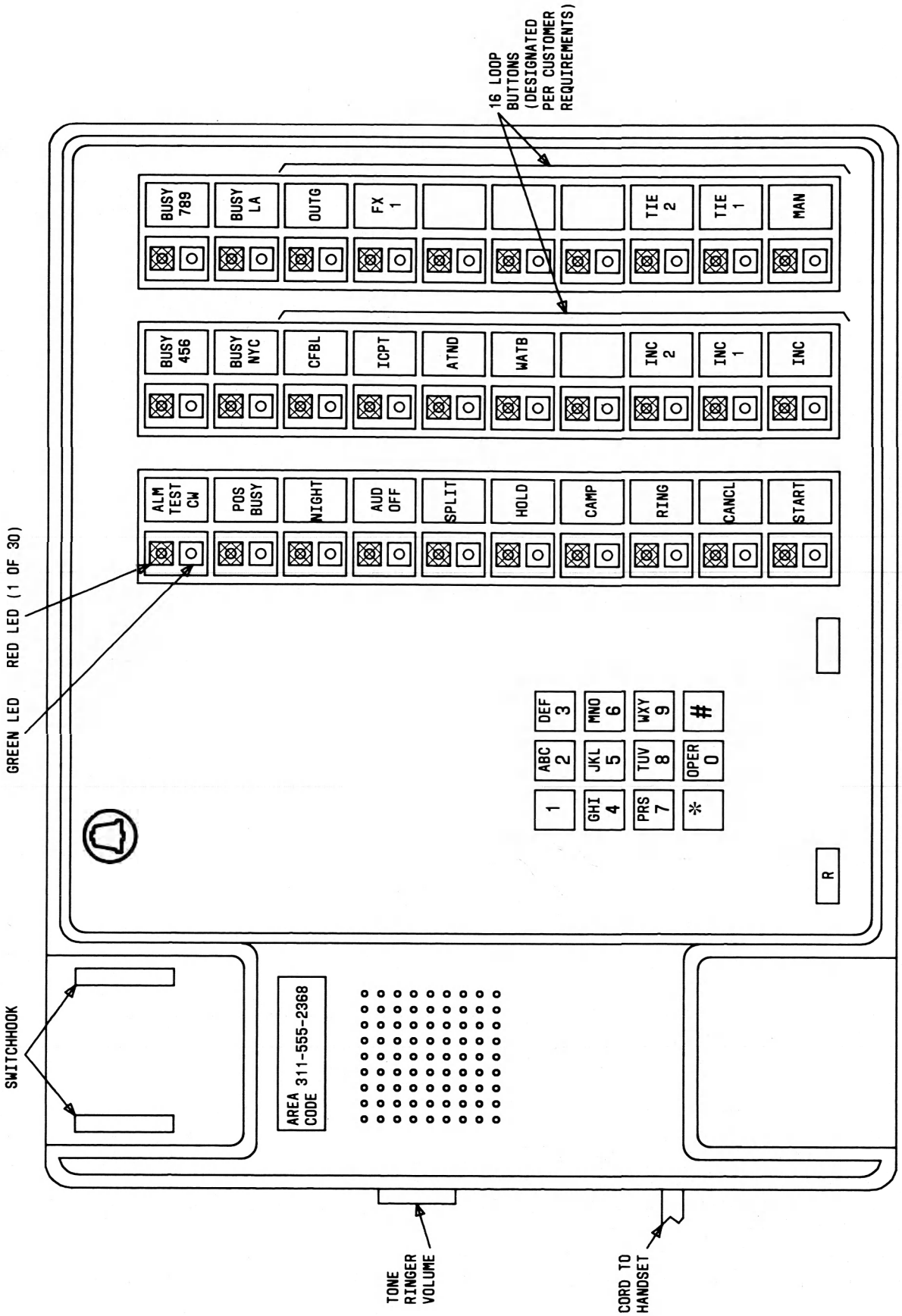


Fig. 25—50B CPS