FEATURE DOCUMENT

ENHANCED PRIVATE SWITCHED COMMUNICATIONS

SERVICE FEATURE

2-WIRE NO. 1 ELECTRONIC SWITCHING SYSTEM

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INTRODUCTION

1. GENERAL INFORMATION

SCOPE

1.01 This Bell System Practice provides the overall description of the Enhanced Private Switched Communications Service (EPSCS) feature.

REASON FOR REISSUE

1.02 This document is reissued to provide coverage for EPSCS phase 2, available with No. 1

ESS 1E6 generic programs. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

FEATURE AVAILABILITY

1.03 The EPSCS feature is available with the 1E5 and later generic programs of the No. 1 ESS. EPSCS is not available with the No. 1A ESS.

2. DEFINITION/BACKGROUND

DEFINITION

2.01 The Enhanced Private Switched Communications Service is a private switched network of dedicated facilities providing full duplex communication on all connections. EPSCS is unique in that, in addition to features of other private network systems, it provides 4-wire transmission within the network; it utilizes exclusively the No. 1 ESS equipped with the HILO 4-Wire Switching feature which provides equivalent 4-wire switching. It also provides the customer with a Customer Network Control Center (CNCC) from which the customer can implement and monitor control functions relative to the performance of the network.

BACKGROUND

2.02 Enhanced Private Switched Communications Service is intended for major corporate customers who have a significant dependence on communications in the transaction of its business. The communication needs of these customers are most nearly met by private, dedicated networks. Satisfying the needs of these special customers is the objective of EPSCS.

2.03 Major advantages afforded to the customer by EPSCS are as follows:

(a) The customer can control and manage the use and operation of certain traffic features.

(b) The service and facilities can be of the highest quality available and can be made to more nearly match the customer needs.

(c) The customer is relieved of costly capital outlays and obsolescence.

(d) The customer can manage and allocate communication costs in line with the desired level of service.

2.04 EPSCS is complex in terms of the number of features provided. Because of this complexity, the EPSCS feature is described in a series of feature documents.

2.05 The feature documents describing EPSCS include an overall system document and a number of separate feature documents that warrant description on an individual basis.

2.06 This document describes the No. 1 ESS capabilities which are used to provide EPSCS. ***No attempt is made to define the appropriate intrastate or interstate tariff(s) under which EPSCS is provided. Care must be taken when implementing an EPSCS arrangement to ensure that the arrangement is consistent with the tariff(s) currently in effect.***

2.07 The elements and aspects of EPSCS described in this document are as follows:

(a) Station-to-station calling

(b) Uniform numbering plan

(c) Network calling

(d) Off-network calling

(e) Circuit assurance

(f) Tones and announcements

(g) Call routing

(h) Direct connect calling (off-hook calling)

(i) Bypass access lines

(j) Restriction capabilities.

2.08 Additionally, this document describes the EPSCS interface with the 2-wire No. 1 ESS. For those cases where a No. 1 ESS is serving as the business customer's switch, details of the actions required within the switch to access EPSCS are

given. A brief description of the following features is also included:

(a) Meet-Me Conferencing—reference A(1) in Part 18

(b) Network Trunk Queueing—reference A(2) in Part 18

(c) Network Message Detail Recording to Customers—reference A(3) in Part 18.

(d) Customer Network Control Center Interface—reference A(4) in Part 18

(e) Network Data Transmission—reference A(5) in Part 18

(f) Direct Access Lines, 4-Wire—reference A(6) in Part 18

(g) Off-network calling using TOUCH-TONE® and dial pulse outpulsing—reference A(7) in Part 18

(h) User-Dialed Authorization Codes—reference A(8) in Part 18

(i) Automatic Time-Out of Announcements and Tones—reference A(9) in Part 18

(j) Interface Peripheral Data Processor—reference A(10) in Part 18

(k) Selected Traffic Data to Customer—reference A(11) in Part 18

(l) Automatic Calling Station Identification (ACSI)—reference A(30) in Part 18

(m) Network Attendant Service (NEAT)—reference A(32) in Part 18

(n) Traveling Class Marks (TCM)—reference A(26) in Part 18.

2.09 The capabilities and features listed in paragraphs 2.07 and 2.08 constitute EPSCS including EPSCS phase 2 improvements. This service incorporates many features associated with the Common Control Switching Arrangement (CCSA) feature and must be provided in conjunction with the HILO 4-Wire Switching feature. Thus, EPSCS is closely associated with these two features covered in references A(12) and A(24) in Part 18, respectively. An understanding of HILO and CCSA will aid in the comprehension of EPSCS.

2.10 A typical EPSCS network is depicted in Fig. 1. As indicated in the figure, there are two separate networks serving the customer:

(a) A dedicated message transmission network interconnecting shared switches for customer communications

(b) A shared monitoring and control network including a dedicated Customer Network Control Center (CNCC).

2.11 All circuit facilities comprising an EPSCS network are totally dedicated to the customer being served. The switching centers are No. 1 ESS offices shared by EPSCS customers and may also serve as Message Telecommunications System (MTS) switching centers. The selected switching centers may also serve as points of access and exit between the private networks and the MTS network.

2.12 Although the No. 1 ESS switching center may be shared with other EPSCS customers as well as the MTS network, dedicated circuits are provided for each EPSCS customer. Figure 2 identifies the elements associated with EPSCS, either on a per switch basis or a per network basis. The dedicated circuits provided by the switching center for each customer are as follows:

(a) Network trunks

(b) PBX access lines

(c) Centrex access lines

(d) Direct access lines

(e) Off-network access lines (ONALs).

2.13 The customer monitoring and control network consists of the Peripheral Data Storage Processor (PDSP), the monitor and control data links, the CNCC, and the Customer Service Administrative Control Center (CSACC). These elements are shown in Fig. 2 and in the network configuration depicted in Fig. 1.

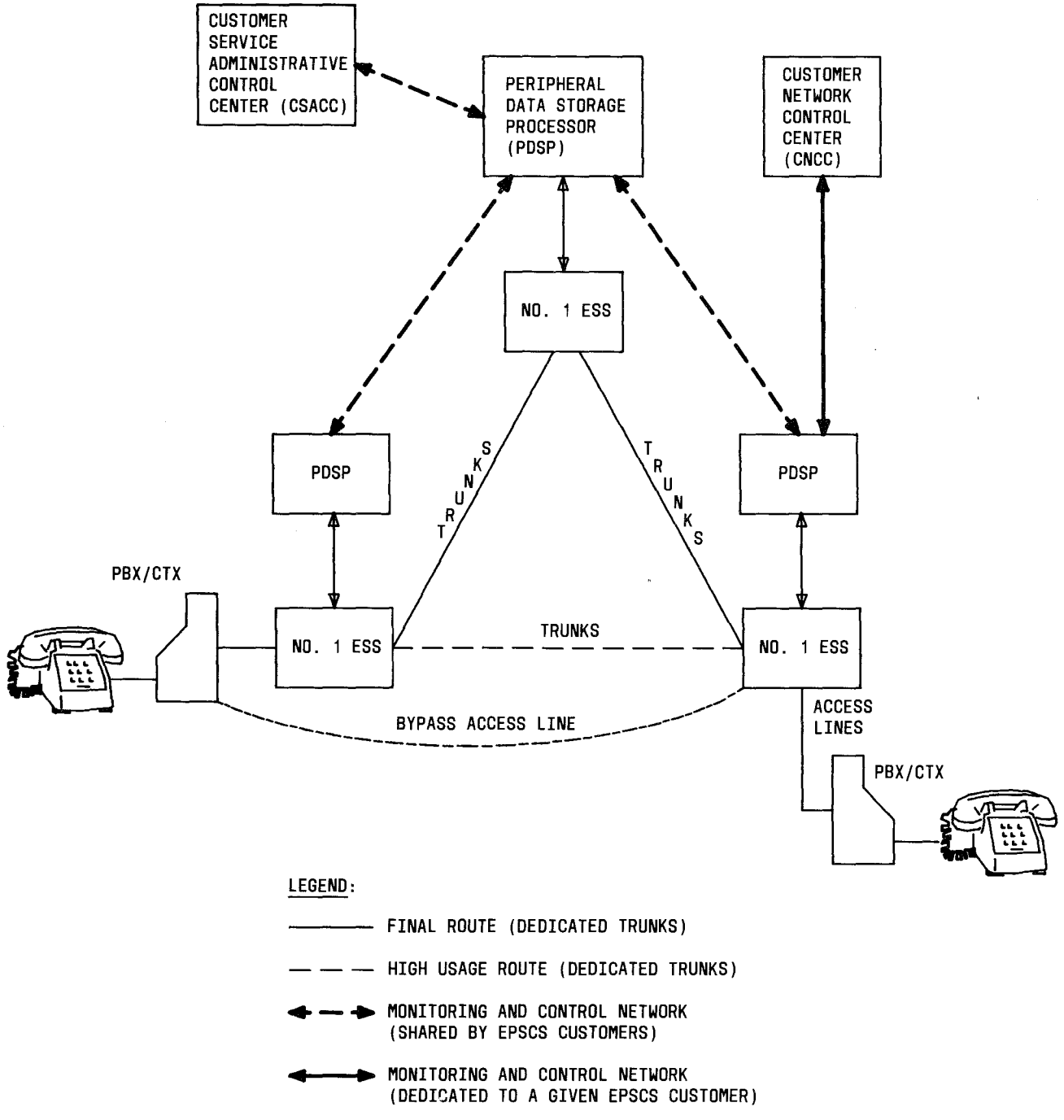


Fig. 1—Typical EPSCS Network

2.14 The customer monitoring and control network interfaces with the EPSCS No. 1 ESS processor via the PDSP and transmits monitor and control messages between the No. 1 ESS and the CNCC. Data transmitted to the CNCC is also sent to the CSACC. The PDSP and the data links are shared facilities in that a number of customers may be served by these facilities.

2.15 The PDSP consists of interfacing hardware with the No. 1 ESS and data links that are located on the peripheral interface frame and the

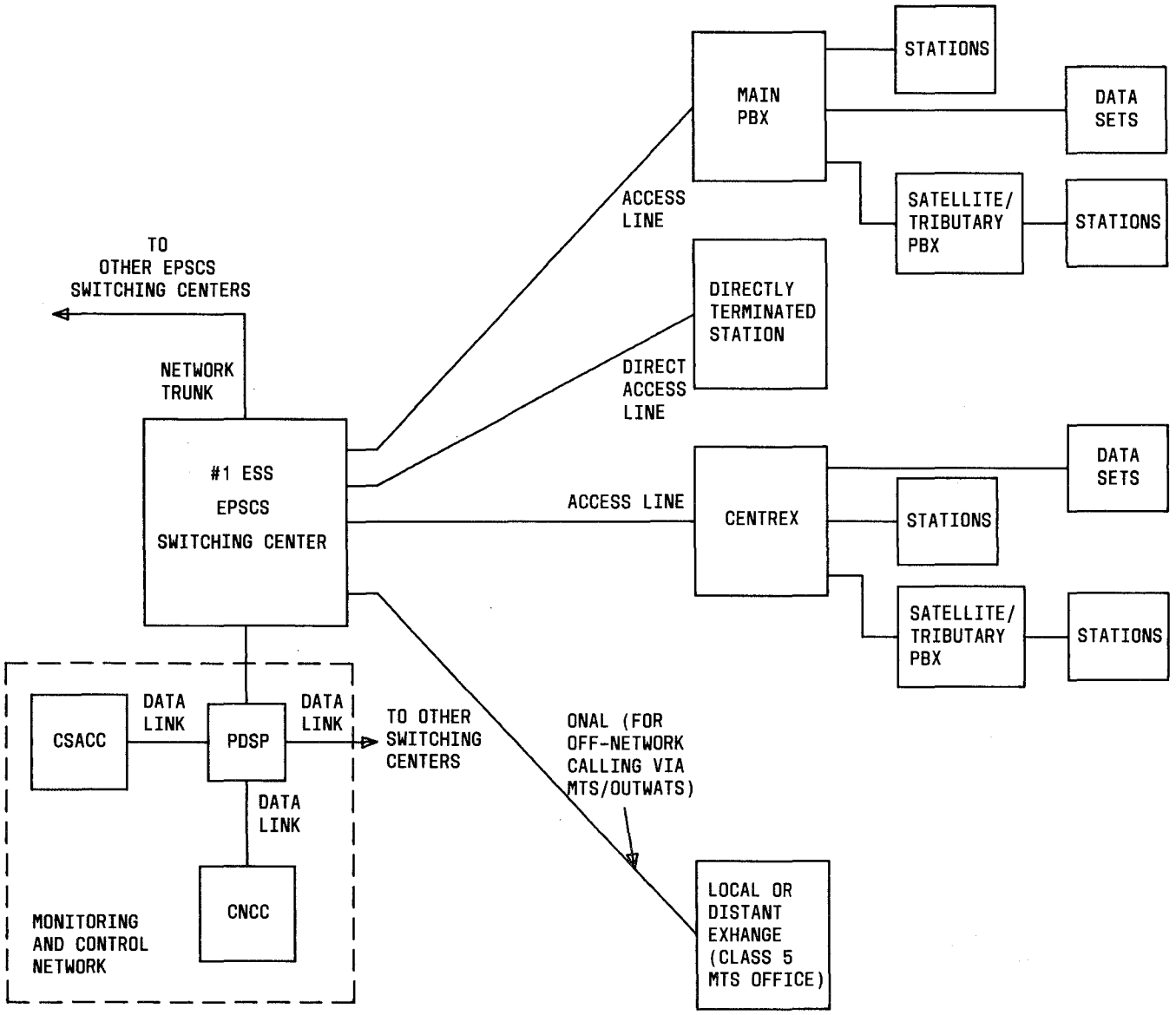


Fig. 2—EPSCS Network Elements

3A auxiliary processor as shown in Fig. 3. The 3A auxiliary processor serves as the interface between the No. 1 ESS and the monitor and control data links. The EPSCS configuration uses full-duplex asynchronous data transmission. The required data is received from No. 1 ESS and is processed, formatted, and address routed via the data links to CSACC and CNCC. Messages from the CNCC and CSACC to the No. 1 ESS are received, processed, formatted, and routed to the proper switch(es) in the network.

2.16 At least one CSACC serves all EPSCS networks and is responsible for overall coordination of maintenance, installation, and rearrangement activity on all customer networks. It serves as the single point of contact with customers for network-related trouble reporting.

2.17 One CNCC per customer network is provided on the customer premises and may be equipped with displays, printers, magnetic tape recorders, cathode ray tubes (CRTs) with keyboards,

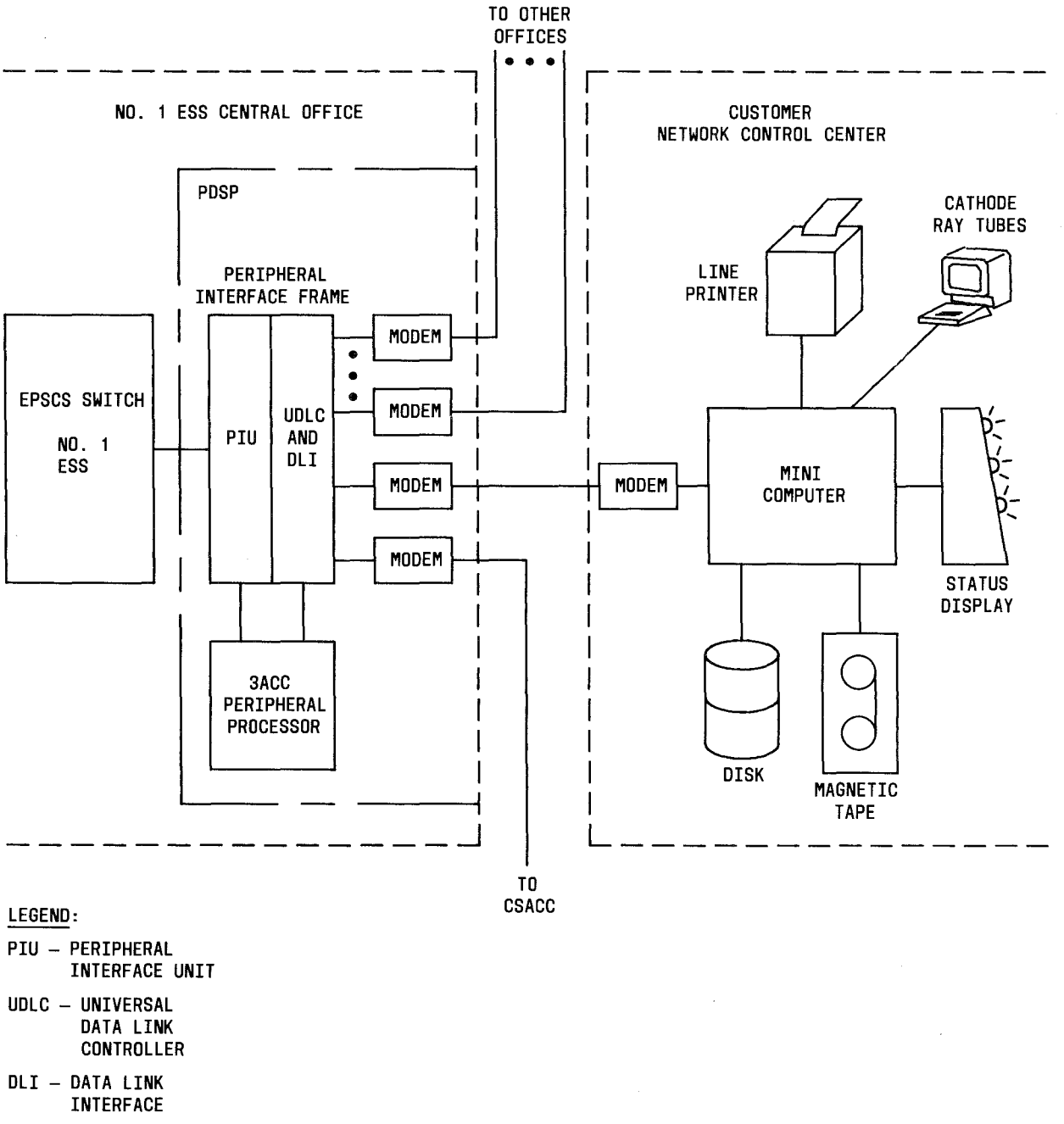


Fig. 3—PDSP in Control and Monitor Network

and a minicomputer. Data received at a given CNCC pertains only to the associated customer's EPSCS network. The CNCC is manned by customer-provided personnel who may perform any of the following functions:

(a) Exercise selective network controls for routing and screening changes to the network

(b) Determine traffic and maintenance status of the network

(c) Collect sufficient data to permit internal allocation of the cost of the network.

2.18 The CNCC, though capable of communication to and from network switching centers, is

isolated from the call processing activities of the No. 1 ESS.

GENERAL FEATURES

2.19 EPSCS provides the customer with access to many of the features and capabilities now available with electronic switching. Additionally, updated capabilities and techniques introduced into MTS service are also available to the EPSCS customer. Consequently, the EPSCS network does not suffer obsolescence. Features such as conference calling, economical off-network and time-variable routing, user-dialed authorization codes, special recorded announcements, data-switching capabilities, status and usage data, and management and control capabilities are of particular interest to large corporations and are available to individual customers based on their requirements.

2.20 The standard and optional features available to the EPSCS customer are classified as basic features, traffic efficiency features, customer control features, and data handling features. A brief description is given below.

Basic Features

2.21 ***Uniform Numbering Plan***—Every station in the customers network is assigned a unique 7-digit number.

2.22 ***Station-to-Station Calling***—Any station on the network can be dialed by any other network station via dial pulse or TOUCH-TONE® signaling. On-network calls are initiated by dialing the 7-digit network number (or in certain cases a special 3-digit number) of the called station after gaining access to the network.

2.23 ***Off-Network Calling***—If off-network capabilities are included in the EPSCS network, off-network locations are reached by dialing the 10-digit MTS number after gaining access to the network.

2.24 ***Audible Tones and Standard Announcements***—The network provides a complement of call-progress tones and announcements. Dial, busy, overflow, and audible ringing tones are standard in the network. All switching centers provide standard announcements advising the caller of unassigned and denied authorization codes as well as nonworking or inaccessible numbering plan areas (NPAs) or NNX codes. In addition, certain tones and announcements may be provided by business service switching vehicles.

2.25 ***Bypass Access Lines(s)***—A one-way access line group from any EPSCS network originating switching center to any customer location may be established, allowing a call to bypass the terminating switching center. If this access line group is busy, the call may utilize "normal" routing which involves the terminating network switching center serving the particular location.

2.26 ***Access to Customer-Provided Network Attendant***—The EPSCS switching center permits routing of calls from the MTS, and the private network to a customer provided network attendant. Although the feature is intended mainly for calls from off the network, stations on the network may also reach the attendant by dialing a standard 7-digit code or a special 3-digit code.

2.27 ***Conferencing (Optional)***—"Meet-me" type conference call connections can be provided for up to six network conferees.

2.28 ***Special Recorded Announcements (Optional)***—A customer-formulated recorded announcement may be provided at each switching center.

Traffic Efficiency Features

2.29 ***Automatic Alternate Routing***—When three or more network switching centers are provided for a customer, a sequence of high usage and final intramachine trunk groups may be provided at each switching location. When the customer's first choice route is busy, an alternate route(s) is attempted.

2.30 ***Automatic Off-Network to On-Network Express Calling***—A call originating off-network and placed to a specially designated ONAL is automatically forwarded to a predetermined on-network number.

2.31 ***Off-Network to On-Network Calling Via Network Attendant***—Off-network MTS calls to a designated ONAL group are automatically connected to the network attendant serving that switching center. The network attendant answers and may extend the call. The

attendant must remain on the call until ringing occurs to the extended destination.