MET Set—Controls and Indicators

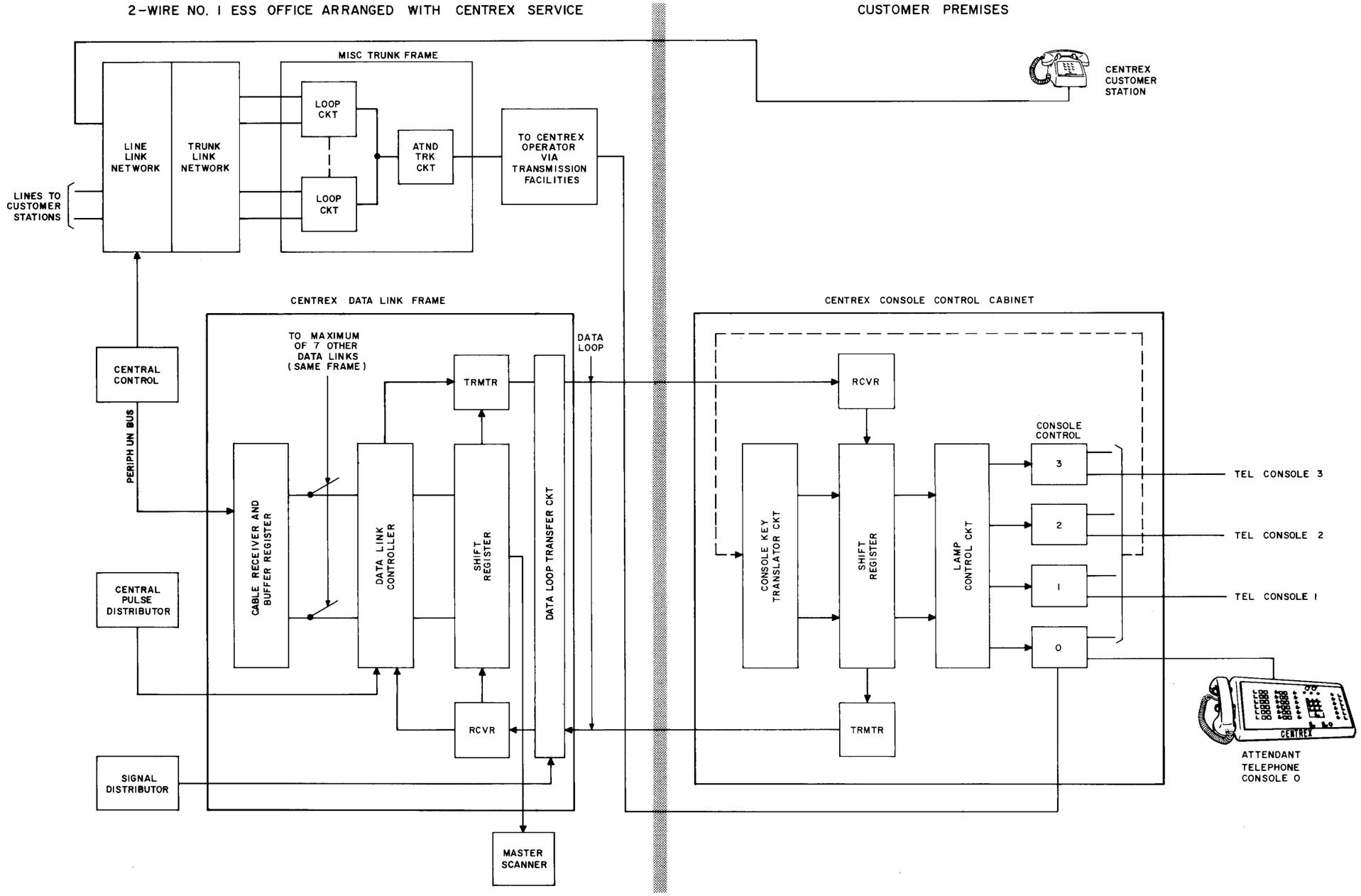