2.32 ***Automatic On-Network to Off-Network via Customer Premise Switching System***—A call dialed to an off-network number by an on-network user may be routed off-network via an access line, a customer premise switching system, and a line to the local serving central office.

2.33 ***Economic Route Selection (Optional)***—Each EPSCS switching center is capable of routing calls destined for the MTS over the most economic route. Calls are routed over the private network to the appropriate switching center (which could be the originating switching center); then a sequence of up to four routes (one primary and a sequence of three alternate routes) can be provided for completing these calls. Upon encountering a busy condition on the primary route, the call will automatically be offered to the first choice route in the sequence of alternate routes and so on for completion. Sequences are predetermined by the customer.

2.34 ***Time-Variable Routing***—Each customer is provided with up to three predetermined traffic-routing patterns for both on- and off-network calls. Shifts in patterns can be made at any time of the day by the customer at the CNCC and will effect all switches in the network.

2.35 ***Network Queueing (Optional)***—When all primary and alternate routes are busy, facility utilization is increased by placing calls in an off-hook queue. Queueing is controlled at the CNCC for traffic management and overload protection.

2.36 ***Off-Hook Calling (Optional)***—Any station terminated by a direct access line that is so authorized and equipped can, upon seizure of the line, automatically initiate a call to a predetermined on- or off-network number.

2.37 ***Originating Call Screening (Optional)***—EPSCS switching centers can be arranged to deny call origination from specified customer locations (by access line group) to specified network codes (NXXs) or NPAs.

2.38 ***Off-Network Routing Control (Optional)***—A screening arrangement can be provided in order to access each NPA via an off-network EPSCS switching terminal (except for calls routed over WATS). This screening may be necessary to make calls compatible with the public exchange network (e.g., prefixing the digit 1) and/or to deny calls to certain NXXs within the NPA, and to select a proper route on multiple ONAL groups to an NPA when provided.

2.39 ***Traveling Class Marks (Optional)***—This feature provides a 2-digit identifier to be passed with all calls traveling over network trunks for the purpose of passing class of service type information to all switches within the EPSCS network.

Customer Control Features

2.40 ***Customer Network Control Center (21A Customer Premise System)***—A customer premises facility used to monitor and control some network operations and to obtain usage and status information automatically and on demand.

2.41 ***Network Message Detail***—Each switching center in the network records basic information relative to each call attempt for customer administrative and engineering purposes. This information consists of originating call/message details on all originating calls. Terminating records are made for off-network calls going off-network at any switch other than originating switch involving more than one EPSCS switching center. If a call goes off-network at the originating switch, only the originating record is made. The accumulated information is transmitted to the CNCC and the CSACC on a near real-time basis. The transmitted information is not retained at the EPSCS switching center; i.e., no office record is made. No message detail records are originated at intermediate switches.

2.42 ***Voice Channel Availability Monitoring***—Automatic circuit testing assures detection of troubles. Tests include routine transmission tests, analysis of circuit usage for abnormal patterns, and operational tests on call setup. Out-of-service circuits are reported to the CNCC and CSACC on a near real-time basis.

2.43 ***Traffic Measurements***—Traffic data is recorded at each EPSCS switching center on all circuit groups appearing in that switching center; queue counts are also made when the queueing feature is provided. The data is summarized

at each EPSCS switching center at fixed time intervals and transmitted to the CNCC for customer use. The summarized data is also transmitted to the CSACC.

2.44 ***Class of Service Restricting***—Class of service restrictions are provided at each switching center to permit various calling capabilities on individual access line groups. The user's class is based on the user's identity (access line group or authorization code).

2.45 ***User-Dialed Authorization Codes (Optional)***—The user, after dialing the called number, is notified via recall dial tone, to dial an identification number. The identification number is included in the message detail record. Recall dial tone is 3 short bursts of tone (100 msec. on, 100 msec. off) followed by steady dial tone. Call privileges will be set according to class of service restrictions associated with the authorization code. Two arrangements are available as determined by customer and are discussed in detail in reference A(8) in Part 18. They are consecutive authorization codes or ordered (nonconsecutive) authorization codes.

2.46 ***Automatic Calling Station Identification (Optional)***—This feature allows for identification of the EPSCS customer and the station user on each originated call. For centrex-CO locations, the station identification is transmitted automatically on the access line group to the EPSCS switch using the Automatic Identified Outward Dialing (AIOD) feature and a new advanced private line termination (APLT) circuit. For more details refer to A(30) in Part 18.

Data Handling Features

2.47 ***Switched Voiceband Data***—Using voiceband channels on network access lines, EPSCS switching centers can provide 2-way data transmission, operating in a circuit switched mode, between main customer switching centers at rates of less than or equal to 4.8 kilobits per second (KBS). For more details refer to A(36) in Part 18.

DESCRIPTION

3. USER OPERATION

CUSTOMER

A. Customer Dialing Procedures

3.01 Each user station has a unique telephone number. This number consists of a network code (NNX) plus a 4-digit station number. An individual station may home on a network switching center either by an access line group, if the station is at a PBX or centrex location, or by direct connection to the switch. The user dialing procedure depends on (a) whether an access code is required, (b) whether the call is either on- or off-network, and (c) whether an authorization code is required for the specific call. The customer dialing procedure is summarized by the general format given in Fig. 4.

3.02 A station user, except a direct access station, typically dials a single-digit access code (more than a single digit if the user is at a tributary PBX) to place an on- or off-network call (typically digit 8). After the proper access code has been dialed, a dial tone is returned to the calling station from the EPSCS switch, at which time the caller dials the 7-digit number consisting of the network NNX plus the 4-digit station number. If the called party is off the network, then a 10-digit MTS (NPA-NXX-XXXX) number is required. The off-network call is routed through network switch(es) and then to an OUTWATS office, exchange office, or PBX for completion.

3.03 A station terminated directly on the network receives dial tone after going off-hook; an access code is not required. An authorization code is required when indicated by the customer.

3.04 Station-to-station calls at a given customer location are not routed through the EPSCS network switch.

B. User-Dialed Authorization Codes

3.05 Authorization codes can be imposed on any user accessing the private network from a PBX, centrex, or direct access line. If an authorization code is required, the caller receives recall dial tone. On receipt of this tone, the caller dials a 3- to

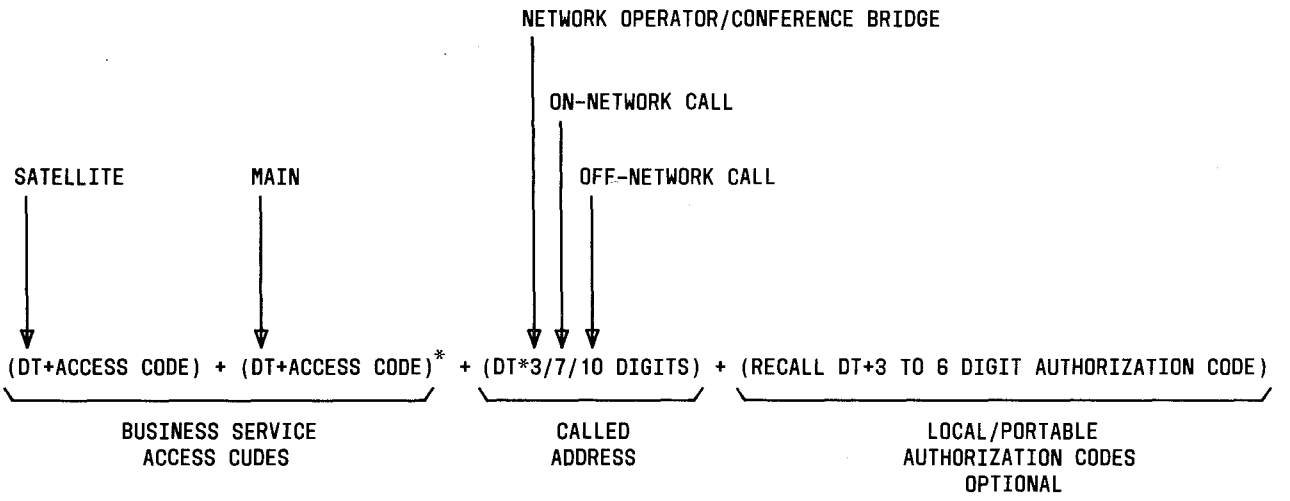


Fig. 4—Call Origination Dialing Format

6-digit authorization code. A correct authorization code for the particular access line group and called number results in normal completion of the call. If an invalid authorization code consisting of the correct number of digits is dialed, the call is routed to an announcement or tone as specified in the network. An invalid authorization code resulting from insufficient digits being dialed is given standard partial-dial treatment, resulting in reorder.

C. Standard Tones and Announcements

3.06 Network users are given the status of call progression by standard tones and announcements generated by the local network switch. A standard recorded announcement advises the user of unassigned or invalid network NNX or NPA codes dialed and denied authorization codes. Also, nonworking or inaccessible numbers are indicated to the user by standard announcements from the business customer switch. If a user fails to go on-hook within a predetermined period of time after being routed to busy, overflow, or other tones and announcements, an automatic time-out occurs. This releases the tone and announcement trunks for use by other calls. A user connected to a tone or announcement (subject to the time-out treatment) receives dial tone and eventually receives permanent-signal partial-dial treatment if the tone or announcement was locally generated. If the tone or announcement was generated by a distant office, the user encounters silence after the time-out. This capability is provided via the Automatic Time-Out of Announcements and Tones (TATO) feature. [See reference A(9) in Part 18.]

3.07 The tones applicable to the EPSCS feature are listed and defined in Table A. Standard announcements are listed in Table B.

D. Routing and Code Screening

3.08 EPSCS provides flexibility in the modification of the normal call routing based on the identity of the caller. For network access lines, routing may be based on:

(a) An authorization code dialed by the calling party.

(b) The access line group over which the call is originated.

3.09 For direct access lines, the calling station is uniquely identified by its appearance at the network switching machine; in some cases authorization codes may be required.

3.10 Each identifiable entity is assigned a class of service in the network switch. The class

TABLE A

STANDARD TONES APPLICABLE TO EPSCS

TONE	FREQ (Hz)	INTERRUPT RATE (NOMINAL)	USE
Dial	350 + 440	Steady	Orginating trunk seizure
Recall dial tone	350 + 440	3 Bursts (100 ms on, 100 ms off, then steady)	Indicates authorization code to be dialed
Audible ringing	440 + 480	10 IPM (2 seconds on, 4 seconds off)	Called station ringing
High	480	1-second burst	Conferencing preemption
High	480	100-ms burst	Party entering/leaving the conference
Busy	480 + 620	60 IPM (0.5 second on, 0.5 second off)	Called number is busy
Reorder	480 + 620	120 IPM (0.3 second on, 0.2 second off)	Try call again; incorrect authorization code

of service defines the features available and codes dialable by any station in that class. There is a maximum of 32 classes of service available per customer. Sixteen of these may be used with stations identified by authorization codes. An example of code dependent calling privileges is given in Table C. Table D lists station or access line group features.

E. Originating Call Screening

3.11 Calls from specified customer locations to certain network NNXs or NPAs may be allowed or denied by screening based on the access line group or authorization code. One possible use of screening is to prohibit on-network calling between locations in the same city, thereby reducing uneconomical use of the network.

F. Automatic Calling Station Identification

3.12 When ACSI is provided, the calling station is uniquely identified by its extension number which is automatically transmitted to the EPSCS switch for MDR recording. For further details see reference A(30) in Part 18.

G. Network Queueing

3.13 The efficiency of network circuits may be increased by providing an off-hook queueing feature for network users. This allows a user to be placed on a waiting queue for the primary routes if all primary and alternate routes are busy.

3.14 The user can be placed on waiting queue only after going off-hook and dialing the called address and authorization code, if required, and only if all circuits capable of completing the call are busy, including alternate routes.

3.15 While in queue, a tone, music, or silence may be given to indicate all lines are momentarily busy. To remain on queue, the user simply remains off-hook, and if a route becomes available prior to exceeding the customer specified time limit, the call proceeds to completion or busy. To avoid going on queue or remaining on queue, the user goes on-hook. If a call remains on queue longer than the customer-specified time limit, the user is removed from the queue and given a reorder tone indicating that the call should be attempted at a later time.

TABLE B

EPSCS STANDARD ANNOUNCEMENTS

ORIGIN	FACILITY	ANNOUNCEMENT	USE
Customer premises	Business Customer CO/CU	"You have reached a nonworking number at the (firm name) company. For assistance, please dial (customer's number). If using the (EPSCS network name) network, dial (EPSCS listed number). This is a recording." (See Note 1.)	User dials a vacant or disconnected station number.
Customer premises	Dial PBXs	"The number you have reached is not in service at this time. If you need assistance, please hang up and dial your network operator. This is a recording." (See Note 1.)	User dials a vacant, changed, or disconnected number.
First network switch encountered	EPSCS	"I'm sorry, we are unable to complete your call as dialed. Please check the number and dial again or ask your network operator for assistance. This is a recording. SCC ____." (See Note 2.)	Dialing of vacant 1XX, NXX, and NPA codes (first 3 digits dialed).
Terminating switching center	EPSCS	"The number you have reached is not in service at this time. If you need assistance, please hang up and dial your network operator. This is a recording. SCC ____." (See Note 2.)	A vacant station number (last four digits) is received on a call to a directly terminated access line.
All switching centers	EPSCS	"The digits dialed are not valid. Please check the number and dial again. If you need assistance, please hang up and dial your network operator. This is a recording. SCC ____." (See Note 2.)	Originations denied due to: (a) ORIG call screening (b) Invalid authorization code (c) AC treatments (d) Special screening.

Note 1: As an alternative to the recorded announcement, these misdirected calls may be routed to the network attendant.

Note 2: Announcements associated with EPSCS switching center should end with the switching control center (SCC) 3-digit code, e.g., the Chicago SCC is 201.

3.16 Users with certain assigned authorization codes, as well as meet-me conference calls, will be given priority queueing which allows these calls to be placed at the head of a queue.

H. Direct Access Lines

3.17 Direct access lines (DALs) are provided via 4-wire connections from the station (individual telephone, keyset) directly to the network switch. DAL users can call anywhere on the private network or off-network to MTS stations unless restricted by screening established by the customer. A station terminated by a DAL, unlike other EPSCS network stations, does not have an MTS number assigned; thus, DAL stations may be called only via the EPSCS network. Since DALs terminate at a network switch, access codes are not required.

TABLE C

CODE DEPENDENT CALLING PRIVILEGES

CALLING PRIVILEGES	COMMENTS
Selected on-network	Only a portion of the on-network codes are allowed; off-network codes are not allowed
Full on-network codes (with priority queueing)	All on-network calls are allowed; off-network codes are not allowed
On-network codes plus selected off-network codes	All on-network codes and some off-network codes are allowed
Full network dialing (with priority queueing)	All on-network codes and off-network codes are allowed
Conference bridge N	Conference bridge N can be reached
Data traffic	Calls restricted to certain specially conditional circuits

TABLE D

STATION/ACCESS LINE GROUP FEATURES

FEATURES	COMMENTS
Off-hook dialing (direct-connect)	Direct access lines only
Priority queueing	Can be associated with either a station/access line group or an authorization code treatment
Data traffic	Specially conditioned circuits
Authorization codes	Authorization codes may be used to allow/deny certain calling privileges
1-way/2-way circuits	

Direct Connect (Off-Hook Calling)

3.18 DALs may be equipped with automatic dialing via the Direct Connect feature. This feature permits the user to reach a predetermined destination simply by taking the handset off-hook. No dialing is required. Only one number can be called from each of these lines. Normally, stations terminated by direct connect are not equipped with a dial, and the user does not receive a dial tone. The called number associated with each line is stored at the network switch and therefore can be changed only by the telephone company at the request of the customer. Normal call progress tones apply to calls initiated over a DAL arranged for direct connect. A call terminating over a DAL arranged for direct-connect calling is treated the same as any other DAL terminating call.

DAL Via Special Codes

3.19 Although normally reached by dialing the 7-digit station number, it is possible to assign a 3-digit code for termination to a DAL.

I. Off-Network Access Lines

3.20 Off-network access lines (ONALs) provide 2-way communications between the private network (EPSCS) and an MTS switch(s). ONALs are provided per customer specification. If more than one ONAL group is provided from a given EPSCS switch to MTS, the customer specifies the sequence in which the ONAL groups are accessed. The second and subsequent choice groups are accessed only if all ONALs in the previous choice group are busy. For on- to off-network calling, the EPSCS station user dials a 10-digit MTS directory number (NPA + 7 digits). Calls off-network are normally routed to their destination as far as possible over EPSCS facilities before MTS facilities are used.

3.21 For off- to on-network calls, the user dials the assigned MTS directory number for ONAL access. The call is routed to a class 5 office that has an ONAL to an EPSCS switch, and subsequently forwarded to the EPSCS switch where it is processed in one of two ways as determined by customer option:

(a) The call is routed to a network operator. The user hears audible ringing from the MTS office until the network operator answers. Upon answering, the operator determines the on-network station being called as well as the caller's right to place the call. The operator completes an accepted call.

(b) The call is routed directly to a specific station. The caller hears audible ringing from the MTS office until the specific station answers.

3.22 An on-network user making an off-network call dials the 10-digit MTS number (NPA+NXX-XXXX). The on-network caller is unaware of the call-routing method which can occur in one of three ways:

(a) An ONAL to a local or distant exchange.

(b) A WATS ONAL.

(c) A network access line via business customer switch. The EPSCS switch will transmit a code, usually the digit "9", to "cut through" the business customer switch to a class 5 MTS office and then transmit the called number.

J. Conferencing

3.23 The Meet-Me Conference feature allows up to six parties to participate in a conference call by dialing a special network number, called a conference dial code, at a prearranged time. The conference dial code provides security and privacy for the conferees by insuring that only those parties dialing the assigned code are given access to the conference. Conferences are scheduled through the conference coordinator at the CNCC.

K. Network Attendant Feature

3.24 The Network Attendant feature provides a service arrangement which allows an EPSCS customer, having more than one business location, served by separate EPSCS switches, to concentrate attendants at one or more locations. Release link operation is used to access the attendant, to reduce facility usage, and improve transmission quality. This feature does not eliminate the local business attendant. This will be discussed further in Part 4. See reference A(32) in Part 18.

L. Traveling Class Marks (TCM)

3.25 The TCM is a feature that is optionally available to the EPSCS customer. This feature allows for a 2-digit code to be passed along with the called digits to aid in screening information to provide more economical use of expensive off-network facilities. For more details of this feature refer to A(26) in Part 18.

TELEPHONE COMPANY

3.26 Within a No. 1 ESS, EPSCS, MTS, and business service switching are completely separate functions. All interconnections between EPSCS switching and business service switching and/or between EPSCS switching and MTS switching are via physical circuits; ***simulated facilities are not used.*** If the office providing EPSCS switching (on the HILO 4-wire network) also provides business service switching for an EPSCS customer location and/or MTS switching for EPSCS off- to on-network or on- to off-network calling,

the required connections are via loop-around trunks. ***HILO intraprocessor trunks are not used.*** The recommended circuits to interconnect the HILO EPSCS network with the 2-wire No. 1 ESS network are given in Part 4 and in A(24) in Part 18.

3.27 The Simulated Facilities feature is used for the implementation of the optional off-hook queueing feature. This is the only use of the Simulated Facilities feature in the EPSCS network.

3.28 Circuit status for EPSCS is provided via the test facilities available to the HILO 4-wire network. These facilities include:

(a) The manual trunk test position (MTTP). For detailed information, see references A(14) and A(15) in Part 18.

(b) The remote office test line (ROTL). Remote testing is performed under the control of CAROT (centralized automatic reporting on trunks). For detailed information, see reference A(16) in Part 18.

(c) A full complement of test lines:

- Code 100 [Reference A(17) in Part 18].
- Code 101 [Reference A(18) in Part 18]. This test line is incorporated into the MTTP.
- Code 102 [Reference A(19) in Part 18].
- Code 103 [Reference A(20) in Part 18].
- Code 104 [Reference A(21) in Part 18].
- Code 105 [Reference A(22) in Part 18].
- Code 107 [Reference A(33) in Part 18].
- Code 108 [Reference A(23) in Part 18].

4. SYSTEM OPERATION

HARDWARE

4.01 With the exception of a few additional circuits, the hardware necessary for the EPSCS feature is the same as that provided by the HILO 4-Wire Switching feature. The hardware described in this part is only that introduced by EPSCS.

EPSCS HARDWARE

A. Message Trunk Circuits

4.02 As indicated in the HILO 4-Wire Switching feature document, a full complement of incoming, outgoing, and 2-way message trunk circuits are provided for the HILO feature. Table E identifies the trunk circuits required to implement EPSCS in a HILO 4-wire office.

Direct Access Line Trunk Circuit

4.03 A DAL is an SD-1A364 trunk circuit and is designed for use with F-type or equivalent single frequency (SF) signaling units. Signaling (actually station ringing) is controlled by the DAL feature package, which operates and releases the signal distributor (SD) points associated with the applicable SD-1A364 trunk circuit. SD point operation controls the state of two relays in the trunk circuit, which results in alternately transmitting ground (2600 Hz) over the signaling facilities at a rate of 2 seconds on and 4 seconds off until answer or abandon. The SF signaling unit nearest the called station causes ringing in accordance with the ground signal.

B. Service Circuits

4.04 The service circuits required for EPSCS application are shown in Table F. These circuits are mounted on a miscellaneous trunk frame, J1A033 type, and require HILO interface circuits SD-1A392 for HILO network terminations. This HILO universal plug-in circuit contains the HILO modulators and demodulators that provide the conversion to the HILO mode of transmission. It has no scan or SD points and is mounted on the HILO universal trunk frame. The service circuit is wired to the interface circuit via the intermediate distributing frame (IDF) and uses the network appearance of the interface circuit. One SD-1A392 circuit (two circuits per plug-in) is required for each TNN of each circuit on a miscellaneous trunk frame.