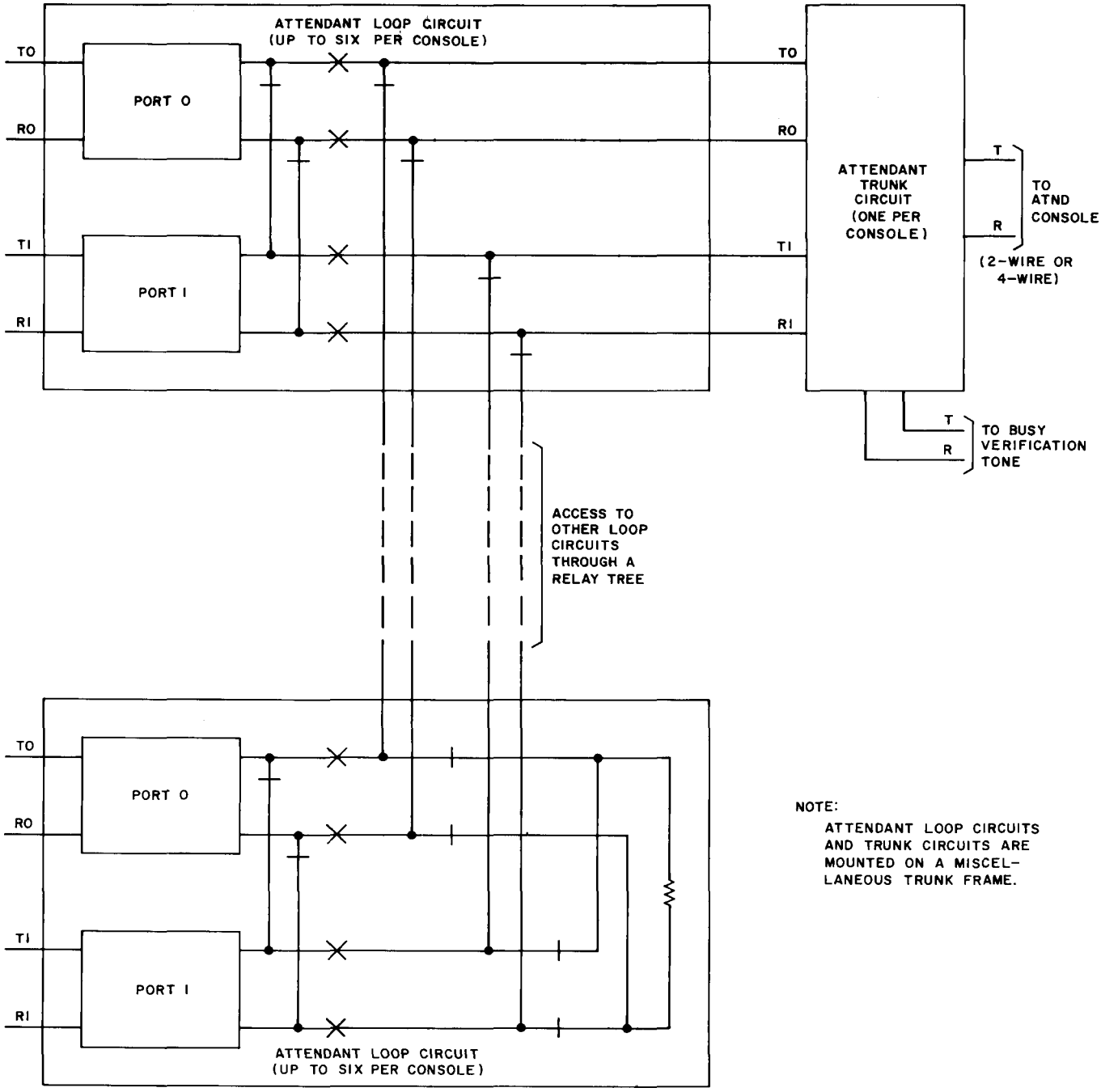


Fig. 26—Centrex System Control—Block Diagram



NOTE:
ATTENDANT LOOP CIRCUITS AND TRUNK CIRCUITS ARE MOUNTED ON A MISCELLANEOUS TRUNK FRAME.

Fig. 27—Attendant Trunk and Loop Circuits

the attendant telephone consoles are properly received at the ESS central office and if signals generated at the ESS central office are properly displayed to the attendant.

5.36 Testing is provided by parity checks on a per-call basis and by automatic diagnostic programs injected at regular intervals. The automatic test is a round-trip test which is designed to test the entire console data interchange system.

5.37 In the event of parity failures or round-trip failures, the ESS initiates a special series of diagnostic tests in sequences which help in localizing the troubles.

5.38 If a trouble is suspected, diagnostic programs may be injected at any time by a request from the maintenance teletypewriter (TTY) at the ESS central office to which the centrex customer group is connected.

6. SYSTEM ORGANIZATION DESCRIPTION FOR CENTREX/ESSX-1 WITHOUT DATA LINK HARDWARE

50A CPS

6.01 Figure 29 is a block diagram of a Centrex/ESSX-1 system equipped with a 50A CPS type attendant console (without data link hardware). The console shown in this figure represents a 131- or 151-type with attendant DSS and busy lamp field.

6.02 Centrex/ESSX-1 operation is under control of the centrex programs in the No. 1 or 1A ESS.

6.03 All station lines are connected over outside plant facilities directly into the CO. There is no physical trunk facility required to handle calls between the customer's location and the CO.

6.04 The attendant(s) position provides service from which listed directory number and other calls requiring assistance can be answered and completed by the attendant (via the call transfer feature). Each line appearance on an attendant console is referred to as a loop and terminates directly to the line link network in the CO.

6.05 Centrex/ESSX-1 service that is provided without data link hardware utilizes the 50A CPS when attendant services are required. The 50A CPS consists of attendant console(s) and modular panels located on the customer's premises that provide supervision and control of the attendant position(s).

6.06 The 720A and 722A modular panels used in the 50A CPS accommodate circuit packs and key telephone units. The key telephone units and circuit packs hold the following circuits.

(a) ***Line Circuit:*** The line circuit provides the attendant console with pickup, hold, key lamp, and tone ringer control. When an incoming call to the attendant console is detected, this circuit applies a 60-ipm flash rate to the appropriate loop key lamp and operates the console tone ringer. Then, operation of the loop key trips ringing by connecting the attendant circuit to the loop. The line circuit silences the tone ringer and lights steady the loop lamp.

(b) ***Permanent Hold Detector Circuit:*** This circuit places a permanent hold on an attendant loop. When the attendant momentarily operates the hold key, an operated loop key will release and the loop is placed on permanent hold (indicated by a wink loop lamp rate).

(c) ***Flutter Generator Circuit:*** This circuit provides flutter flash rate to a loop key which indicates the call is on temporary hold. In the call transfer sequence, after the attendant answers an incoming call and dials the requested station, the RLS key must be operated to free the console to handle other calls. The call is placed on temporary hold and the flutter generator circuit causes the loop key lamp to flutter until the called party answers. The call is then released from the loop on the console.

(d) ***Line Busy Circuit:*** This circuit provides a busy station indication, via busy lamp supervision, to an attendant using a 131- or 151-type console. When a line is busy or when the line is ringing, the line busy circuit lights a lamp in the console busy lamp field.

(e) ***Trunk Group Busy Circuit:*** This circuit provides steady lamp supervision to a preselected lamp location at the console when a trunk group is busy.

(f) ***Attendant Direct Station Selection Dialer Circuit:*** This circuit, located in the