TOUCH-TONE Transmitter

4.05 The TOUCH-TONE transmitter SD-1A375 generates TOUCH-TONE frequency signals to transmit the network or MTS number of the called party to off-network switching centers via any access line or ONAL and to EPSCS business

TABLE E

TRUNK CIRCUITS FOR EPSCS

TYPE AND USE	SUPER-VISION	SD NUMBER	J-CODE NUMBER	TRUNK ORDER CODE	FACILITY	TRUNK FRAME	CIRCUITS PER UNIT	PER CIRCUIT		TRUNK LINK NETWORK TERMINATIONS PER CIRCUIT
								SCAN	SIGNAL DISTRIBUTOR	
2-Way; Network Trunk, Network Access Line	E&M	1A362	J1A090BB	11200	4-Wire	(H)U	2	2	3	1
2-Way Long Haul FX; ONAL	GS	1A396	J1A090BJ	14600	4-Wire	(H)U	2	2	2	1
Direct Access Line	E&M	1A364	J1A090BM	11400	4-Wire	(H)U	2	2	2	1
2-Way Dial Repeating Trunk-4-Wire with Cut Through *	OP	1A473	J1A033CR	17301	4-Wire	(H)U	1	3	6	2

* Used for advance private line termination (APLT) and is located at the customer premise location.

TABLE F

EPSCS SERVICE CIRCUITS

USE	SD NUMBER	J-CODE NUMBER (1AXXX)	TOC	SUPV SCAN	DIR SCAN	PAST SCAN	SD	CPD	CKTS PER UNIT	2" MTG PLATES PER UNIT	INTERFACE UNITS PER UNIT
TT Transmitter	1A375-01	033MH	12500	0	3	0	1	9	1	2	1
TT Transmitter Test	1A369-01	033NF	11900	0	8	2	3	0	1	2	1
3-Port Conference Bridge 4-Wire	1A483-01	033MR	NA	3	0	0	6	NA	2	2	3

customer locations. The circuit also transmits dial pulses, if required. Supervision of the distant office is maintained in the outgoing trunk circuit. The SD-1A375 circuit contains oscillators for generating a signal in a 2-out-of-8 code (see Table G). The duration of the signal is program controlled to be at least 60 ms, with the tone off for at least 60 ms. The circuit has built-in logic that permits an output only when two frequencies are generated, one from the high group and the other from the low group. When used for dial pulsing, the digits are outpulsed via central pulse distributor (CPD) operation under program control at a 10-pulse-per-second rate.

TABLE G

"TOUCH-TONE" TRANSMITTER SIGNALING CODE

Hz	697	770	852	941
1209	1	4	7	* (STAR)
1336	2	5	8	0
1477	3	6	9	# (NUMBER SIGN)

TOUCH-TONE Transmitter Test Circuit

4.06 The TOUCH-TONE transmitter test circuit SD-1A369 receives voice frequency (inband) TOUCH-TONE signals generated by the TOUCH-TONE transmitter and tests them for the correct frequency and level. This circuit also converts the signaling frequencies into dc signals suitable for operating the associated scan points. Because the SD-1A369 circuit makes marginal tests on the received signals, its bandwidth for each signaling frequency is narrower and more accurately maintained than the corresponding bandwidth of a TOUCH-TONE detector circuit. It is also less sensitive to the input level. Thus, an oscillator to the TOUCH-TONE transmitter drifting in frequency or level is detected by this circuit before it drifts far enough to cause false operation of a TOUCH-TONE calling detector circuit. In addition to testing TOUCH-TONE signals, this circuit provides a high degree of protection against false operation by noise. The test circuit signaling code is the same as for the transmitter (Table G).

C. Test Hardware

4.07 The manual trunk test position (MTTP), the remote office test line (ROTL), and the test lines for HILO trunks are all required by the EPSCS feature. Their use for EPSCS testing is governed by normal engineering criteria established for their use in the HILO environment. (See reference A(24) in Part 18).

4.08 The test line of the MTTP having a telephone set should be assigned a standard number for all networks so that locations served by the switch can contact the MTTP.

4.09 EPSCS offices require the tone-presence detector (SD-1A382, option Y) TOC 13201. This detector provides the capability to test the

voice switched-gain devices that are present in the 6-port conference circuit.

D. Peripheral Data Storage Processor (PDSP) and Interface

4.10 The complement of hardware comprising the interface between the EPSCS No. 1 ESS and the data network is summarized in Table H.

3A Auxiliary Processor

4.11 The PDSP for the EPSCS application is the 3A auxiliary processor. The processor uses 1A ESS logic circuits; the periphery is largely transistor-to-transistor logic (TTL); the main stores are insulated-gate field effect transistors (IGFETs) with a tape cartridge backup.

Peripheral Interface Unit

4.12 The duplicated peripheral interface unit (PIU) provides a channel for data communications between the No. 1 ESS central control (CC) and the 3A auxiliary processor. The PIU connects to the No. 1 ESS call store bus, as shown in Fig. 5 and responds to call store read and write commands from the CC. To accommodate the PDSP complex in central offices, the call store bus can be extended to 175 cable feet. The PIU connects to the 3A auxiliary processor on its parallel channel (PCH) via the duplex bus selector (DBS). The PIU provides first-in/first-out (FIFO) buffers through which all data between the two processors flows. The FIFO buffers allow both processors to scan and unload the PIU at relatively large time intervals; as a result, the processors are "loosely coupled."

4.13 Although only one is used for PDSP, the addressing arrangement allows as many as 16 auxiliary processors to be connected to a single No. 1 ESS. Each processor would be connected via its own PIU and a unique K-code. Each message sent through the PIU must have header information containing message length, message priority, and job identity.

Universal Data Link Controller (UDLC)

4.14 Figure 6 is a functional block diagram showing the duplicated UDLC as a part of the PDSP Data Communications System. The UDLC interfaces with the auxiliary 3A CC subparallel channel via the duplex bus selector. The DBS is a standard unit containing cable drivers and receivers in addition to control circuits that respond to specific types of commands. This permits the UDLC to communicate on either bus to either processor, or it can be quarantined from both buses if a failure occurs. The use of the DBS permits the UDLC to be as far as 60 cable feet away from the processor.

4.15 The UDLC contains two device address decoders, a control circuit, subparallel channel response leads, a line control circuit, a number of data link interface (DLI) activity registers, a multiplexer-demultiplexer circuit, a select register, and a read-only memory (ROM) sequencer.

4.16 The UDLC controls from 1 to 16 data links. It has the capability for half-duplex or full-duplex operation, as well as synchronous and asynchronous data transmission. Control and data communications between the UDLC and the individual data links take place over a dc bus. The dc bus structure is made up of 3 buses: the enable bus, the command and reply bus, and a multiplexed bidirectional data access bus. The enable bus consists of a dedicated signal pair for each DLI. The command and reply bus and data access bus are parallel buses shared by all DLIs. For reliability, the UDLC is duplicated with each DLI accessible by either UDLC. However, only one UDLC will be active at any given moment. It should be noted that the data link is not duplicated.

Data Link Interface (DLI)

4.17 The data link interface circuit provides an interface unit compatible with data link control requirements on one end and the UDLC on the other. It consists of an EIA interconnection conforming to RS-232C interface standards, a universal synchronous asynchronous receiver transmitter (USART) which performs parallel-to-serial and serial-to-parallel conversion, and data buffering with control and error-checking circuits to guarantee the integrity of the data communicated between the UDLC and the DLI. See Fig. 7.

4.18 The DLI consists of two circuit boards, FG4 and FG5. The first (FG4) contains the transmit FIFO buffer with FIFO pointer, parity checker/generator, bus 0 drivers and receivers, and the internal bus control circuits. The second board (FG5) contains the USART, EIA interface, USART control with digital loop-around features,

TABLE H

EPSCS — PERIPHERAL DATA STORAGE PROCESSOR CONFIGURATION

ITEM	QTY	QTY	DESCRIPTION
J1A093A-1, L1	1		Processor interface frame F/W, one set of DL1 circuit packs (FG4 and FG5) required to equip one channel.
J1A093AC-1, L2		As Required	One set of data link interface circuit packs. (One list 2 is required for each additional data channel provided.)
J1C060A-1	1		Maintenance frame L2 F/W, LK (printer shelf and associated hardware).
J1C106B-1	1		Auxiliary 3A processor frame L1 E/W:
		1	L2 CTI and power (duplicated)
		3	L3 equipped for memory 2, 3 (duplicated)
		7	L4 128K memory (duplicated)
		1	L6 PCH (duplicated)
		1	L11
		1	LB
		1	LE (if standard floor plan).
Terminal	1		DS40.
201C Modem	—	—	1 per data channel.
Cables	—	—	As required.
J6A003A-1, L2	1		TTY frame (equipped for DS40 TTY).

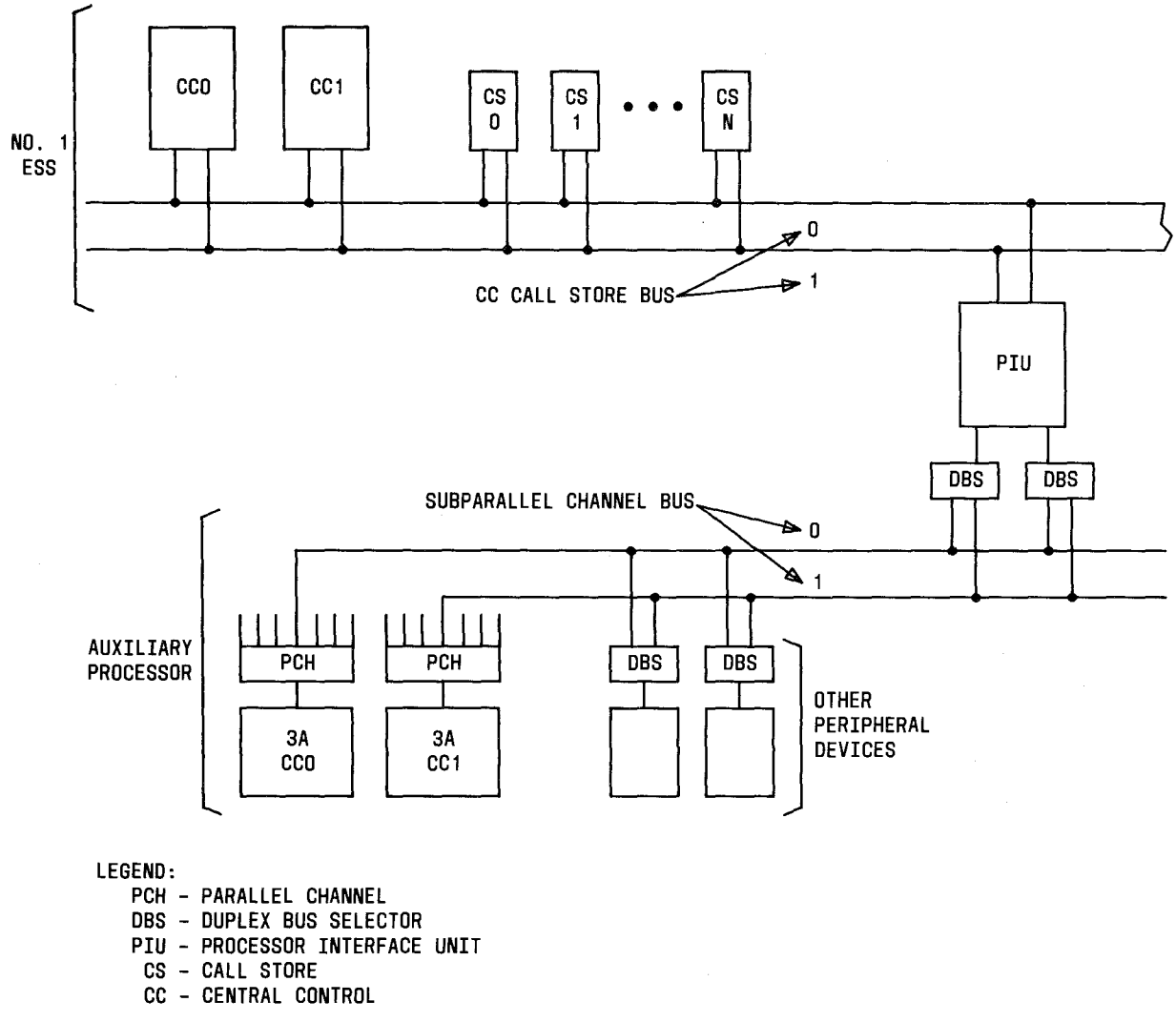


Fig. 5—Processor Interface Unit Arrangement

status register, receive FIFO buffer with FIFO pointer, and bus 1 drivers and receivers.

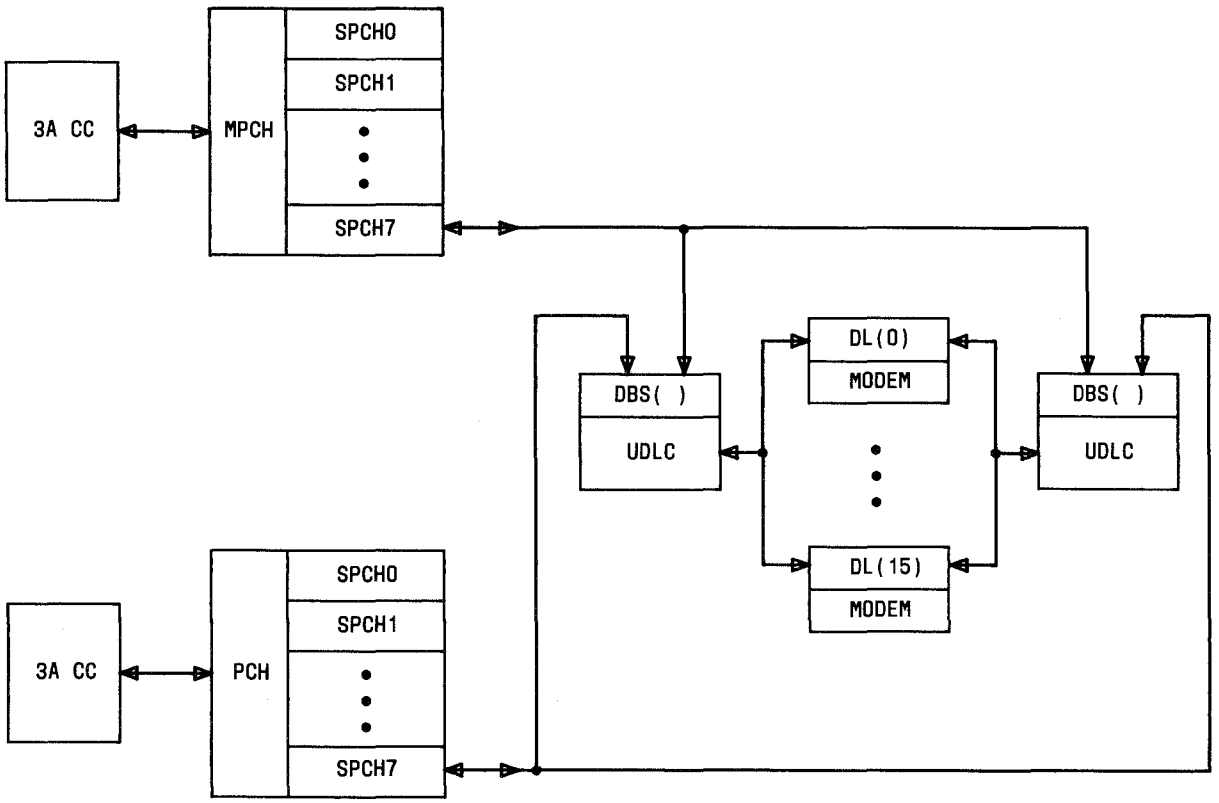
4.19 DLI bus 0 communicates with UDLC 0; DLI bus 1 communicates with UDLC 1.

4.20 Data for transmission is received from the UDLC and checked for proper parity. If successful, the data is loaded into the transmit FIFO buffer to await transmission and a positive acknowledgement is returned to the UDLC. Incoming data is loaded into the receiver FIFO buffer. When read by the UDLC, parity is computed and returned with the received data.

4.21 The control portion of FG4 board administers access to the common D-bus within the DLI in response to data and/or commands received by either bus. The FG5 board control section provides administrative control over the USART, the unloading of the transmit FIFO, and the loading of the receive FIFO via the common D-bus within the DLI. A maximum of 16 DLI positions can be equipped.

Processor Interface Frame (PIF)

4.22 The PIF provides the mounting space for the PIU, UDLC, and DLIs. In addition, the PIF provides filters, power converters, fuses, and a means for control and distribution of power to all circuits using the frame. Abnormal conditions



LEGEND:
PCH - PARALLEL CHANNEL
SPCH - SUBPARALLEL CHANNEL
DBS - DUPLEX BUS SELECTOR
UDLC - UNIVERSAL DATA LINK CONTROLLER
DL - DATA LINK
3A-CC - MICRO PROCESSOR

Fig. 6—Universal Data Link Controller Arrangement

within the frame are reported to the system by scan points and by initiating audible and visual alarms. The PIF is equipped with 4 unipolar CPD, 10 bipolar CPD, 12 directed, and 6 supervisory master scanner points.

Data Input Terminal

4.23 A model DS40 TTY terminal is provided for the EPSCS PDSP application. It is housed in a TTY frame, J6A003A-1, equipped for the DS40. The DS40 features are listed in Table I.

Automatic Identified Outward Dialing Circuit SD-1A131

4.24 When an EPSCS switch provides ACSI for business customer CU locations, the AIOD frame J1A033G-1 is required. There are three basic hardware items in the AIOD system. They are:

- Central office data link circuit
- Automatic number identification circuit on customer premise used to identify the customers station and trunks

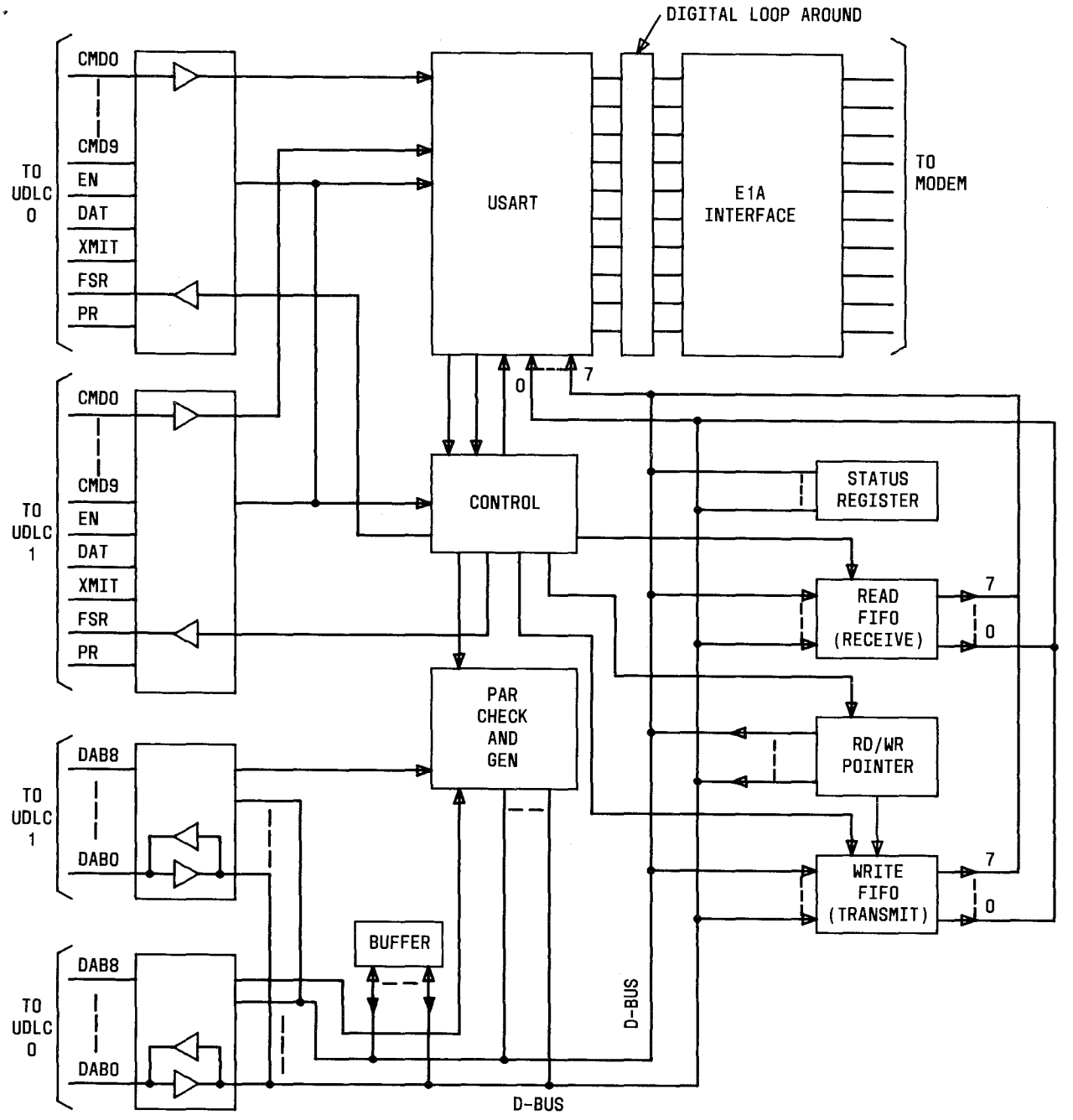


Fig. 7—Data Link Interface

- Dedicated cable or carrier facilities for the data link.