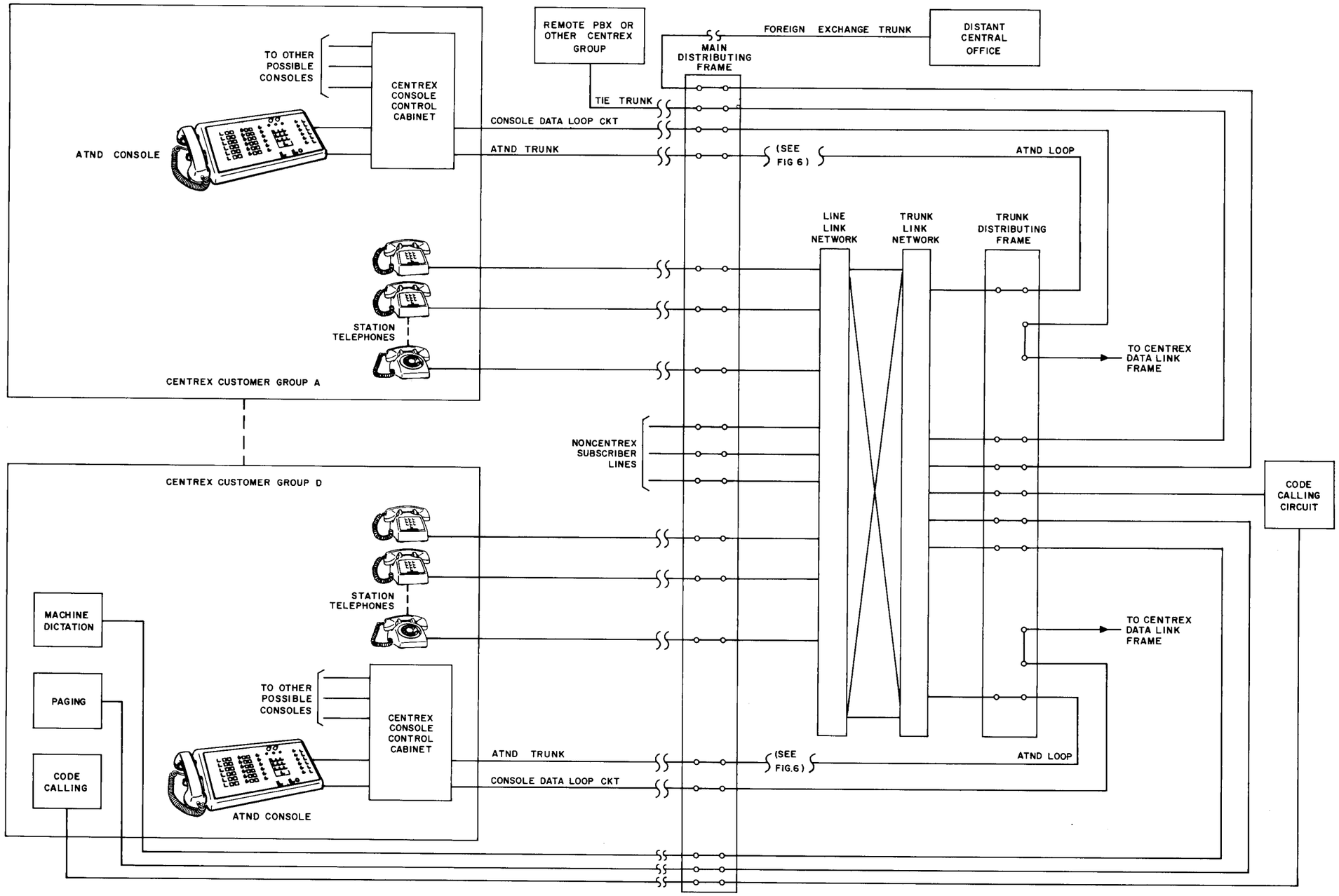


Fig. 28—Centrex Connections to a 2-Wire No. 1 and 1A ESS Switching Network

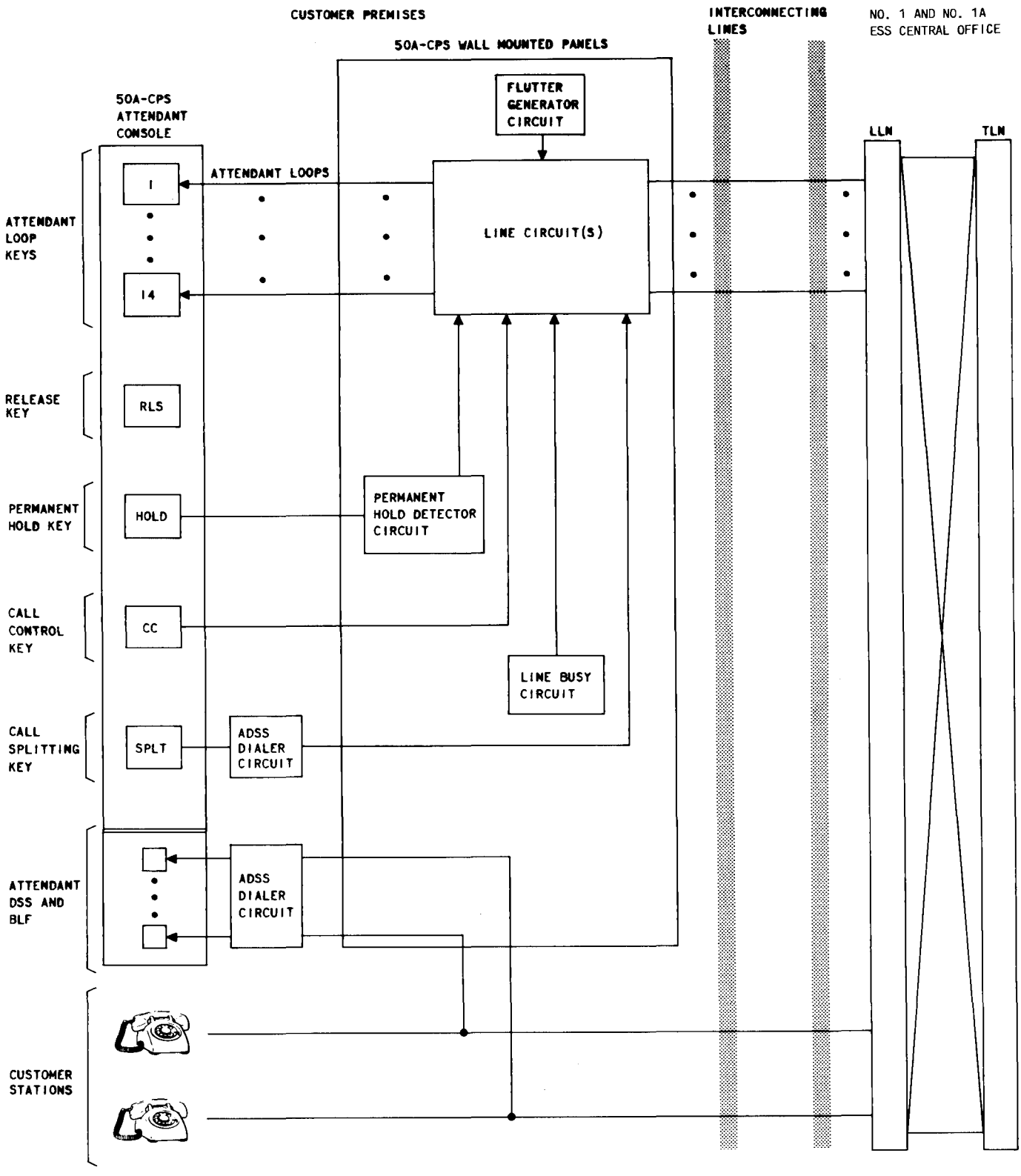


Fig. 29—50A CPS—Block Diagram

console transmits TOUCH-TONE signals to the CO when the attendant DSS key (on a 131- or 151-type console) associated with a station line is momentarily operated. The attendant DSS circuit is also used to signal the CO to split a call (one way) when the SPLT key is operated. In this case, the SPLT key must be located in the control key portion of the console.

(g) ***Split Key Circuit:*** This circuit, located in the console, transmits a TOUCH-TONE signal to the CO to split the calling party from a call while the attendant is talking to the called party. The SPLT key on the 121-, 131- or 151-type console may be used with this circuit when attendant DSS is not provided but BLF is provided.

6.07 Reference should be made to Sections 981-300-100 and 540-580-301 for further information concerning the 50A CPS and attendant console's method of operation.

50B CPS

6.08 The 50B CPS (Fig. 30) works in conjunction with a No. 1 or No. 1A ESS central office (CO) to provide Centrex/ESSX-1 attendant services. The CO provides switching and translations for the 50B CPS loop circuits and for the customer stations which are external to the 50B CPS. Attendant features available with the earlier 50A CPS are available with the 50B CPS, plus additional features. One customer system may have up to 4 attendant positions with busy lamp field (BLF)/direct station selection (DSS) features or up to 16 attendant positions without BLF/DSS features. Each system is custom engineered for the desired features and traffic capability. A control unit provides a microprocessor controlled interface between the CO and system units. Any of three types of attendant consoles may be provided with more or fewer features to match the customer's requirements. If a console with BLF/DSS features is provided, scanner circuits monitor the customer station lines for busy status. Station busy status is displayed on the console.