For further details see reference A(28) in Part 18.

Dial Repeating Tie Trunk Circuit SD-1A473

4.25 If the ACSI feature is used with a No. 1 ESS business customer, it is required that dial repeating trunk circuit SD-1A473 be used for

TABLE I

DS40 FOR EPSCS APPLICATION OF PDSP
LIST OF FEATURES FOR MODEL 40/2 KD-ROP

USOC CODE	DESCRIPTION
40 PXF	ROP unit (80 column printer). Table top, tractor, with integrated controller
M4TAAF	KD unit (table top). (See Note 1)
M4T200	72 lines of memory
M4T500	Full edit features
MWE94X	Key tops
4D1XA	Teletype compatible controller 40/2
WES7K	25 feet data set cable (See Note 2)
WES6W	Destructive scrolling. Use TP410018 in slot 7 - blanks old line

Note 1: The KD controller should be equipped with the Issue 4A or later 410770 card.

Note 2: This cable connects the ROP to the KD. Other lengths are available as follows:

7 foot — Omit USOC WES7K
12 foot — Replace USOC WES7K with WES7J
50 foot — Replace USOC WES7K with WES7L.

these access lines to improve transmission quality. This circuit is used for advance private line terminations (APLT). Locations serving any rotary dial stations must use these trunks. This circuit is installed at the customer premise location. Table E summarizes the equipment characteristics of this circuit. For further details refer to A(28) in Part 18.

3-Port Conference Bridge Circuit SD-1A483

4.26 When an EPSCS switch provides the Centralized Network Attendant feature, a new 3-port conference bridge circuit for 4-wire HILO switching is required. One 3-port bridge should be provided for each release link trunk facility terminating on an EPSCS switch. The circuit specifications are in Table F. Three interface circuits SD-1A392 are required for each 3-port bridge circuit. For further details see reference A(32) in Part 18.

Release Link Trunk (RLT)

4.27 A release link trunk terminates at the EPSCS switch on an SD-1A362 trunk circuit. A No. 1 ESS serving the network attendant terminates the release link trunk facility on trunk circuits compatible with SD-1A362, e.g., SD-1A237. Other circuit cuplets may be used with the RLT such as: SD-1A361—SD-1A163, SD-1A373—SD-1A166. The SD1A362—SD-1A237 cuplet is recommended at the present time. Release link trunk facilities are required between each EPSCS switch and the switch serving the network attendant. The added network usage generated by network attendant is included in the total tandem load. See reference A(32) in Part 18.

OFFICE DATA STRUCTURES

4.28 The major areas affected by the EPSCS implementation for the No. 1 ESS are as follows:

(a) Selected translations and parameters

(b) Modification of the existing CCSA digit analysis program to support EPSCS

(c) Communication of the message detail records and other monitoring and control messages to the PDSP which, in turn, generates or receives messages to or from the CNCC.

4.29 Data structures for EPSCS features covered by separate documentation are given in the associated documents listed in Table J. The following translations are applicable for station-to-station calls, off-network calls, network calls, off-hook calls and access line calls as required.

A. Translations

Trunk Network Number-to-Trunk Group Number (TNN-to-TGN) Translator

4.30 The TNN-to-TGN translator auxiliary block (Fig. 8) reflects a member number (MEMN) for evey EPSCS trunk. This translator is required for all calls using a trunk or network access line to complete the call.

Trunk Group Supplementary Translator

4.31 The trunk group supplementary translator contains three optional words, D, E, and G as shown in Fig. 9. The presence of the optional word D is indicated by the TGOD bit in word 0 being set to 1. The items included in the optional word D are as follows:

(a) ***CUSTID***—An EPSCS customer identification number is needed for all trunks dedicated to an EPSCS customer, including any dedicated service circuit.

(b) ***ICUP***—Individual circuit usage and peg counts are provided on this trunk when this bit is set to 1. This item must be set if the message detail bit is set in word 8 of the screening line equipment number (LEN) translation for this trunk.

(c) ***PNTYPE***—The private network trunk-type item establishes the type of circuit. It may have the following values:

0 - Other than the following (for example, access lines)

1 - Network trunk

2 - FX circuit

3 - Unused

4 - Conference circuit.

Note: Any value for PNTYPE other than 0 implies that the "private network" bit in the trunk class code expansion must be set to 1.

(d) ***ACI***—The authorization code index selects a subtranslator for authorization codes received over a given trunk group.

4.32 The presence of optional word E is indicated by the TGOE bit being set to 1. This optional word is required only when trunk group queueing is in effect for the trunk group. Optional word E consists of the single item, QTLQN (queue number), which is used to index the unit type 55 subtranslator.

4.33 Optional word G is used by the ACSI feature and MDR feature, see Table J for details.

Trunk Group Translator

4.34 All incoming or 2-way EPSCS trunk groups must specify TGTYP=6 in the TGN auxiliary block. TGTYP=6 implies that a screening LEN is assigned to the trunk group. The screening LEN is contained in word 2 of the TGN auxiliary block (which also supplies the TNN and trunk class code). See Fig. 10 for layout.

Line Equipment Number (LEN) Translator (Screening)

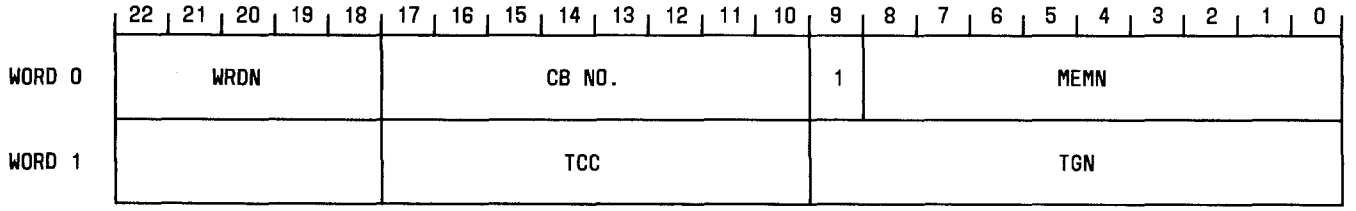
4.35 A number of items are included in this translator for EPSCS (Fig. 11). Each EPSCS trunk group (incoming or 2-way) has a screening LEN. The originating major class of services provided by the LEN translator must be one of the following:

(a) 4FNAL=28, network access line - interstate

TABLE J

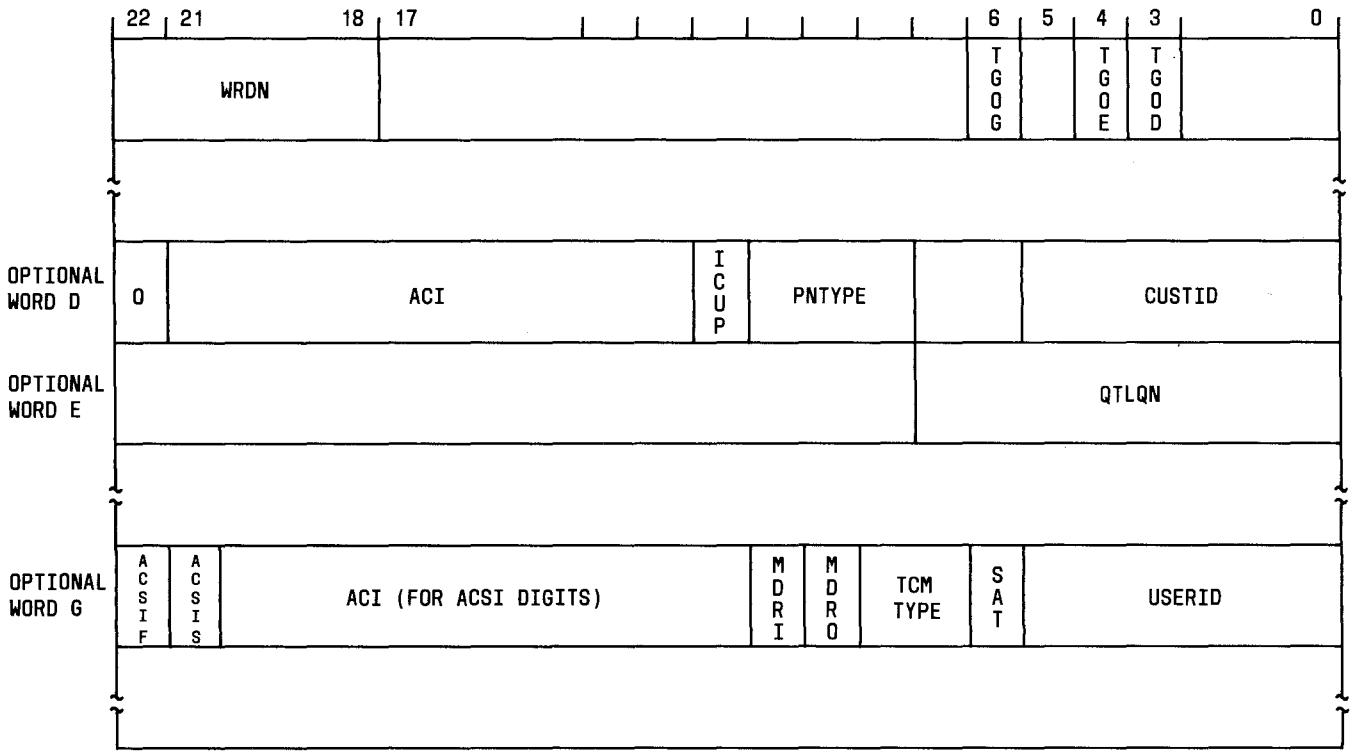
EPSCS FEATURES AND EPSCS RELATED FEATURES

FEATURE	DOCUMENT	OPTIONAL PER CUSTOMER
HILO 4-Wire Switching Feature	FD 231-090-366	No
Interface With Processor Interface Unit Feature	FD 231-190-136	No
Automatic Time-Out of Announcements and Tones Feature	FD 231-090-137	No
User Dialed Authorization Code Feature	FD 231-190-135	Yes
Interface With CNCC Feature	FD 231-190-131	No
Network Message Detail Recording	FD 231-190-130	No
Selected Traffic Data to Customer Feature	FD 231-090-340	No
Off-Network Calling Using TOUCH-TONE and Dial Pulse Outpulsing	FD 231-190-134	Yes
Network Trunk Queueing	FD 231-190-129	Yes
4-Wire Direct Access Line Feature	FD 231-190-133	Yes
Meet-Me Conferencing	FD 231-190-128	Yes
Traveling Class Marks — TCM	FD 231-090-138	Yes
Automatic Calling Station Identification	FD 231-190-139	Yes
Network Attendant Feature	FD 231-190-140	Yes



LEGEND: WRDN - AUXILIARY BLOCK WORD SIZE
CB NO. - CONFERENCE BRIDGE NUMBER
MEMN - MEMBER NUMBER ALWAYS EXISTS FOR EPSCS TRUNKS
TCC - TRUNK CLASS CODE
TGN - TRUNK GROUP NUMBER

Fig. 8—TNN-to-TGN Auxiliary Block



LEGEND: WRDN - WORD SIZE OF AUXILIARY BLOCK
TGOG - TRUNK GROUP OPTION WORD G INDICATOR
TGOE - TRUNK GROUP OPTION WORD E INDICATOR
TGOD - TRUNK GROUP OPTION WORD D INDICATOR
ACI - AUTHORIZATION CODE INDEX
ICUP - INDIVIDUAL CIRCUIT USAGE AND PEG COUNTS (1=YES, 0=NO)
PNTYPE - 4-WIRE PRIVATE NETWORK TRUNK TYPE
CUSTID - CUSTOMER IDENTIFICATION NUMBER
QTLQN - QUEUEING TRUNK AND LINE QUEUE NUMBER
ACSIF - ACSI INDICATOR
ACSIS - ACSI SIGNALING INDICATOR
MDRI - MDR ON INCOMING FACILITY INDICATOR
MDRO - MDR ON OUTGOING FACILITY INDICATOR
TCM TYPE - TRAVELING CLASS CODE TYPE
SAT - SATELLITE INDICATOR
USERID - USER IDENTIFICATION NUMBER

Fig. 9—Trunk Group Supplementary Auxiliary Block

(b) 4FNALS=33, network access line - intrastate

(c) 4FCNAL=34, CTX network access line - interstate

(d) 4FCNALS=35, CTX network access line - intrastate.

4.36 The requirement for message detail is indicated by item MSGD in the LENCL3 word. If item MSGD is set (1), a message detail record is sent to the CNCC for every incoming call over the trunk group.

4.37 An optional pair of words to relate an external billing number (EBN) is included in the LEN translator for EPSCS. The presence of the optional words is indicated by item EBN in the LENCL3 word. These words contain an external billing number in binary-coded decimal (BCD)

TABLE K

VALID CCSA AND EPSCS CALL TYPES

CALL TYPE	MEANING
0 — 4FINV	Vacant office code — 7 digits expected
1 — 4FINV3	Vacant — route after 3 digits
3 — 4FCOMP	Dialing complete (without outpulsing)
4 — 4FCMPP	Dialing complete (with outpulsing)
5 — 4FITRA	Intraoffice
6 — 4FFAT	Foreign area 6-digit NXX translation required
7 — 4FITER	Interoffice — 7 digits expected
10 — 4FTEN	Interoffice — 10 digits expected
13 — 4FINVT	Invalid — 10 digits expected
19 — 4FONNT *	Local on-network via simulated NAL
20 — 4FOFFA *	Simulated ONAL to foreign NPA
21 — 4FOFHA *	Simulated ONAL to home NPA
26 — 4FMTDR †	More digits to be collected digit-by-digit
28 — 4FIDN	Expand to intraoffice DN

* Valid for CCSA only

† Valid for CCSA with 1E5 and later generic programs.

format. The words are "external" in that the number is not related to a number group in the office. Any 7-digit number can be used. The presence of the EBN is permitted only when MSGD = 1.

4.38 When item QINH in the LEN translator is set, no call incoming over a facility utilizing this screening LEN will be allowed to queue for an outgoing trunk. QINH is allowed only for originating major classes 34 and 35. Item OP (originating priority queueing) may also be set for originating major classes 34 and 35. If set, a call incoming over this facility will receive priority queueing.

4.39 The LEN translator may also contain the address of a speed calling list. This item is required for direct access lines arranged for direct connect and for ONALs used for attendant access or off- to on-network express calling. Direct connect, attendant access, and express calls are identified by (a) no inpulsing indicated in the trunk class code expansion table and (b) item SC=01 in the LEN auxiliary block.

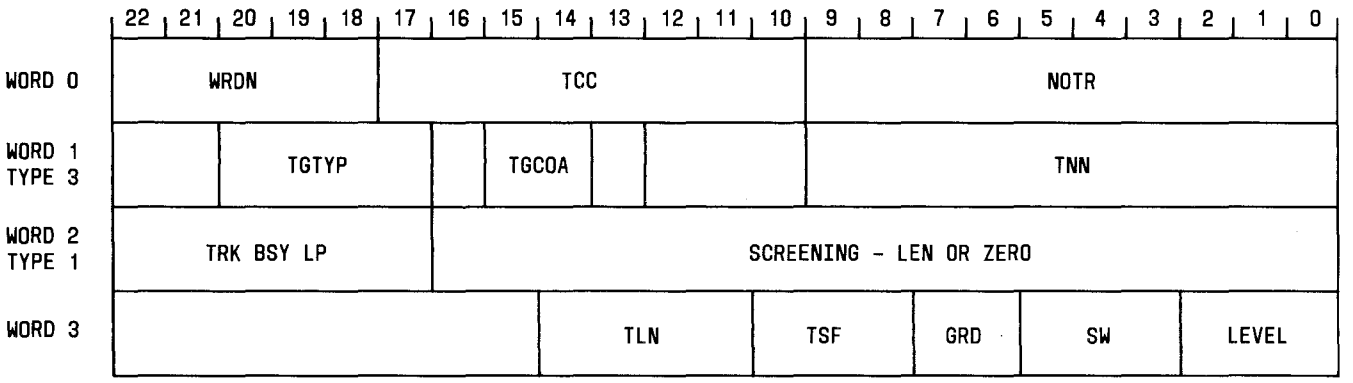
4.40 The LEN translator may contain a LENCL4 word if bit 15 of the LENCL3 word is set to 1. The LENCL4 word contains private network option word (PNOW) bit in position 1. If this indicator is set (1) it implies that PNOW is included in this translator. (See Fig. 11.) The PNOW word contains the facility restriction level (FRL) indicator in bit position 16 and the FRL in bit position 12 through 14. Bit 15 is reserved in this word for future growth of FRL requirements.

Directory Number (DN) Translator

4.41 The DN translator requires that the terminating major class code (TMAJ) of direct access lines be 28 and that the ringing ***code*** be 0. Unassigned DNs continue to use RI0085. The tone program converts these to pseudo RI055. All DNs associated with screening LENs must have a TMAJ class code of 24.

Number Group Number to Rate Center (NOG-to-RAC) Translator

4.42 Figure 12 depicts the number group-to-rate center (NGN-to-RAC) translator. The EPSCS



LEGEND: WRDN - NUMBER OF WORDS IN THE AUXILIARY BLOCK
TCC - TRUNK CLASS CODE
NOTR - NUMBER OF TRUNKS
TGTYP - TRUNK GROUP TYPE
TGCOA - TRUNK GROUP CITY OF ORIGIN ANNOUNCEMENT
TTN - TEST TABLE NUMBER
TRK BSY
LP - TRUNK BUSY LAMP
SCREENING
LEN - SCREENING LINE EQUIPMENT NUMBER
TLN - TRUNK LINK NETWORK
TSF - TRUNK SWITCH FRAME
GRID - TRUNK SWITCH FRAME GRID
SW - TRUNK SWITCH FRAME SWTICH
LEVEL - TRUNK SWITCH FRAME LEVEL

NOTE: WORD 3 WILL BE REPEATED FOR EACH MEMBER OF THE TRUNK GROUP, IF TRUNK IS 2-WAY.

Fig. 10—Trunk Group Auxiliary Block

customer identification item, CUSTID, has a range of 1 through 63 and is required for route pattern selection for the given EPSCS customer. The assignment of CUSTID is common for all number groups pointing to the same RAC. CUSTID is a national customer ID; that is, it is unique for the entire country and is used in each EPSCS switch utilized by a particular customer.

Chart Column Translator

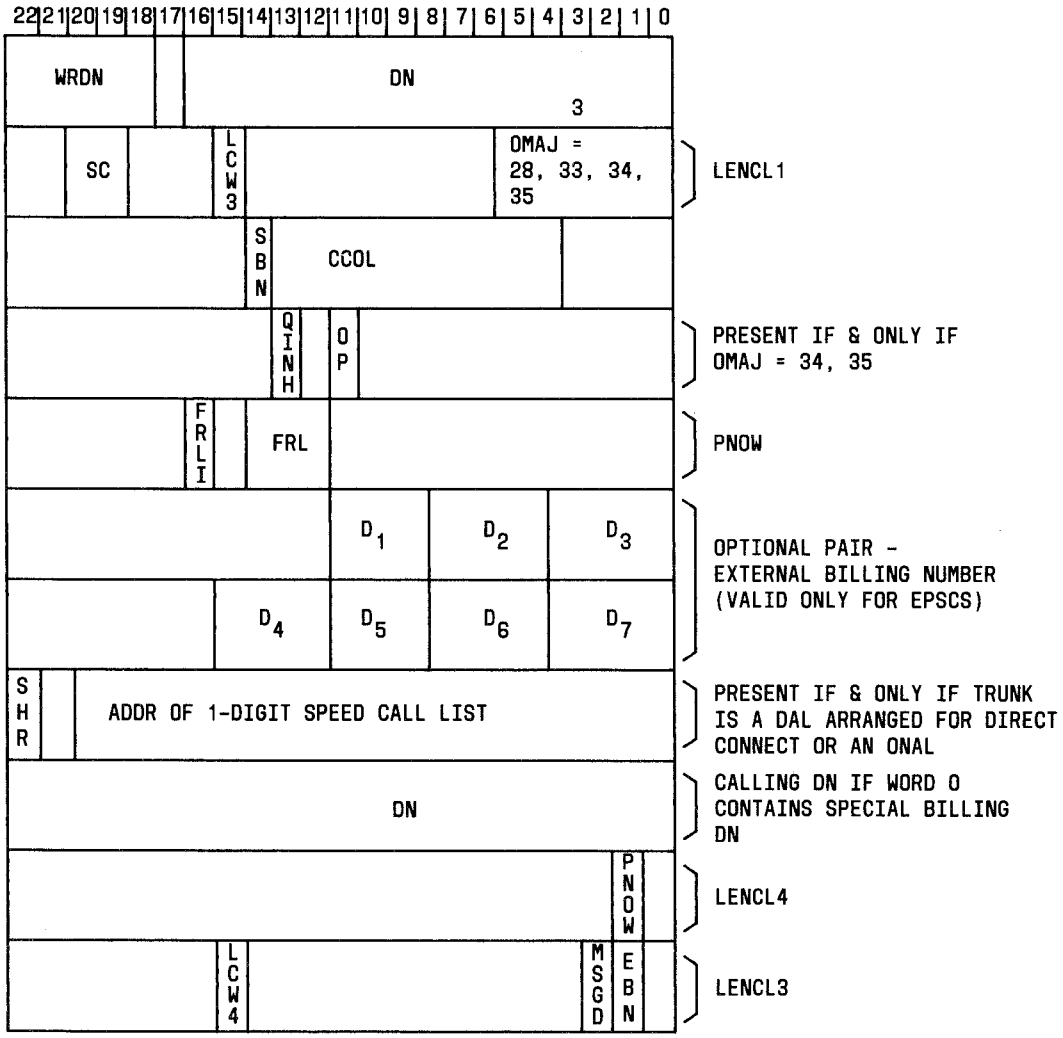
4.43 The chart column (CCOL) translator contains an authorization code item, AC, as shown in Fig. 13. Item AC set (1) means that an authorization code is required for those lines utilizing the given CCOL. When item AC is set, recall dial tone is returned to the user after the called number is dialed, and the user-dialed authorization code is collected. Authorization codes may apply to invalid call types as well as those for valid routes. Type 1 translation word is used for regular type calls while type 4 word is for regular calls using simulated facility group number.

Rate and Route Pattern Translator

4.44 The CCSA digit analysis program has been modified to provide for EPSCS incoming calls as well as CCSA call types. The modifications required permit additional call types related to EPSCS. The valid call types per CCSA and EPSCS for the rate and route pattern translator are listed in Table K. The call types added to the CCSA list are call types 1, 3, 4, 26, and 28.

Pseudo-Route Index (PRI) Translator

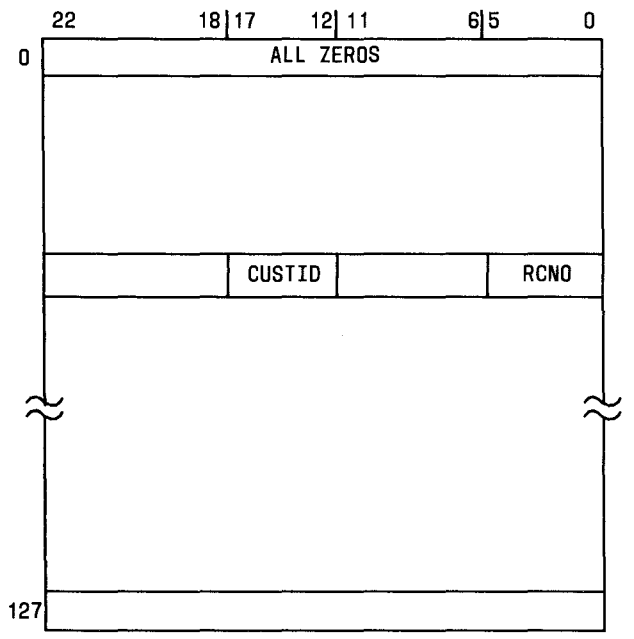
4.45 The pseudo-route index, PRI055, is assigned for "intercept—unassigned number (HILO 4-wire)" in the pseudo-route index translator. The



SC - SPEED CALLING INDICATOR = 01 (SINGLE DIGIT) OR 00 (SPEED CALLING NOT APPLICABLE)
LCW3 - LENCL 3 WORD PRESENT (0 IF NO; 1 IF YES)
SBN - SPECIAL BILLING NUMBER INDICATOR
QINH - INHIBIT QUEUEING INDICATOR
OP - ORIGINATING PRIORITY INDICATOR
FRL1 - FRL INDICATOR (0 IF NO; 1 IF BITS 12-14 CONTAIN FRL)
FRL - FACILITY RESTRICTION LEVEL (RANGE 0-7; BIT 15 RESERVED FOR FUTURE GROWTH)
EXTERNAL BILLING NUMBER - CONTAINED IN BCD FORMAT IN THE OPTIONAL PAIR OF WORDS ("EXTERNAL" IN THAT IT IS NOT RELATED TO A NUMBER GROUP IN THE OFFICE; ANY 7-DIGIT NUMBER CAN BE USED.)

SHR - SHAREABLE SPEED CALLING (0 IF NO; 1 IF YES)
PNOW - PRIVATE NETWORK OPTION WORD (INDICATOR (0 IF NO; 1 IF PNOW EXISTS)
LCW4 - LENCL 4 WORD PRESENT (0 IF NO; 1 IF YES)
MSGD - MESSAGE DETAIL REQUIRED

Fig. 11—LEN Auxiliary Block (Screening LEN)

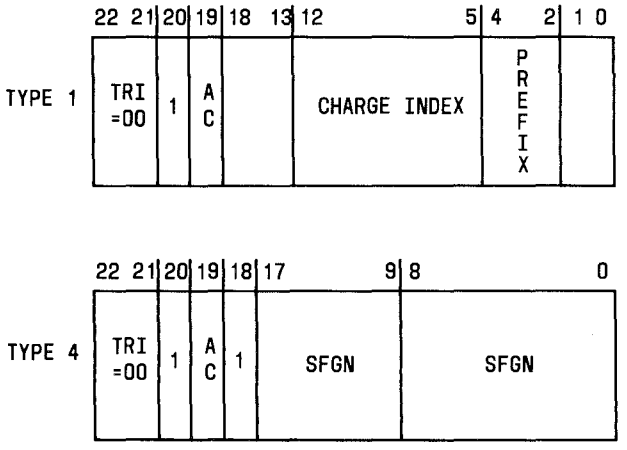


CUSTID - EPSCS CUSTOMER IDENTIFICATION NUMBER (1 ≤ CUSTID ≤ 63)

RCNO - RATE CENTER NUMBER

Fig. 12—Number Group Number to Rate Center Translator

CHART COLUMN TRANSLATOR
SCIW



TRI - TREATMENT INDICATOR
AC - AUTHORIZATION CODES REQUIRED FOR EPSCS
SFGN - SIMULATED FACILITY GROUP NUMBER

Fig. 13—Chart Class Column Table Words

associated nonfixed route index should be type 01 (nonoutpulsing).

Unit Type 55 Auxiliary Block

4.46 The trunk group queueing feature for ESCS required a change in the unit type 55 auxiliary block. Item QTGN in word 15 of the auxiliary block indicates the trunk group number served by the queue. The associated trunk group must be outgoing or 2-way and must be HILO 4-wire. (The queue number is related via item QTLQN in the trunk group supplementary translator Fig. 9.) Queueing details and data layouts are given in the documentation listed in reference A(2) in Part 18.

Trunk Class Code Expansion Table

4.47 The trunk class code expansion table entries for EPSCS contains a private network indicator for a 4-wire private network trunk (CCSA or EPSCS). Additionally, item disconnect timing (DT) has replaced the "CAMA disconnect" item used previously. When item DT is set for an incoming trunk, 10- to 11-second disconnect timing is done on the incoming trunk. (This applies to incoming and 2-way trunk groups.)

4.48 The basic trunk class code expansions required for EPSCS trunk circuits are summarized as follows:

(a) 4-wire direct access line universal trunk circuit. Details are given in reference A(6) in Part 18.

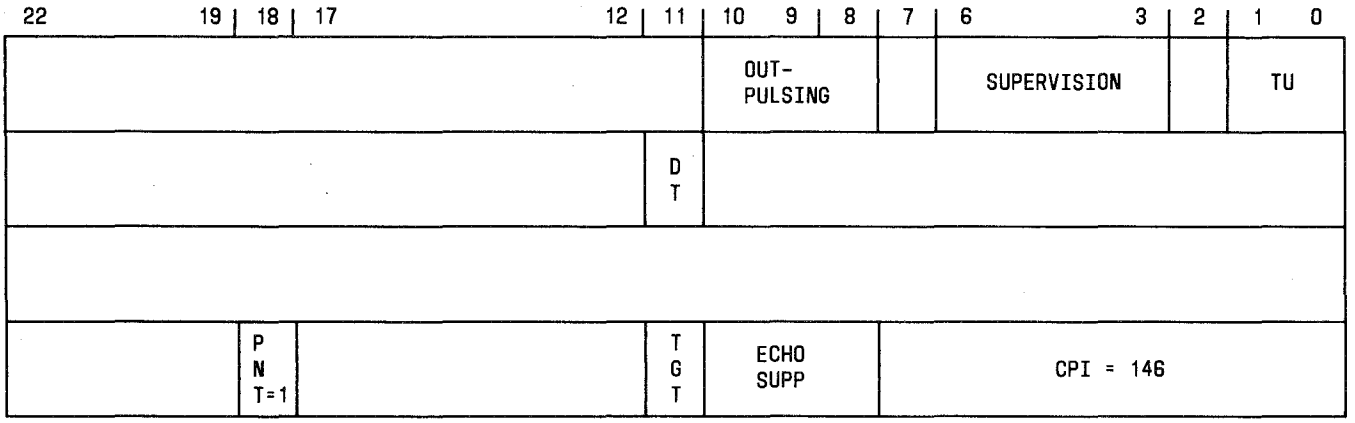
(b) 4-wire FX universal trunk circuit (ONAL). The layout is given in Fig. 14.

(c) 4-wire EPSCS network trunk circuit. The layout is given in Fig. 15.

(d) 4-wire EPSCS network access line. The layout is given in Fig. 16.

B. Parameters/Call Store

4.49 The HILO 4-wire parameter changes are covered in the documentation listed in reference B(1) in Part 18. Additional parameter changes required specifically for EPSCS are given below.



OUTPULSING = 2 FOR DIAL PULSE, 5 FOR TOUCH-TONE

SUPERVISION = 11 (GROUND START)

TU - TRUNK USAGE = 2 (2-WAY)

DT - DISCONNECT TIMING = 1 (10- TO 11-SECOND TERMINATING DISCONNECT TIMING)

PNT - PRIVATE NETWORK TRUNK = 1 (YES)

TGT - TRUNK GUARD TIMING = 1 FOR INCREASED GUARD TIMING; 0 FOR REGULAR GUARD TIMING

ECHO SUPP - ECHO SUPPRESSOR = 2 FOR HALF ECHO SUPPRESSOR; 3 FOR FULL

NOTE: THE TRUNK CIRCUIT IS AN SD-1A396. THE TRUNK ORDER CODE IS 14600. THE SPI IS 44

Fig. 14—Trunk Class Code Expansion for an ONAL (HILO 4-Wire)

Processor Interface Frame (PIF)

4.50 The presence of the PIF is indicated by parameter X2LMN60, which indicates the highest member number of the PIFs in the office. This parameter is an additional entry in the X2LMN table and is required for the unit type 60 translation. [See reference A(10) in Part 18.]

TOUCH-TONE Transmitter

4.51 Parameter set cards NAX, NDO, NOR, and NMF are modified to include the TOUCH-TONE transmitter for the HILO 4-wire network. [See reference A(7) in Part 18.]

Direct Access Line (DAL) Ringing Register

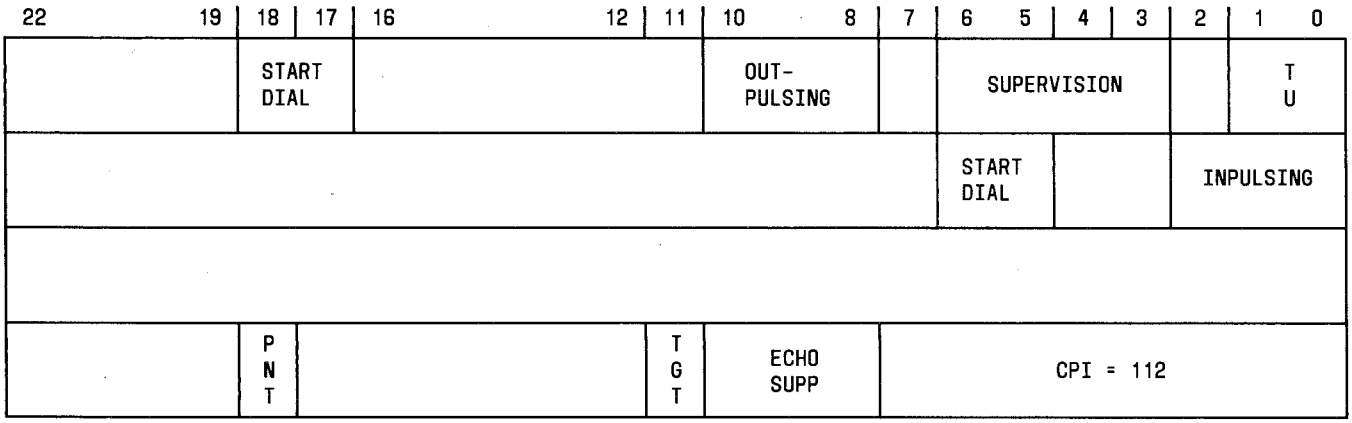
4.52 A 19-word ringing register is required by the DAL feature. This register permits the ringing of a station terminated by a DAL via software control of the DAL trunk circuit. [See reference A(6) in Part 18.]

Conferencing

4.53 Parameter changes for the Meet-Mė Conference feature are (a) a new set card, HLCF6, (b) a fixed program store parameter word, Y3MMSB, and (c) a variable call store block. See reference A(1) in Part 18.

Customer Traffic Counts

4.54 Parameter word E2SEGMNT (EPSCS traffic segment counter) is required to transmit customer traffic counts via the peripheral interface unit. The right half of the parameter word points to a block of call store used to indicate the number of data segments transmitted by No. 1 ESS. The



WORD 1 - START DIAL = 3 (WINK START) FOR 1-WAY OUTGOING OR 2-WAY TRUNK; OTHERWISE 0.

OUTPULSING = 1 [MULTIFREQUENCY (MF)] FOR 1-WAY OUTGOING OR 2-WAY TRUNKS; OTHERWISE 0

SUPERVISION = 3 (E & M OR F-TYPE SIGNALING)

TU = 0 (OUTGOING), 1 (INCOMING), OR 2 (2-WAY)

WORD 2 - START DIAL = 2 (WINK START) FOR 1-WAY INCOMING OR 2-WAY TRUNK; OTHERWISE 0

INPULSING = 1 (MF) FOR 1-WAY INCOMING OR 2-WAY TRUNK; OTHERWISE 0

WORD 4 - PNT – PRIVATE NETWORK TRUNK = 1 (YES)

TGT – TRUNK GUARD TIMING = 1 FOR INCREASED GUARD TIMING; 0 FOR REGULAR GUARD TIMING

ECHO SUPP – ECHO SUPPRESSOR = 2 FOR HALF ECHO SUPPRESSOR; 3 FOR FULL

CPI – CIRCUIT PROGRAM INDEX

NOTE: THE TRUNK CIRCUIT IS AN SD-1A362 (NEW APPLICATION FOR EPSCS). THE TRUNK ORDER CODE IS 11201. THE SPI IS 32, 34, OR 36.

Fig. 15—Trunk Class Code Expansion for a Network Trunk (HILO 4-Wire)

left half of the parameter word contains the size of the call store block, which is 64 if the EPSCS feature package is loaded. If the EPSCS feature package is not loaded, both halves of the parameter word are zero. E2SEGMNT is neither address restricted nor phase protected.

Network Queueing

4.55 The pointer to the trunk group head cell annex table is modified to include the Network Queueing feature. [See reference A(2) in Part 18.]

Peripheral Processor Messages

4.56 Parameter set card PPMB is required whenever the peripheral interface unit (PIU) feature package is loaded to enable communications between the PIU and the ESS. Parameter word P2PPMSG contains (a) the quantity of peripheral processor message blocks as indicated by the set card, (b) the length of each block, and (c) the address of a call block used as a message buffer. Parameter word P2PPMC contains the pointers required to control the call store block. [See reference A(10) in Part 18.]

22 19	18 17	16 15	14	13 12	11	10 8	7	6 5	4 3	2	1 0
	START DIAL		SG FHP			OUT-PULSING	0	SUPERVISION			T U
					D T			START DIAL		INPULSING	
	P N T				T G T	ECHO SUPP		CPI = 112			

START DIAL = 2 (DELAY DIAL) OR 3 (WINK START) FOR 1-WAY OUTGOING OR 2-WAY TRUNK; OTHERWISE 0

SG/FHP–STOP-GO/FINAL HEAVY POSITIVE PULSE = 1 (YES) OR 0 (NO)

OUTPULSING = 1 (MF), 2 (DIAL PULSE), OR 5 (TOUCH-TONE)

SUPERVISION = 3 (E & M OR F-TYPE SIGNALING)

TU – TRUNK USAGE = 0 (OUTGOING), 1(INCOMING), OR 2 (2-WAY)

DT – DISCONNECT TIMING = 1 (10- TO 11-SECOND TERMINATING DISCONNECT TIMING); 0 (NORMAL DISCONNECT TIMING)

START DIAL = 1 (DELAY DIAL), 2 (WINK START), OR 3 (DIAL TONE)

INPULSING = 1 (MF), 2 (DIAL PULSE), OR 5 (TOUCH-TONE OR DIAL PULSE)

PNT – PRIVATE NETWORK TRUNK = 1 (YES)

TGT – TRUNK GUARD TIMING = 1 FOR INCREASED GUARD TIMING; 0 FOR REGULAR GUARD TIMING

ECHO SUPP – ECHO SUPPRESSOR = 2 FOR HALF ECHO SUPPRESSOR; 3 FOR FULL

NOTE: THE TRUNK CIRCUIT IS AN SD-1A362 (NEW APPLICATION FOR EPSCS). THE TRUNK ORDER CODE IS 11201. THE SPI IS 32, 34, OR 36.

Fig. 16—Trunk Class Code Expansion for a Network Access Line (HILO 4-Wire)

Network Message Detail

4.57 Network message detail records transmitted to the CNCC and CSACC are accumulated in the office, using modified 13-word AMA registers. The set card is NAM. The affected parameters are I4AMA (number of AMA registers) and I4QMAX (maximum number of linked registers).

Routing Patterns

4.58 The EPSCS feature provides the customer with three routing patterns, any one of which may be activated from the CNCC. A call store table is pointed to by parameter, F4CUST (EPSCS customer identification call store table). This table consists of one word of call store per four customer IDs. The five bits allocated per customer contain the routing pattern and the recent change indicator for the EPSCS translator. The F4CUST word contains the address of a 16-word call store block allocated when the EPSCS feature package is loaded in the office. If the EPSCS feature package is not loaded, no call store is allocated, and F4CUST is zero. The call store block is in central control call store. It is neither

address restricted nor phase protected. The layout is given in Fig. 17.

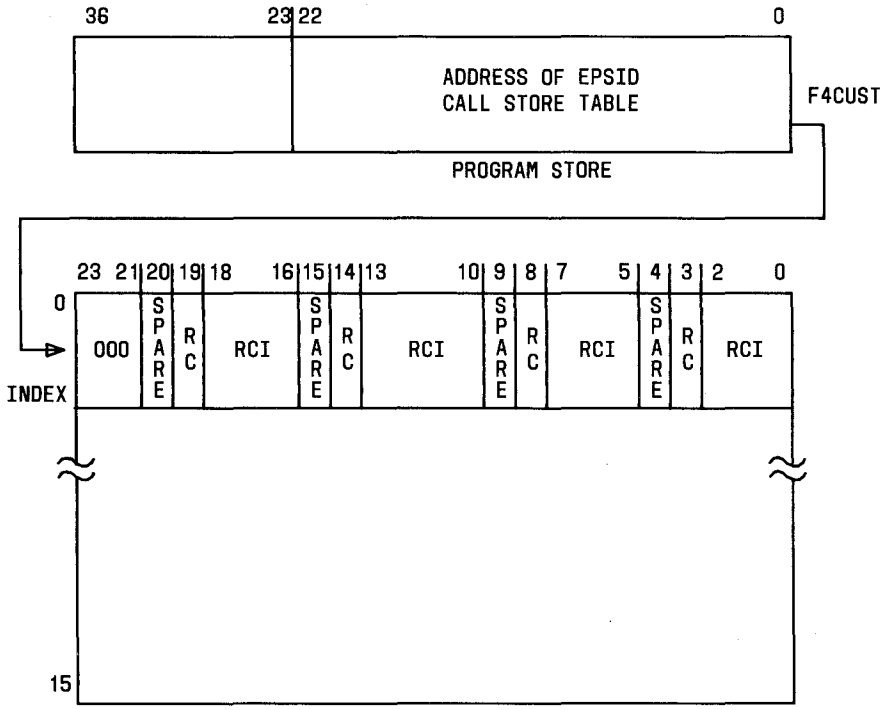
Network Attendant

4.59 The Network Attendant feature uses a 4-wire 3-port conference bridge circuit SD-1A483. Each circuit requires approximately 32 words of central control call store. One, 6-word conference assistance register (set card NAC) should be provided per circuit.

FEATURE OPERATION

A. General

4.60 The many features comprising EPSCS service are described separately from an operational standpoint. These feature-by-feature descriptions will vary primarily in the procedures and actions required up to the point of trunk seizure at a given network switch and from outpulsing at the switch. The network operations between trunk seizure and up to outpulsing are common to all calls processed through the switch.



INDEX - EPSID/4 YIELDS THE WORD NUMBER; THE REMAINDER YIELDS THE APPROPRIATE BLOCK WITHIN THE WORD.

RC - RECENT CHANGE INDICATOR: RC IS SET IF RECENT CHANGES FOR THE EPSCS HEAD TABLE EXIST. THIS ITEM IS USED BY SYSTEM AUDIT AND IS UNRELATED TO RCI.

RCI - RATE CENTER INDEX: RCI IS THE ITEM CHANGED VIA A MESSAGE FROM THE CNCC. THE VALUE OF RCI IS ADDED TO THE BASE RATE CENTER TO INDICATE THE CURRENTLY ACTIVE RATE CENTER. SINCE THE DIFFERENT ROUTING PATTERNS ARE BUILT IN DIFFERENT RATE CENTERS, RCI PLUS THE BASE RATE CENTER YIELDS THE ROUTING PATTERN TO BE USED.

Fig. 17—Parameter F4-CUST—Program Store and Call Store Layouts

4.61 The discussion in this part is restricted to describing common operations of EPSCS call processing and the No. 1 ESS interface; individual feature-dependent operations are described in the appropriate individual feature documents. (See Table J.)