7. REFERENCES

7.01 Reference should be made to the following sections for further information concerning Centrex/ESSX-1.

(a) Division 231-118 layer for No. 1 ESS or 231-318 layer for No. 1A ESS BSP sections or Division 231-048 layer for No. 1 or 1A ESS BSP sections for recent change procedures and overall procedures to build Centrex/ESSX-1 groups.

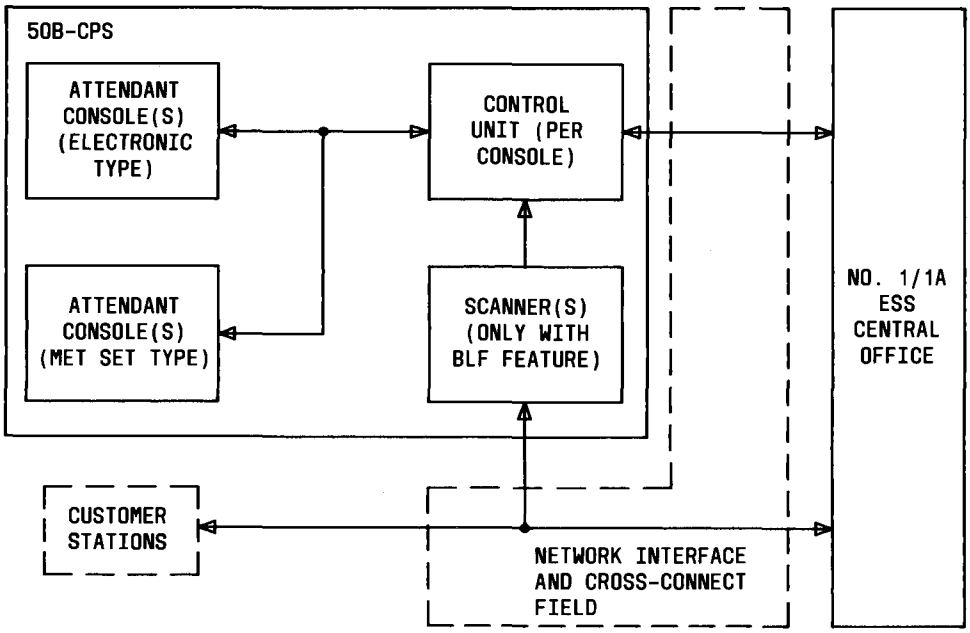


Fig. 30—50B CPS—Block Diagram

(b) Division 231-119 layer for No. 1 ESS BSP sections for growth procedures for centrex data link hardware.

(c) Section 533-110-101 for method of operations of the 1B-, 2B-, 27A-, and 47A-type attendant consoles.

(d) Section 540-580-301 for method of operations of the 121-, 131-, and 151-type attendant consoles.

(e) Division 540-580 layer for 50A CPS descriptive information.

(f) Division 533-000 layer for 50B CPS descriptive information.

(g) Division 533-110 layer for 51B CPS descriptive information.

(h) Section 231-090-011 for abstracts of feature documents for No. 1/1A ESS.

8. ABBREVIATIONS AND ACRONYMS

ACBC	Automatic Callback Calling
ACD	Automatic Call Distribution
ACMOS	Automatic Customer Message Outputting System
ACOF	Attendant Control of Trunk Group Access
ACSI	Automatic Calling Station Identification
ACTT	Attendant Call-Through Test on Centrex Trunks
ADSS/BLF	Attendant Direct Station Selection with Busy Lamp Field
AEMIS	ACD-ESS Management Information System
AEO	Attendant Emergency Override
AIOD	Automatic Identified Outward Dialing
AMA	Automatic Message Accounting
AMOS	Automatic Message Output Service
A&M	Additions and Maintenance
ANI	Automatic Number Identification
AUTOVON	Automatic Voice Network
BDN	Billing Directory Number
BLF	Busy Lamp Field
BVL	Busy Verification of Station Lines
BVT	Busy Verification of Centrex Trunks
CA	Call Answering
CC	Central Control
CCSA	Common Control Switching Arrangement
CDAR	Customer Dialed Account Recording
CFBL	Call Forwarding Busy Line
CFDA	Call Forwarding Don't Answer
CFG	Customer Facility Group
CFILB	Call Forwarding Inhibit Line Busy
CFIMB	Call Forwarding Inhibit Make Busy
CFO	Call Forwarding Outside
CFOV	Call Forwarding Overflow
CFPF	Call Forwarding over Private Facilities
CFV	Call Forwarding Variable
CFUS	Call Forwarding Unrestricted Source
CHD	Call Hold
CIS	Customer Information System