B. Translations

4.62 EPSCS translations are accomplished in four basic functions: (a) initial screening, identification, and collection of called digits, (b) digit analysis to obtain rate and route patterns and the determination of the need for an authorization code, (c) authorization code digit collection and analysis, and (d) routing and outpulsing.

4.63 Network trunk seizure occurs as a result of the calling party going off-hook and dialing the appropriate network access code. If the calling party is served by a direct access line, trunk seizure occurs from simple off-hook signal. [If the business customer has the Automatic Calling Station Identification (ACSI) feature, the station is identified for record. Figure 18 shows typical dial "8" call to access the EPSCS network. This example illustrates a customer usage with the ACSI feature. For further details of ACSI, see reference A(30) in Part 18.]

4.64 A trunk network number to peripheral equipment number (TNN-to-PEN) translation occurs to locate the trunk circuit number for use by the change in circuit (CIC) program. This program access is necessary to operate and release signal distributor points to prepare for the call progress. A digit receiver is connected to the incoming trunk to supply dial tone.

4.65 The calling TNN is made busy in memory and a trunk class assigned as a result of trunk network number-to-trunk group number (TNN-to-TGN) translations. All EPSCS trunk groups must specify a trunk group type of six. This type six implies that a screening LEN is assigned to the trunk group.

4.66 The requirement for individual circuit usage and peg count (ICUP) data relative to the call is established by the supplementary trunk group number translations. The ICUP information is required when message detail record (MDR) item is set in the screening LEN. For more details of the MDR see reference A(3) in Part 18.

4.67 The screening LEN, obtained from the TGN auxiliary block, is translated to provide further identification of features and restrictions as required. The screening LEN translations provide such items as: originating major class (OMAJ), chart column (CCOL), billing directory number, queueing inhibit (QINH), speed calling, facility restriction level (FRL), message detail record indicator (MSGD), etc. (See Fig. 11). For further details of queueing see reference A(2) in Part 18. Also, for further details of FRL (used with the Trunk Class Mark [TCM] feature) see reference A(26) in Part 18.

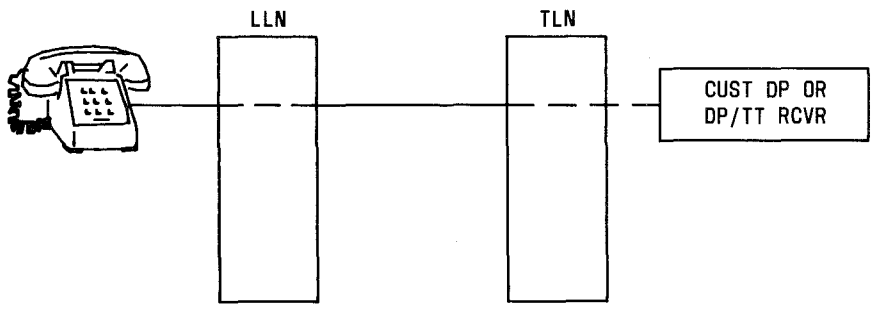
4.68 Upon receipt of dial tone, the caller dials the called number and the digits are received and stored in a call register. Dialing may be either TOUCH-TONE or dial pulse. For DAL, a nonmanual dialing technique may be detected. This nonmanual technique consists of obtaining from the LEN auxiliary block a speed call list address and item SC equal to two. This translation is used to internally generate digits preprogrammed for use by this DAL arrangement. Complete details are given in reference A(13) in Part 18.

4.69 The digits (manually or automatically generated) are collected and 3/6-digit translation is performed. The input required for digit translation is the CCOL, number group number (NGN), and the dialed digits. The output of the 3/6-digit translation is the call type, toll digit-by-digit translation index, route index, or normalized office code.

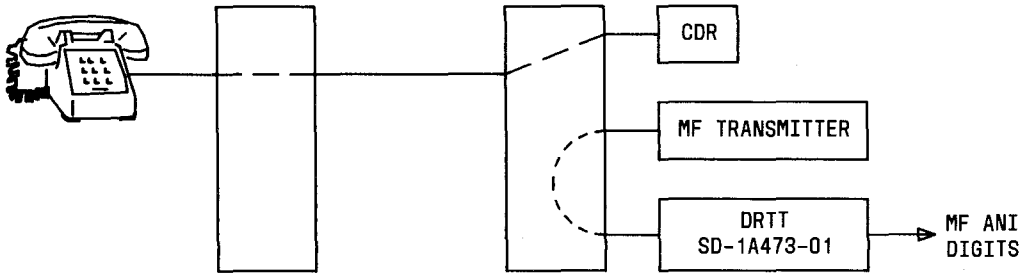
4.70 The NGN input, obtained from the LEN translations, is utilized to obtain the base rate center number (RCNO) and EPSCS customer identification number (EPSID) from number group number-to-rate center (NGN-to-RAC) translator. EPSID is used as input to the private network customer (PNC) translator to obtain current route patterns (NPAT), route index (RI), screening LEN (SLEN), etc. [See reference A(8) in Part 18 for layout of PNC translator].

4.71 The base RAC and the first three digits dialed (D1, D2, D3) are utilized in translations to obtain the rate and route pattern. Rate and route translations and chart column (CCOL) translations yield a call identification word (CIW).

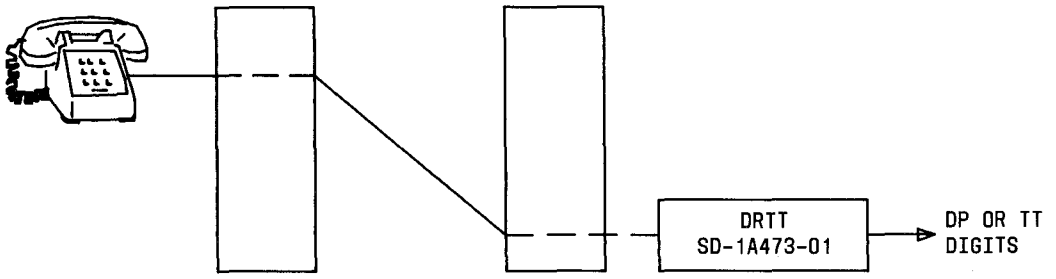
4.72 The CIW provides call type and associated data. The data will be either (a) a normalized



A. USER DIAL '8'



B. OUTGOING TRUNK (SD-1A473) SEIZED, WINK RETURNED, ANI INFORMATION SENT FORWARD



C. SERVICE CIRCUITS RELEASED, STATION DIALS DESTINATION ADDRESS AND AUTHORIZATION CODE TO EPSCS NETWORK SWITCH.

Fig. 18—Access to EPSCS Network with ACSI Feature

office code (NOC) for intraoffice calls, (b) an RI for interoffice calls, invalid calls, service calls, or to the network attendant, (c) a normalized area code (NAC) indicating that foreign area translations are required, or (d) a toll digit-by-digit (TDXD) index for a call type 26 requiring an abbreviated 6-digit translation.

4.73 The Network Attendant feature is covered in reference A(32) in Part 18.

4.74 If the CIW indicates an NAC, 6-digit translation is performed with the NAC data and digits D4, D5, D6 as inputs. If the data is TDXD, a digit-by-digit translation is performed with TDXD, D4, D5, D6, and D7 as inputs. A call type indicating intraoffice call utilizes the NOC, D4, D5, D6, and D7 to perform a DN translation; this yields a nonoutpulsing route index. At the completion of the digit translations, a check is made of the state of the authorization code (AC) indicator contained in the chart column translations (see Fig. 13). Complete details of AC are given in reference A(8) in Part 18. If the indicator is not set, the output route index obtained from translations is utilized to locate a trunk group, and a trunk hunt is performed to find an idle trunk. A TGN supplementary translation is performed to send the ICUP message to the customer network control center (CNCC) [see reference A(4) in Part 18]. The call is completed in accordance with the data in the route index expansion table.

4.75 If the authorization code indicator is set, the routing data obtained to this point is ignored. Checks are made to determine that a receiver is on the call, whether or not error conditions exist, the type of receiver (TT or DP) is determined, and then the recall dial tone is applied indicating to the caller to dial the authorization code. The first three digits of the authorization code are collected and a trunk group supplementary translation is performed to find the authorization code index. Since the number of digits in the authorization code is dependent on the first dialed digit, the digit collection is done in two parts. After the initial three digits are collected, an authorization code translation is performed and the output is either the final data or the number of digits remaining to be collected. The remaining digits, if any, are then collected and the authorization code translation is utilized again. This time the output consists of the final data, which is simply a new screening LEN. A 3-digit translation is now repeated on the original dialed digits (called number), but using the new chart column obtained from the screening LEN of the authorization code. The output from this translation may be the same route and call type as the first 3-digit translation, or may indicate routing to intercept (if the call is not allowed with the authorization code dialed), or may indicate some other route based on the new chart column. From this point the call proceeds as a call without authorization code screening.

4.76 The screening LEN output from the authorization code translation may have other uses in addition to providing a chart column. For example, the screening LEN may indicate that priority queueing is applicable to the call.

CHARACTERISTICS

5. FEATURE ASSIGNMENT

5.01 EPSCS provides a network of dedicated circuits interconnected via No. 1 ESS offices at operating telephone company locations. This service relies on the HILO 4-Wire Switching feature. EPSCS, as a private network, is implemented only on a per customer basis.

5.02 EPSCS is intended for the larger user (a corporation) desiring features that are not available in existing private network offerings, particularly in the areas of customer network control and management.

5.03 EPSCS offers both standard and optional features. Features are applied by either class-of-service coding or authorization codes (which may be applied on an access line or network group basis).

6. LIMITATIONS

OPERATIONAL

6.01 The general limitations pertaining to the HILO feature are applicable to the EPSCS feature and are summarized as follows:

(a) All EPSCS trunks must be located on the HILO network to insure proper transmission levels and office balance.

(b) Existing limits on software items in 2-wire offices are valid for HILO 4-wire offices.

Maximum values for items such as trunk groups, route indexes, trunk link networks, and trunk group size, are unchanged by the HILO feature and reflect the total office configuration, on both the HILO side and the 2-wire side.

(c) All trunks and service circuits terminating on a HILO trunk link network (TLN) must be HILO circuits. Mixing of HILO and 2-wire trunk circuits is not permitted.

Traffic Counts

6.02 The closeout times for traffic counts are not synchronized between network offices; therefore, an outgoing peg count may not equal the corresponding incoming peg count at the opposite end of a trunk group. Pairs of usage figures will exhibit discrepancies from the same cause. The clocks governing these count intervals can be out of phase by several seconds.

Message Detail Record

6.03 There is not necessarily a message detail record corresponding to each access line incoming peg count increment. The peg count is advanced every time a circuit is seized, whereas a message detail record is initiated only if the call provides a realistic called number. Thus, the peg count may exceed the number of message detail records.

TOUCH-TONE Stations

6.04 If any stations in a given customers switching system are TOUCH-TONE, the entire trunk group (i.e., access line group) must utilize dial pulse/TOUCH-TONE receivers. This is also true for centrex groups unless the stations are connected via a tie line cut-through circuit which translates TOUCH-TONE digits, including an authorization code, into dial pulse.

Six-Port Conference Circuits

6.05 Each six-port conference circuit SD-1A399 requires a separate trunk group number.

ASSIGNMENT

6.06 EPSCS software is designed to uniquely identify up to 64 separate EPSCS customers nationwide. It is expected however, that limits such as the number of trunk groups, route indexes, 3/6-digit translators, real time, etc., may limit the number of customers to a switch.

Translators

6.07 A maximum of 256 3- and 6-digit translators exist in a No. 1 ESS, with 3-digit translators limited to appearing in the first 64 entries. The limit includes the total of all MTS, EPSCS, and CCSA translators in the office. Digit translators are dedicated to a given customer; they cannot be shared by the different EPSCS networks served by a given office.

6.08 A maximum of 22 customer-traffic translators are available in a given No. 1 ESS office. One translator is required for:

(a) each 245 traffic counts or fraction thereof, or

(b) each 255 trunks or fraction thereof (for which nonusage information is being gathered).

PBXs Sharing Same NNX

6.09 In a particular network where two or more PBXs share the same NNX, digit-by-digit translations are required to route calls to the appropriate location; number groups are not required and should not be used. Note that 640 NNXs are available to each EPSCS customer; it is preferable to use a separate NNX rather than sharing an NNX since sharing requires additional digit-by-digit translation.

Conferencing

6.10 Routing translations do not provide for the selection of a specific trunk from a trunk group. Consequently, conferencing implementation requires each conference bridge to be assigned a unique trunk group number (TGN).

6.11 The number of conferees per conference bridge (6-port bridges) is limited to no more than six for a conference call.

6.12 Access or restriction to the conferencing feature is provided by screening actions of the authorization codes.

Queues

6.13 A single EPSCS switch can have a maximum of 255 queues to serve all applications on that switch (EPSCS and otherwise).

- The maximum waiting time (T maximum) on a queue can be 17 minutes.

- Trunk groups have a maximum of one queue.

Rate Center Assignments

6.14 Each EPSCS customer is assigned a rate center and, therefore, a unique 3-digit translator. Thus, all the CCSA and EPSCS customers may share a single chart number (on the rate and route pattern record, ESS 1305, and line class code record, ESS 1306). Separate columns must be assigned per network for screening and routing.

6.15 The assignment of two to seven consecutive rate centers must be made for each EPSCS customer for the implementation of the route-pattern selection feature; three consecutive rate centers are standard. Rate centers must have an index in the range 00 through 63, while 6-digit translators may appear in the range 00 through 255. It may be advantageous to reserve 00 through 63 for the rate centers and assign foreign area translators only to the range of 64 through 255; this alleviates the problem of assigning additional rate centers when they are needed.

Authorization Codes and Treatment Groups

6.16 There is a maximum of 16 treatment groups (TRTGs) available per customer. A typical or reasonable number to use is 3 to 8 TRTGs for general screening and 1 additional for each conference bridge in the network. Treatment group 1 is recommended for 6-port conference bridge access. TRTG 0 is recommended for invalid authorization codes. Treatments associated with authorization codes are specified by the customer.

6.17 There are two versions of authorization code screening (ACS), consecutive or ordered. Either version can be used at the same EPSCS switch, and both may be applied to the same EPSCS customer. The decision to use one or the other or both is made by the customer. It should be noted that the treatment group and/or the treatment of a treatment group may be changed with either version of ACs, while changing ACs can only occur under the ordered version.

Direct Access Line (DAL)

6.18 Whenever possible, all DALs for a given customer on a given switch should be assigned to the same ***NNX*** and thousands block. This thousands block may also contain the screening DNs associated with screening LENs. The given ***NNX*** must be unique in that No. 1 ESS office; it may ***not*** be the same as an MTS ***NNX*** served by the EPSCS switch and may ***not*** be the ***NNX*** for DALs of any other EPSCS customer network in the same office.

6.19 DALs may also be assigned a multiple DAL group. This permits two or more DALs per trunk group while allowing:

(a) Access to individual DALs in the same group via a unique 7-digit code

(b) A unique screening LEN for each DAL in a group to permit individual billing

(c) Series completion among members of a group and non-DAL network DNs.

6.20 Multiple DALs are used to conserve trunk group numbers (TGNs) while retaining individual routing and billing capabilities for group members.

7. INTERACTIONS

STATIC

7.01 The EPSCS feature may be loaded with any features that are applicable to the No. 1 ESS 1E5 generic program and later. However, EPSCS trunks may not utilize common channel interoffice signaling (CCIS).

DYNAMIC

7.02 Basically two types of PBX trunk circuits are used to interconnect PBXs with the serving EPSCS office: dial repeating tie trunks (DRTTs) used for advanced private line termination (APLT) application, and CCSA trunks. Neither type is compatible with all EPSCS features or all PBX features. For example, CCSA trunk circuits used with older electromechanical PBXs, such as

the 770A and 812B, are incompatible with certain EPSCS off-network features. DRTTs are compatible with the off-network features but are incompatible with certain PBX features, such as call transfer and automatic identified outward dialing. The features available with the various PBXs are summarized in Table L.

7.03 The EPSCS customer generally falls into one of two categories based on that customer's previous service. Those customers previously served by a tandem tie trunk network (TTTN) will have DRTTs. Those customers previously served by CCSA will have CCSA trunks, but some PBXs will have DRTTs.

7.04 It is the objective to resolve compatibility problems so that all EPSCS features will be available to all business customer switching systems. The reasons for this is so certain customer switching system features will not have to be denied access to and from the EPSCS network. Table M has been developed to determine compatibility and availability for prior TTTN customers. Table N is similar to Table M except it is for prior CCSA customers. Table O is similar to Table L except it is for EPSCS customers with the APLT. Table P gives reference documentation to PBXs which may be used with EPSCS.

7.05 The major EPSCS external interactions are with the HILO feature and the CCSA feature. EPSCS is an extension of the HILO feature and in essence is a dedicated 4-wire network. The interaction between EPSCS and CCSA is in the sharing of the same digit analysis program within the No. 1 ESS.

7.06 The internal interactions within the EPSCS feature package, consisting of a number of relatively independent features, are more numerous than the external interactions and are covered in the following discussion.

TOUCH-TONE Outpulsing

7.07 The TOUCH-TONE Outpulsing feature, as it pertains to EPSCS, is HILO feature dependent; however, the junior register loading and the actual outpulsing is independent of HILO, as is much of the outpulsing return handling.

Authorization Codes and Conferencing

7.08 Authorization codes interact with the Conferencing feature primarily to insure privacy for the conferees. For this reason, the two features are not independently optional. Conference call routing is accomplished via the treatment group assigned to the authorization code. Final routing is derived from the screening LEN chart column; routing is built into the originating screening translation and is not affected by the Routing Pattern Selection feature. Therefore, the CNCC does not have the capability for routing controls for conference calls.

7.09 Conferencing may be provided using either customer-changeable or telephone company-changeable authorization codes. The former allows the customer to change the treatment group associated with a given code as well as selecting which authorization code is applicable for a given conference call. Utilization of these capabilities provides conference security. The latter represents a relatively stable environment, in that changes are infrequent. Thus, this arrangement results in some sacrifice of conference security.

7.10 Other Conferencing feature interactions are:

(a) Priority treatment within the queueing feature may be provided for parties calling into a scheduled conference.

(b) Off-network access to a conference bridge is permitted through an attendant position.

Direct Access Lines

7.11 The DAL feature interacts with the EPSCS screening, CNCC, and message detail features as follows:

(a) ***Screening***—Before an origination can be completed on a DAL, the screening feature determines if the originator must dial an authorization code and, if required, whether or not the dialed code is legal. Based on the dialed authorization code, and the access line group number, the screening feature allows the call to proceed or blocks it.

(b) ***CNCC***—Traffic data relative to originations and terminations are gathered on DALs and provided for use at the CNCC.

(c) ***Message Detail***—Records are compiled on originating DAL calls. This information is stored in a message detail register until the CNCC feature can transmit the data to the CNCC and to the Customer Service Administration Control Center (CSACC). The transfer of message detail to these locations is on a near real-time basis.

Queueing

7.12 Queueing interacts with other EPSCS features as follows:

(a) Calls with designated authorization codes will be given priority queueing.

(b) If an incoming FX trunk cannot be put on queue it is routed to reorder, as in the case with other type calls.

(c) When an incoming FX trunk is on queue or connected to reorder, answer is not returned.

(d) Queueing for DALs may be provided. (Recommended only if the DAL goes to a network operator.)

CNCC

7.13 The CNCC feature aids in providing several standard EPSCS data-transfer features for the customer. These are message details, traffic counts, and the automatic and out-of-service trunk lists. The EPSCS CNCC feature brings the data from these features to the customer in near real time. This feature enables the customer to control the data received in terms of types of calls and time of day. The EPSCS optional features (variable routing patterns, authorization codes, conferencing, time variable routing) all operate through commands originating at the CNCC.

Processor Interface Unit

7.14 The Processor Interface Unit (PIU) feature interacts with the EPSCS No. 1 ESS call processing programs and the PDSP by providing interface software. This software enables communications between No. 1 ESS and PDSP connected through the PIU hardware.

Customer Switching Systems Signaling

7.15 The combination of slow-disconnect times associated with certain PBXs and the fast transmission of signaling through the HILO 4-wire EPSCS office, as well as the ESS criteria for delay-dial signals from PBXs, results in signaling incompatibilities.

7.16 To alleviate these incompatibilities, EPSCS provides the following:

(a) Improved glare resolution

(b) Increased trunk guard timing

(c) Protection of originating PBX from momentary switching noise

(d) Ability of 2-way trunks to have separate inpulsing and outpulsing

(e) Programmed pause during outpulsing to satellite or tributary PBXs or to central offices.

Improved Glare Resolution

7.17 The Improved Glare Resolution feature provided by the No. 1 ESS EPSCS network detects glare on outgoing calls as follows:

(a) ***Wink Start Trunks***—Detection of off-hook lasting from 500 to 600 ms.

(b) ***Immediate Dial, E&M, DP***—Provided if the distant end is not on-hook within 500 ms after seizure.

(c) ***Delay Dial***—Provided if the delay dial (off-hook) is not followed by a start dial (on-hook) within 4 or 6 seconds as established in the trunk class translation data.

7.18 Once glare is detected, it can be resolved either by yielding (connecting a digit receiver while maintaining an off-hook toward the distant end) or by remaining in control (maintaining the outpulsing connection).

Increased Trunk Guard Timing

7.19 When an outgoing trunk is idled at the end of a call, the No. 1 ESS performs 800- to

TABLE L

PBX/EPSCS FEATURE A

TYPE PBX ACCESS CIRCUIT

PBX/EPSCS FEATURES	701B		756B	757A		770A			800A	801A	805A	
	CCSA	DRTT	DRTT	CCSA	DRTT	APLT	CCSA	DRTT	DRTT	DRTT	DRTT	APLT
NID to Stations	A	A	A	A	A	A	A	A	A	A	A	A
—Number NID Digits	1-5	1-5	2	3	3	2-3	2-3	2-3	2	2-3	2	3-4
NID to Attendant												
—Single Digit "0"	A	A	A	NA	A	NA	NA	A	A	A	A	NA
—"011"	A	A	NA	A	NA	A	A	NA	NA	NA	NA	A
Att'd Complete NID Call to PBX, STA, CO, or Tie Trunk	A	A	NA	A	A	A	A	A	NA	A	A	A
Call Transfer, Individual	A	NA	NA	A	NA	A	A	NA	NA	NA	NA	A
Call Transfer, All Calls	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Call Forward-Busy Line	A	NA	NA	A	NA	A	A	NA	NA	NA	NA	A
—Don't Answer	A	NA	NA	A	NA	A	A	NA	NA	NA	NA	A
Timed Reminders	NA	NA	NA	NA	NA	A	A	NA	NA	NA	NA	A
Sta. Id. (ACSI)	A†	NA	NA	A†	NA	A†	A	NA	NA	NA	NA	A†
Trunk Answer Any Station	A	NA	NA	A	NA	A	A	NA	NA	NA	NA	NA
OPR Lockout	A	A	A	A	A	A	A	NA	NA	NA	NA	NA
—Lockout and Privacy	A	A	A	A	A	A	A	NA	NA	NA	NA	NA
Speed Calling	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPSCS Authorization Code	NA‡	A	A	NA‡	A	A	NA‡	A	A	A	A	A
Auto Off-Net to CO	A	A	A	A	A	A	NA	A	A	A	NA	A
Auto Off-Net to TRIB PBX	A	A	A	A	A	A	NA	A	A	A	NA	A

/AILABILITY

FOR EPSCS

812A		101 ESS		DIM 100		DIM 400			DIM 2000			NO. 5 XBR			NO. 1 ESS			NO. 2 ESS	
CCSA	DRTT	CCSA	DRTT	CCSA	DRTT	APLT	CCSA	DRTT	APLT	CCSA	DRTT	APLT	CCSA	DRTT	APLT	CCSA	DRTT	CCSA	DRTT
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
3-4	3-4	3-4	3-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5
NA	A	NA	A	NA	A	NA	NA	A	NA	NA	A	NA	NA	NA	NA	NA	NA	NA	NA
A	NA	NA*	NA	A	NA	A	A	NA	A	A	NA	A	A	NA	A	A	NA	A	NA
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
A	NA	A	NA	A	NA	A	A	NA	A	A	NA	A	A	NA	A	A	NA	A	NA
NA	NA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
A	NA	A	NA	A	A	A	A	A	A	A	A	A	A	NA	A	A	A	A	NA
A	NA	A	NA	A	A	A	A	A	A	A	A	A	A	NA	A	A	A	A	NA
A	NA	A	A	A	A	A	A	A	A	A	A	A	A	NA	A	A	NA	A	A
A	NA	A†	NA	NA	NA	A	A	NA	A	A	NA	A	NA	NA	A	NA	NA	NA	NA
NA	NA	A	A	A	A	A	A	A	A	A	A	A	A	NA	A	A	A	A	A
NA	NA	NA	NA	A	A	A	A	A	A	A	A	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	A	A	A	A	A	A	A	A	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	A	A	NA	NA	A	A	NA	A	A	NA	NA	NA	NA	NA	A	NA	A	NA
NA‡	A	NA‡	A	NA‡	A	A	NA‡	A	A	NA‡	A	A	NA‡	A	A	NA‡	A	NA‡	A
NA	A	NA	A	NA	A	A	NA	A	A	NA	A	A	NA	A	A	NA	A	NA	A
NA	A	NA	A	NA	A	A	NA	A	A	NA	A	A	NA	A	A	NA	A	NA	A

A =Available; NA = Not Available.
* Can be provided if "011" is in the 101 ESS numbering plan.
† Where ANI/AIOD equipment is in place and providing 20% CCSA sample.
‡ Can be provided if calling station is equipped with TOUCH-TONE Calling.

	TYPE PBX AND ACCESS CIRCUIT (DRTT)													
PBX/EPSCS FEATURES	701/711 65718-02 1E500-02	740 65718-02 1E500-02	756 65718-02 1E500-02 (NOTE 3)	757 65718-02 1E500-02 (NOTE 3)	800 65718-02 1E076-01 1E321-01 (NOTE 3)	801 65718-02 1E321-01 (NOTE 3)	805 1E221-01	101 ESS 1H083-01	770 65718-02 1E500-01 1E500-02 (NOTE 3)	812 65718-02 1E500-01 1E500-02 (NOTE 3)	DIMENSION 100/400/400E/2000/ CUSTOM LC-11 CIRCUIT PK (NOTES 2, AND 10)	#5XBR 65718-01 65718-02 65718-02 ES262882	NO. 1 ESS 1A237	NO. 2 ESS 2H157
1 Digit "8" Acess	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Note 8	Yes	Yes
3, 7, 10 Digit Address	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Authorization Code	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Note 5	Yes	Yes	Yes	Yes	Yes	Yes
Tandem SAT/TRIB	Yes	Yes	Yes	Yes	Yes	Yes	No	Note 6	Yes	Yes	Yes	Yes	Yes	Yes
Tandem Off-Net	Yes	Yes	Yes	Yes	Yes	Yes	No	7 digits only	Yes	Yes	Yes	Yes	Yes	Yes
Network In-Dial to Stations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Network In-Dial to Attendant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Att'd Complete NID Call to Station CO or Tie Trunk	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Call Transfer	No	No	No	No	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Call Forwarding Busy Line/Don't Answer	No	No	No	No	No	No	No	No	No	No	Yes	No	Yes	Yes
Station ID (ACSI)	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Attendant Release Link Trunk (RTL)	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Start Signal Required	None	None	DD	Note 4	DD	DD	DD	Note 7	DD	DD	DD	WS	WS	WS

DD = Delay Dial; WS = Wink Start

Notes:

1. This table shows the feature availability assuming the tie trunk equipment used for TTTN service is retained for EPSCS.
2. The LC-11 circuit pack is covered by different SD drawings for each of the DIMENSION® systems.

Dim.		Code	
	100	201VS	SD-1E477
	400	201S	SD-1E446
	400 E	201SE	SD-1E464
	2000		
	Custom	201L	SD-1E480

3. In addition to trunk circuit SD-65718-02 the following auxiliary units are required on the indicated PBXs:

756—SD-65741-01	801-SD-1E319-01 (If 1E321-01 circuit used, aux unit not required)
757—SD-66765-01	812-SD-1E406-01
800—SD-1E027-01/02 (If 1E076-01 or 1E321-01 circuit used, aux unit not required)	770-SD-1E 363-01

4. 757 PBX—No standard delay dial option: field mod. information available.
5. 101 ESS—User authorization available only if stations are TOUCH-TONE equipped. Possible impairment of stutter-dial tone.
6. When 101 ESS is used as main, Note 5 applies to SAT/TRIB PBXS as well.
7. 101 ESS—Delay dial option is not compatible.
8. #5XBR digit "8" cut-through modification is required; in addition the following private line network (PLN) options are required to provide standard digit "8" access.
   #5XBR CTX—In additon to the trunk circuit SD-65718-01/02, the auxiliary unit ES 26288 is required.

Dial tone marker	26001-01YX	Trunk link connector	26033-01ZC
Completing marker	26002-01QL	AMRST	25680-01JV
Originating register	26040-01UJ	Master test control	25800-01
ORMC—Marker part	26023-01A	Master test connector	25805-01TE
ORMC—Register part	26024-01H		

9. All PBX CTX feature are available contingent on individual local company tariffs.
10. Since the same hardware is used for tie trunks, CCSA access lines, and advanced private line trunks (APLT), changing the software encode will provide all features shown in Table I.

TABLE M

TTTN-TO-EPSCS CUSTOMER CONVERSION AND FEATURE AVAILABILITY (NOTE 1)

TABLE N
CCSA-TO-EPSCS CUSTOMER CONVERSION AND FEATURES AVAILABLE (NOTE 1)

	TYPE PBX AND ACCESS CIRCUIT													
PBX/EPSCS FEATURES	701/711 5E006-1 5E004-01 5E028-01	740 65718-02 1E500-02 NOTE 6	756 65718-02 1E500-02 NOTE 6	757 5E041-01	800 65718-02 1E076-01 NOTE 6	801 65718-02 1E321-01 NOTE 6	805 1E221-01 NOTE 6	NO. 101 ESS 1H088	770 1E352-01	812 1E407-01	DIMENSION 100 1E476	DIMENSION 400/2000 1E446 1E464 1E480	NO. 5 XBAR 27654 27655	NO. 1 ESS 1A236 1A237	NO. 2 ESS 2H157 2H158
1 Digit "8" Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
3, 7, 10 Digit Address	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No		No	Yes	Yes
Authorization Code	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Note 2	Yes	Yes	Note 2		Note 2	Note 2	Note 2
Tandem SAT/TRIB	Yes	Yes	Yes	No	Yes	Yes	No	No	No	No	No		No	No	No
Tandem Off-Net	Yes	Yes	Yes	No	Yes	Yes	No	No	No	No	No		No	No	No
Network In-Dial to Stations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Network In-Dial to Attendant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Attendant Complete NID Call to Station CO or Tie Trunk	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Call Transfer	Yes	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Call Forwarding Busy Line/Don't Answer	Yes	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Station ID (ACSI)	Note 3	No	No	Note 3	No	No	No	Note 3	Note 3	Note 3	No	Yes	No	No	No
Attendant Release link trunk (RLT)	No	No	No	No	No	No	No	No	No	No	No	Note 5	Note 5	Note 5	No
Start Signal Required	None	None	DD	DD	DD	DD	DD	Note 4	DD	DD	DD	DD/WS	WS	WS	WS

DD = Delay dial; WS = Wink start

Notes:

1. Exisiting CCSA customers cutting over to EPSCS may have CCSA trunk circuits in 701 and 757, these should be retained with limited features. It is recommended not to retrofit 701 or 757 with the CCSA trunk circuit if it is not already equipped.
2. Can be provided if calling station equipped with TOUCH-TONE calling (stutter dial tone may be impaired with 101 ESS).
3. Where ANI/AIOD equipment in-place and providing 20% CCSA sample.
4. 101 ESS—No new development planned at this time.
5. The added feature of the attendant release link trunk will be available only with the DIMENSION® 2000 and CTX/CO vehicles (available about 2Q80).
6. These "MD" vehicles do not have a CCSA trunk circuit available, DRTT used for both CCSA and TTTN.

TABLE O
EPSCS CUSTOMER WITH APLT
AND FEATURES AVAILABLE

	TYPE PBX AND ACCESS CIRCUIT				
PBX OR EPSCS FEATURE	770 1E352-01 NOTE 1	812 1E407-01 NOTE 2	DIMENSION 400/2000 LC-11 CKT. PK. NOTE 3	NO. 5 XBAR 28126-01 NOTE 4	NO. 1 ESS 1A473-01 NOTE 5
1 Digit "8" Access	Yes	Yes	Yes	Yes	Yes
3, 7, 10 Digit Address	Yes	Yes	Yes	Yes	Yes
Authorization Code	Yes	Yes	Yes	Yes	Yes
Tandem SAT/TRIB	Yes	Yes	Yes	Yes	Yes
Network In-Dial to Stations	Yes	Yes	Yes	Yes	Yes
Network In-Dial to Attendant	Yes	Yes	Yes	Yes	Yes
Attendant Complete NID Call to Tie Trunk	Yes	Yes	Yes	Yes	Yes
Call Transfer	Yes	Yes	Yes	Yes	Yes
Call Forwarding Busy/ Line Don't Answer	Yes	Yes	Yes	Yes	Yes
Station ID (ACSI)	Note 7	Note 7	Yes	Yes	Yes
Attendant Release Link Trunk (RLT)	No	No	Note 6	Note 6	Note 6
Start Signal Required	DD	DD	DD/WS	WS	WS

DD = Delay dial; WS = Wink start

Notes:

1. 770 PBX—When J58876YU-1 applique is applied.
2. 812 PBX—When J58877BL-1, L-3 modification applied.
3. DIMENSION® 400/2000-When APLT software is applied. The LC-11 circuit pack is covered by different SD drawings for each DIMENSION system.

DIM—400	Code 201S	SD-1E446
DIM—400E	201SE	SD-1E464
DIM—2000	201L	SD1E 480
Custom		

4. No. 5 XBAR - When necessary marker group modifications applied.
5. No. 1 ESS - with 1E6/1AE6 generic program.
6. The added feature of the attendant release link trunk will be available only with the DIMENSION 2000 an CTX/CO vehicles. (Available about 2Q 80.)
7. Where ANI/AIOD equipment in place and previously providing 20% CCSA sample.

TABLE P
TYPE PBX/SWITCH REFERENCES

TYPE PBX SWITCH	BSP REFERENCE
701	981-610-100
756	981-660-100
757	981-662-100
770	981-680-100
800	981-705-100
801	981-706-100
805	981-709-100
812	981-712-100
101 ESS	966-300-100
DIM—100	554-101-102
DIM—400	554-101-100
DIM—400E	554-105-100
DIM—2000	554-111-100
No. 5 XBR	958-110-100
No. 1 ESS	966-102-100
No. 2 ESS	966-202-100

1000-ms guard timing before making the trunk available for further calls. During the guard timing interval, the trunk is not scanned for new seizures. At the end of the interval, the trunk is restored to service without verifying that the distant end has returned on-hook. This results in false seizure when PBXs with disconnect times in excess of the guard interval are involved. To alleviate this problem, the guard timing interval can be extended to an interval of 1600 to 1800 ms by setting bit 11 of word 4 in the trunk class code expansion.

Protection of Originating PBX from Noise

7.20 Certain PBXs may experience false disconnect before a true answer has occurred, due to a momentary off-hook indication which is passed through the network switch from the called end to the originating PBX. The EPSCS office is able to return an off-hook indication to the originating PBX before the tandem connection is set up in the EPSCS office, thus preventing any signals received on the outgoing trunk of less than a 2-second duration from being passed to the originating PBX. This capability is provided by setting the disconnect timing item in the TCC expansion via recent change and update for the associated network access line.

2-Way Pulsing

7.21 The No. 1 ESS can treat inpulsing and outpulsing modes separately for normal 2-way trunks. This alleviates the problem of a manual outgoing/inpulsed incoming trunk to an 805 PBX. Also, MF outpulsing is permitted to a centrex when TOUCH-TONE/dial pulse cut-through from the centrex is provided.

Programmed Pause During Outpulsing

7.22 Outpulsing to a satellite or tributary PBX via a main PBX will result in digit mutilation if the main PBX cut-through and/or register-attachment delay is greater than the minimum No. 1 ESS interdigital interval of 600 ms.

7.23 The programmed pause during outpulsing capability may be used to alleviate this problem. Use of the programmed pause capability is subject to the following limitations:

(a) A pause fills two prefix digit slots out of a maximum of seven in the route index expansion.

(b) When more than four prefix digit slots are used, two route indexes are actually consumed, due to the data structure involved.

(c) The pause is a "blind" pause; no supervision is maintained on the outgoing trunk during the pause interval.

(d) The length of the pause is variable. The maximum is a 9- to 10-second pause, the minimum deviation is 1 to 2 seconds.

(e) Multiple pauses are permitted within the constraints of item (a).

(f) An initial pause is valid.

(g) Only the following pulsing pause combinations are valid:

Dial pulse—Pause—Dial pulse

TOUCH-TONE—Pause—TOUCH-TONE

Dial Pulse—Pause—TOUCH-TONE

The route index expansion must indicate TOUCH-TONE as a transmitter type if TOUCH-TONE is used anywhere in the outpulsing sequence.

Automatic Calling Station Identification

7.24 When EPSCS provides the ACSI feature with a customer premise switching unit, the Automatic Identified Outward Dialing (AIOD) feature is required. Thus the AIOD frame, data links, and dedicated facilities for the data links are required. The AIOD data links are used to transmit the 4-digit station identification number. There is a maximum of 60 AIOD data links in a given ESS office. The NOC is derived from existing translations. A customer failure billing number is substituted for the calling number any time the station identification can not be determined.

8. RESTRICTION CAPABILITY

8.01 The EPSCS feature is considered a Program Controlled System with many subfeatures associated with it. Restriction of features are built into the system through the use of line class codes and authorization codes. Service order activity can give the customer the flexibility and control over the features included in EPSCS.

CNCC

8.02 The Customer Network Control Center (CNCC) software feature cannot directly restrict EPSCS network calling. The CNCC cannot make trunks busy but is notified when trunks are taken out of service or restored, and can request a list of out-of-service trunks.

8.03 The CNCC has the capability to establish up to three types of traffic patterns for their particular network. Traffic overflows, maintenance, and usage are reasons for this flexibility of control. When a pattern is changed, it is changed at all switches.

INCORPORATION INTO SYSTEM

9. INSTALLATION/ADDITION/DELETION

GENERAL

9.01 The procedures for incorporating the EPSCS feature into an office are given in Fig. 19. The No. 1 ESS business service procedures required for EPSCS access are given in Fig. 20.

10. HARDWARE REQUIREMENTS

COST FACTORS

10.01 The following system cost factors are given on a per circuit basis. The circuits are described in Part 4. Engineering data is given in DETERMINATION OF QUANTITIES below.

(a) Each processor interface frame SD-1A457 requires 10 bipolar central pulse distributor (CPD) points and 6 supervisory master scanner points.

(b) Each processor interface requires 4 unipolar CPD points and 12 directed master scanner points.

(c) Each tone and recorded announcement circuit SD-1A383 requires 1 HILO universal trunk scanner point and 2 signal distributor (SD) points.

(d) Each network trunk or network access line circuit SD-1A362 requires 2 HILO universal trunk scanner points and 3 SD points. See Table E for trunk order code.

(e) Each foreign exchange (FX) ONAL circuit SD-1A396 requires 2 HILO universal trunk scanner points and 2 SD points. See Table E.

(f) Each direct access line circuit SD-1A364 requires 2 HILO universal trunk scanner points and 2 SD points.

(g) Each TOUCH-TONE transmitter SD-1A375 requires 9 CPD points, 3 master scanner points, and 1 SD point. See Table F.

(h) Each TOUCH-TONE transmitter test circuit SD-1A369 requires 3 SD points and 10 master scanner points. See Table F.

(i) Each meet-me conferencing circuit SD-1A399 requires 7 supervisory master scanner points and 7 signal distributor points.

(j) Each HILO interface circuit SD-1A392 requires no master scanner points, no SD points, and no CPD points.