CNCC	Customer Network Control Center
CO	Central Office
CPS	Customer Premises System
CPU	Call Pickup
CRT	Cathode Ray Tube
CSACC	Customer Service Administrative Control Center
CSAID	Customer Identification on AMA
CSRAF	Common System Recorded Announcement Frame
CTRF	Selected Traffic Data to Customer
CTX	Centrex
CU	Customer Unit
CWI	Call Waiting—Intragroup
CWO	Call Waiting—Originating
CWT	Call Waiting—Terminating
DCW	Dial Call Waiting
DCT	Digital Carrier Trunk
DDD	Direct Distance Dialing
DID	Direct Inward Dialing
DOD	Direct Outward Dialing
DLIO	Data Link Input/Output Control
DLSQ	Data Link Sequencing
DN	Directory Number
DPNB	Directed Call Pickup—Nonbarge-In
DPRP	Dial Pulse Repeating Diagnostics
DPU	Directed Call Pickup with Barge-In
DRNG/DCWT	Distinctive Ringing/Distinctive Call Waiting Tone
DRTC	Different Route for Transferred Call
DRTT	Dial Repeating Tie Trunks
DSS	Direct Station Selection
ERCO	Extended Ringing Cycle Option
ESS	Electronic Switching System
ETN	Electronic Tandem Network
ETS	Electronic Tandem Switching
FRS	Flexible/Automatic Route Selection
FX	Foreign Exchange
GMB	Group Make-Busy
HL4W	HILO 4-Wire Switching
IAC	Improved Authorization Codes
IBDN	Individual Billing of Directory Number
ICI	Incoming Call Identification
INID	Immediate Diversion Network Indicating
IRES	Inquiry and Response System
LDN	Listed Directory Number
LED	Light Emitting Diode
LEN	Line Equipment Number
LHTO	Local and HILO TOUCH-TONE Outpulsing
LLN	Line Link Network
LONAL	Local Off-Network Access Line
LUTS	Locked-Up Trunk Scan
MCF	Multiple Call Forwarding
MET	Multibutton Electronic Telephone

MLHG	Multiline Hunt Group
MPTY	Multiparty and Coded Ringing
MMCF	Meet-Me Conferencing
MSAC	Main-Satellite AUTOVON Compatibility
MTS	Message Telecommunications Service
MTTP	Manual Trunk Test Position
MUPH	Multiple Position Hunt
NPA	Numbering Plan Area
NUTS	Non-Usage Trunk Scan
ONAC	Off-Network Access Line
ONI	Operator Numbering Identification
PBX	Private Branch Exchange
PDL	Peripheral Unit Controller Data Link
PID	Precedence Network In-Dialing
PIU	Processor Interface Unit
PNAL	Private Network Access Line
PNID	Preceding Network In-Dialing
POTS	Plain Old Telephone Service
PUC	Peripheral Unit Controller
QTL	Queueing for Trunks and Lines
RA	Route Access
RMB	Random Make Busy
RNGR	Ring Reminder
SADA	Service After Delay Announcement
SBAC	Source Billing of Attendant Handled Calls
SCCOF	Selected Customer Control of Facilities
SEMI	Semirestricted Centrex Station Class
SMDR	Station Message Detail Recording
SMRS	Station Message Register Service
SP	Signal Processor
STAR	Silence, Tone, or Audible Ringing
STDN	Satellite Transfer Directory Number
TAS	Trunk Answer from Any Station
TATO	Automatic Time-Out of Announcement and Tones
TCM	Traveling Class Mark
TGBL	Trunk Group Busy Lamp
TLN	Trunk Link Network
TOLD	Toll Diversion to Attendant
TTY	Teletypewriter
TWX	Teletypewriter Exchange
UCD	Uniform Call Distribution
USOC	Uniform Service Order Code
VCFDA	Call Forwarding Don't Answer with Variable Timing
WATS	Wide Area Telecommunications Service
WTAD	WATS Administration