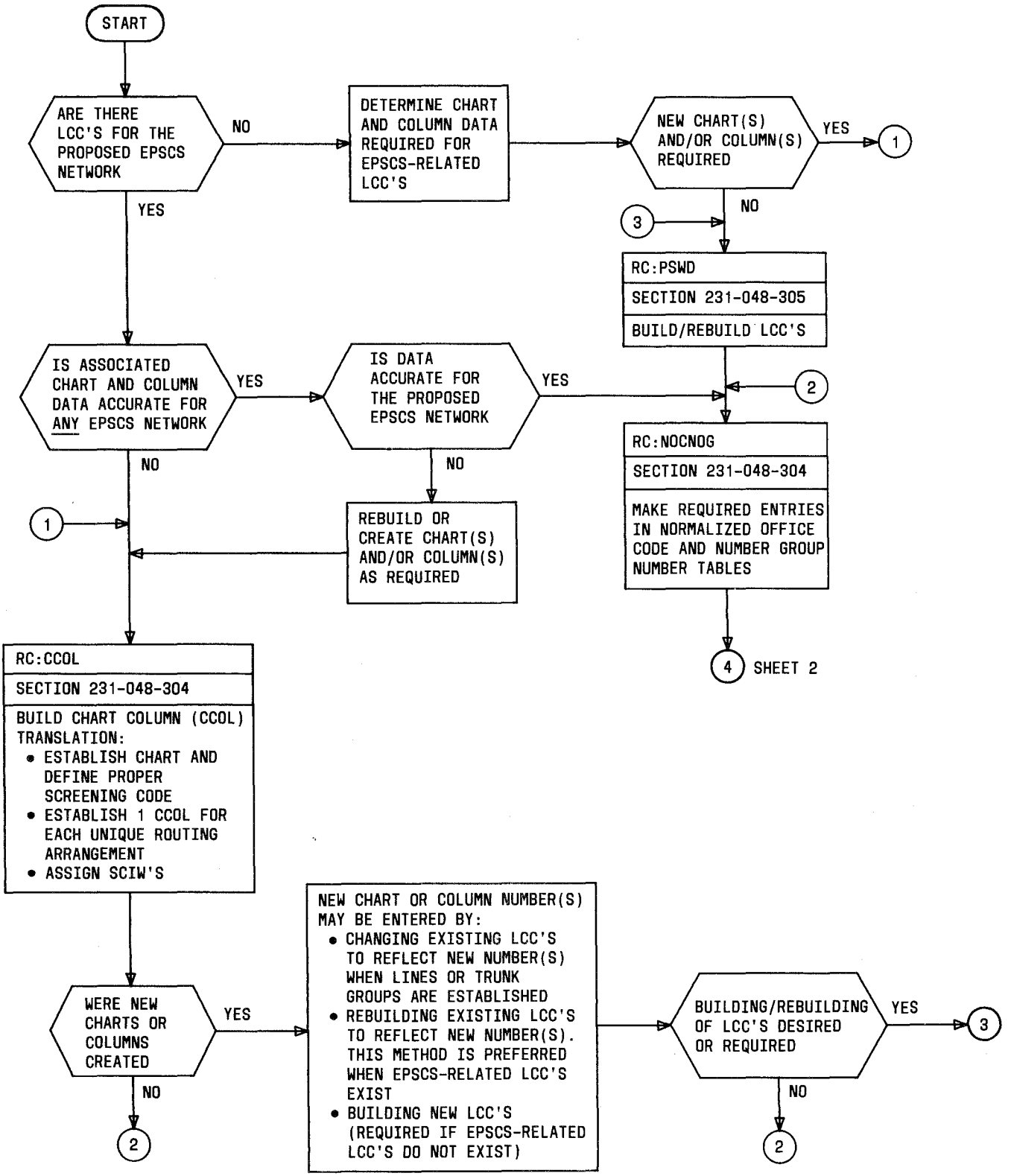
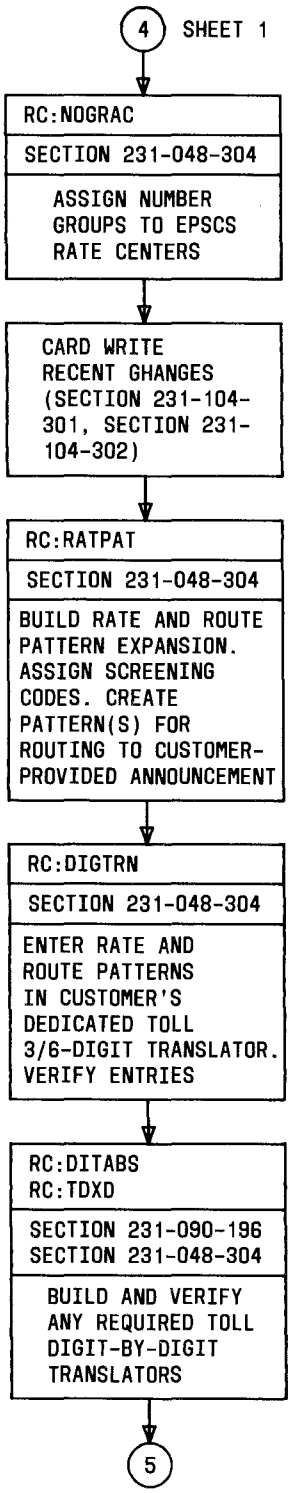
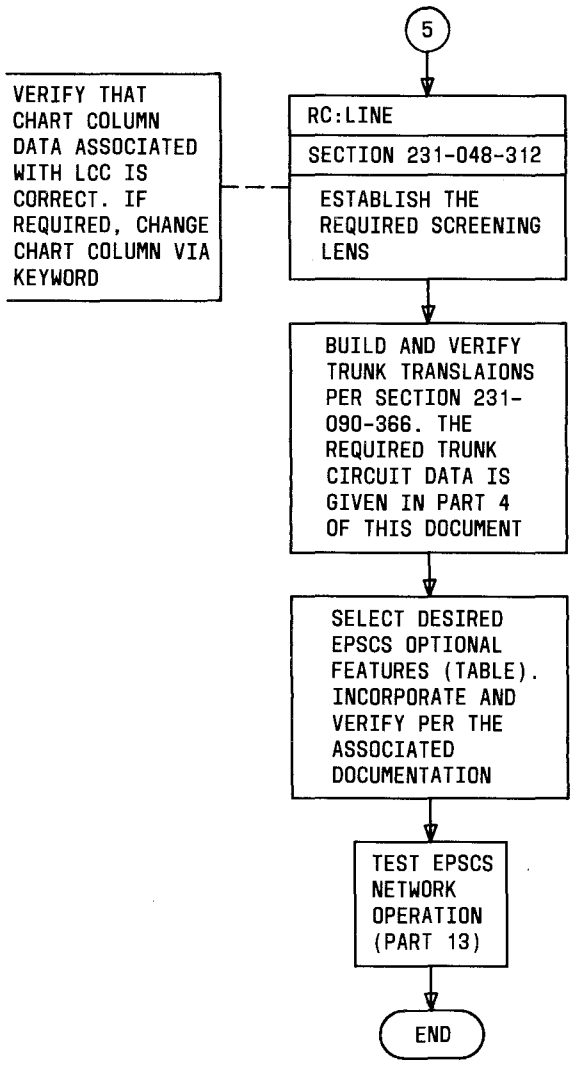


Fig. 19—EPSCS Growth/Retrofit Procedures (Sheet 1 of 2)

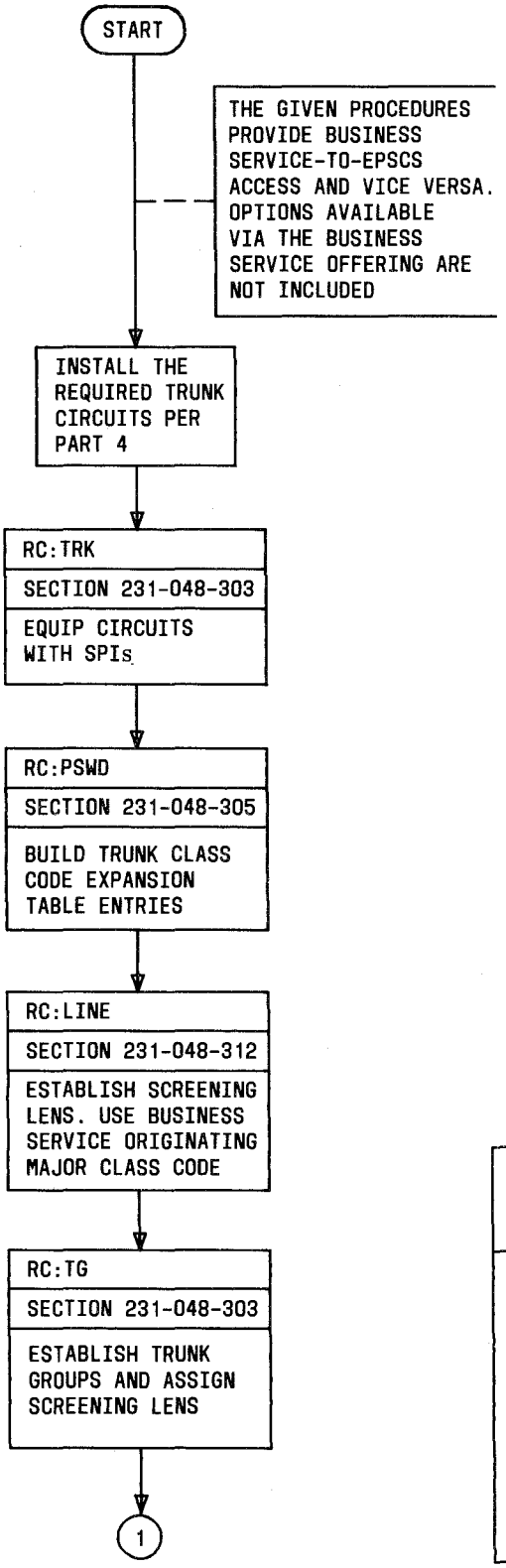


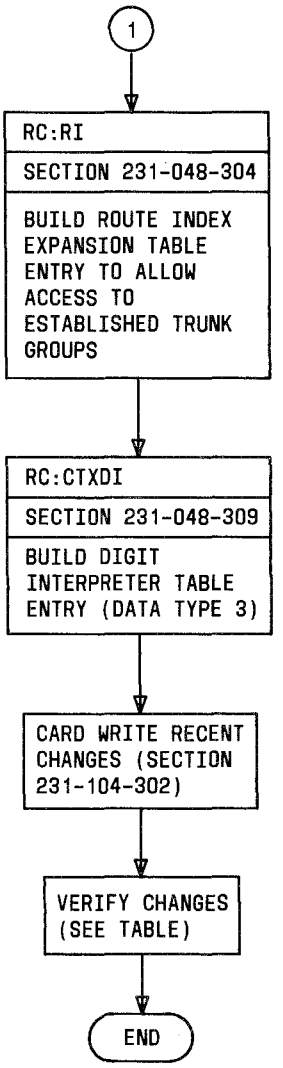


TABLE

OPTIONAL FEATURES	DOCUMENTATION
USER-DIALED AUTHORIZATION CODES	SECTION 231-190-135
NETWORK MESSAGE DETAIL RECORDING	SECTION 231-190-130
OFF-NETWORK CALLING VIA CUSTOMER-PREMISES SWITCHER	SECTION 231-190-134
NETWORK TRUNK QUEUING	SECTION 231-190-129
4-WIRE DIRECT ACCESS LINE	SECTION 231-190-133
MEET-ME CONFERENCE	SECTION 231-190-128
TRAVELING CLASS MARK	SECTION 231-090-138
AUTOMATIC CALLING STATION ID.	SECTION 231-090-254
INTERFACE WITH PDSP	SECTION 231-190-136

Fig. 19—EPSCS Growth/Retrofit Procedures (Sheet 2 of 2)





TABLE

TO VERIFY	USE TTY MESSAGE (IM-1A001)	SYSTEM RESPONSE (OM-1A001)
SPI ASSIGNMENTS	VFY-UTCH	TR11
TRUNK CLASS CODE EXPANSION TABLE DATA	TAG-TNN-TCL T-READ	TR21 TW02
SCREENING LEN DATA	VFY-LEN	TR03
TRUNK CIRCUIT DATA	VFY-TKGN	TR10
ROUTE INDEX DATA	VFY-EXP	TR05
DIGIT INTERPRETER TABLE ENTRIES	VFY-XDGNT	TR18

Fig. 20—No. 1 ESS Business Service—EPSCS Interface Growth/Retrofit Procedures

(k) Each 2-way circuit SD-1A473 at the centrex switch requires 6 SD points and 3 master scanner points. See Table J.

(l) Each 3-port conference bridge SD-1A483 requires 6 SD points and 3 master scanner points. See Table J.

DETERMINATION OF QUANTITIES

10.02 The quantity of facilities required depends upon the number of customers and the choice each customer makes in regard to the characteristics of the network.

A. Network Access Lines and Network Trunks

10.03 Network access lines and network trunks are engineered by members of the national account team, using the economic hundred call second (ECCS) method and customer-specified blocking probability. The quantity of terminations at each switch is specified in a periodic forecast. Details are given in reference A(41) in Part 18.

B. Direct Access Lines

10.04 Each individual access station, key telephone station, and voice frequency data set connected to an EPSCS private network requires trunk circuit SD-1A364. These trunk circuits are provided on the basis of customer need and do not require engineering.

10.05 DAL station dialing may be via dial pulse or TOUCH-TONE. Consequently, digit reception is normally via dial pulse/TOUCH-TONE receivers. If a given customer utilizes dial pulse for all DALs terminating on a given No. 1 ESS, digit reception may be provided via dial pulse or dial pulse/TOUCH-TONE receivers, as determined locally. Digit receivers are engineered according to existing criteria given in references A(40) in Part 18; an update may be required to accommodate DAL station originations.

C. Six-Port Conference Circuits

10.06 The quantity of 6-port conference circuits provided for a given customer is specified by the customer. The quantity provided at a given EPSCS office is the total of the quantities specified by the various customers. This total is entered as the value of parameter set card HLCF6.

D. TOUCH-TONE Transmitter and TOUCH-TONE Transmitter Test Circuit

TOUCH-TONE Transmitters/Dial Pulse Transmitters

10.07 The TOUCH-TONE transmitters should be provided on a high day basis with P.01 blocking. Holding times are a summation of the following:

(a) 0.50 second overhead

(b) 0.12 second per TOUCH-TONE digit outpulsed

(c) 0.10 second per dial pulse; the number of pulses required equals the outpulsed digit, where "0" is treated as 10

(d) The required pause duration, in seconds.

Typically, pauses are for dial tone delay in a class 5 office and/or customer premises equipment setup time; exact times should be determined from the characteristics of the interfacing equipment. The load attributable to EPSCS should be added to the load attributable to all other applications of the TOUCH-TONE outpulsing (LHTO) feature group to give the total load. The LHTO feature group may utilize dial pulse transmitters when an outpulsing sequence is all dial pulse. Usage is office dependent and may affect the quantity of dial pulse transmitters required. Engineering is per existing criteria.

TOUCH-TONE Transmitter Test Circuit

10.08 TOUCH-TONE transmitter test circuits should be provided in the same manner as other test circuits not used for message trunk diagnostics. The quantity provided is typically two.

E. Processor Interface Frame

10.09 EPSCS requires one processor interface frame. This is indicated via parameter set card PIF. The set card value is equal to the quantity of frames. The unused or default value is zero. The maximum value is 16.

F. MF Transmitters and Receivers

10.10 These circuits are used by the Traveling Class Mark feature to pass the 2-digit code between EPSCS network switches. An additional

0.30 second of holding time per call, with TCM feature, should be considered in determining if additional MF transmitters or receivers are required. These circuits are also used for centrex-CO access lines and all network trunks for normal operation. ACSI information from centrex-CO requires MF circuits.

G. 3-Port Conference Bridge 4-Wire

10.11 The Network Attendant feature uses a new 4-wire 3-port conference bridge SD-1A483. One 3-port bridge should be provided for each release link facility terminating on an EPSCS switch. Three interface circuits SD-1A392 are required for each 3-port conference bridge circuit provided.

H. Automatic Calling Station Identification (ACSI)

10.12 When ACSI is provided to an EPSCS business customer and is homed on a Customer Premises Switching System, the AIOD frame J1A033G-1 must be installed. Each access trunk group that passes station identification from a business customer location requires one AIOD data link circuit SD-1A301. Data link circuits are ordered in units of six and mount in the AIOD frame. (See reference A(28) in Part 18.)

10.13 When ACSI is provided to an EPSCS customer and is homed on a No. 1 ESS or No. 5 Crossbar Switching System, it is recommended that the new two-way trunk circuit SD-1A473 is used for access trunking to improve transmission quality. This trunk circuit must be used for dial pulsing and enhances the IXX feature; however, it will be of no use for transferred calls extended onto the EPSCS network. In this case, a 3-port conference bridge circuit becomes an intermediary between the calling party and the outgoing trunk. Dial pulses cannot be repeated through this circuit. Therefore, the standard IXX feature must still be used for this case even if the office has the improved IXX feature. Table E summarizes the equipment characteristics of this circuit. For complete details of the improved IXX and the standard IXX features, see reference A(27) in Part 18.

10.14 MF receiver usage at EPSCS switch and transmitter usage at centrex switch is increased due to ACSI feature. The receivers should be engineered for 10 high days busy-hour calls, with a 2-second holding time and a P.01 grade of service. The transmitters should be provided with the assumption of 1.3 seconds holding time.

11. SOFTWARE REQUIREMENTS

COST FACTORS

11.01 The cost factors listed herein are for the complete EPSCS offering. Tabulation as per fixed, conditional, and variable is included. The following information is applicable to the 1E6 and later No. 1 ESS generic programs. Additional cost factor data per individual feature can be obtained from documents referenced in Table J.

Fixed

11.02 The following memory is required in a No. 1 ESS whether or not the EPSCS feature group is provided.

- ***Generic (Base) Program (program store):*** Approximately 2562 words.

- ***Parameters (program store):***

  (a) 1 word; F4CUST, shared by the EPSCS and ACS feature packages.

  (b) 6 words; (8 if equipped for network management) plus 16 existing words modified for HILO (HL4W) feature.

  (c) 1 word; T6TATO, required to specify a block of variable call store used to administer timing for the TATO feature.

  (d) 1 word; Y3MMSB, contains number of SD1A399 circuits and starting address of conference state block in variable call store, for MMCF feature.

  (e) 1 word; P2PPMSG, used to build call store message blocks needed to receive incoming messages from the PIU.

  (f) 1 word; P2PPMC, used to build a block of call store for identifying confirmations returned after a message is sent to the PIU.

(g) 1 word; P8GRTH, used to indicate the growth status of PIFs in a No. 1 ESS office.

(h) 1 word; X2LMN + 60, contains number of PIFs in office.

(i) 1 word; N2TGNANX, for the NTTQ feature.

(j) 3 words; 1 contains the address of the RR3 head table; 1 contains the length of the RR3 registers; and 1 for the I4REGS table.

(k) 1 word; P2MMSG, for the CNCC feature.

(l) 6 words; B6CTRF, B6CTNL, B6NUTS, B6CTHR, B6CTTM, and E2SEGMNT. The first 5 words are shared with the CTRF feature. E2SEGMNT is dedicated to the EPSCS feature.

Conditional

11.03 The following memory is required when EPSCS is provided in the office:

- ***Generic Program (program store):*** See Table Q for feature group and feature package sizes.

- ***Call Store:***

(a) One trunk group head cell annex word; (call store table TGNANX) required for each trunk group (set card NTG) in the office when NTTQ feature is loaded.

(b) 16 words dedicated plus 16 words shared per queue for QTL supplementary head cell when extended traffic counts are to be taken.

(c) 16 words dedicated, plus 16 words (call store table AQTL HT) per queue for QTL head cell (set card AQTLG).

(d) One 14-word (call store table QRG) queueing register (set card NQR) for each queue slot.

(e) One fixed word plus 2-1/2 words per simulated facilities group; each trunk group with queueing must be assigned a SFG number (set card SFG).

(f) One 8-word (call store table SIMF01) simulated facilities register (set card NSF) for each trunk in a trunk group equipped for queueing.

(g) 8- or 10-word call store block for RADR, if equipped, for the HL4W feature.

(h) 2-word head table for the linked list of idle message block, for the interface with PIU feature.

(i) 2-word head table for the linked list of deferrable message block, for interface with PIU feature.

(j) 11 words for working storage of PIU feature.

(k) 132 words plus the value of set card TATT, with a maximum size of 1027 words, used to administer TATO calls which have no associated call register on the final connection to tone or announcement.

(l) 2 words for the DAL ringing register head table (EPSC).

(m) 1 word for each SD-1A399 circuit provided in the office for MMCF feature.

(n) A block of variable call store to serve as DAL ringing registers. The size of the block is 19 times the value of set card NRR3.

(o) 35 words for a customer traffic timetable map for the CTRF feature.

(p) 23 words for a nonusage trunk scan head table for the CTRF feature.

(q) 64 words for the EPSCS traffic segment table, plus 12 EPSCS traffic scratch words for the CTRF feature.

(r) 16 words for a table to provide rate center indexes for the EPSCS feature.

(s) 13-word MDR register required by the Network Attendant feature per incoming

call and for each attempt to extend the call.

(t) 1 word plus 1 word for each SD-1A483 circuit provided for the NEAT feature (CST QTT4C).

(u) 12 words plus 1 word for each EPSCS customer for RC administration traffic count (CST RCAD).

- ***Translations (program store):***

(a) HILO 4-Wire Switching feature:

(1) 7 words per H(U) frame

(2) 3, 6, or 9 words per H(M) frame, depending upon supplementary signal distributor option

(3) 1 word per TSF

(4) 19 words per MTT frame

(5) 3 words per AMT frame

(6) 12 or 23 words for RADR, if equipped

(7) 1 existing word utilized per ROTL, if equipped

(8) 5 existing words utilized for network management, if equipped.

(b) Network Attendant feature:

(1) 4 words for the 4-wire trunk TOUCH-TONE receiver queue headcell for the Network Attendant feature

(2) 34 words per 4-wire 3-port conference register provided for the Network Attendant feature.

Variable

11.04 The following memory is required when EPSCS is provided to a customer:

- ***Translations (program store):***

(a) Direct Access Line feature:

(1) 5 words minimum to provide screening LEN auxiliary block for the associated DAL trunk group. Trunk groups with different screening requirements must be assigned different screening LENs. An additional word in the LEN auxiliary block (making minimum 6 words) is required if the associated DAL trunk group is equipped with the Direct-Connect feature. The Direct-Connect feature requires 1 word in the speed calling list to contain the DN to which the call completes.

(2) 1 word in the DN subtranslator to deny call termination to a screening LEN. There is one word required for each screening LEN utilized.

(3) 1 or more chart column translators, depending upon screening arrangements. It may be possible to utilize a column(s) in a translator(s) used for non-DAL screening.

(4) 5 words in the route pattern expansion table for each unique normalized office code utilized.

(5) 1 word in the number group number table for each unique normalized office code utilized.

(6) 6 words for DN translations.

(7) 2 words in the route index expansion for each route index utilized.

(8) 4 words per office for a trunk class code expansion for DALs.

(9) 4 words for a trunk group number auxiliary block. This is a per trunk group utilized cost.

TABLE Q
EPSCS PROGRAM STORE SIZE (1E6B GENERIC)

SET CARDS		FEATURE PACKAGE	PROGRAM STORE WORDS		
FEATURE GROUP	ACRONYM		PATCH	LOADED	TOTAL
9SEPSC	9FBASI	Basic ASI Intraflow for QTL Customers	51	397	448
9SEPSC	9FBQNS	Basic QTL Queueing Night Transfer	18	174	192
9SEPSC	9FBTRK	Basic Intraflow QTL Trunk Termination Code	179	1805	1984
9SEPSC	9FCCI	Customer Common Identification	222	1442	1664
9SEPSC	9FCDIS	CAMA Disconnect	17	111	128
9SEPSC	9FDAL	4-Wire Direct Access Line	60	388	448
9SEPSC	9FEPSCS	Misc. Enhanced Private Sw. Communication Srv. Fea.	426	4054	4480
9SEPSC	9FGINF	General Intraflow Logic for QTL Customers	75	437	512
9SEPSC	9FMMCF	4-Wire Meet Me Conferencing	110	914	1024
9SEPSC	9FNTTQ	Network Trunk Queueing	140	564	704
9SEPSC	9FQPRI	Priority QTL Queueing	79	113	192
9SEPS2	9FACSI	Automatic Calling Station Identification	108	404	512
9SEPS2	9FNEAT	Network Attendant for EPSCS	428	4030	4458
9SIAC	9FACS	Authorization Code Screening	148	2156	2304
9SIAC	9FCLOG	Printed Record of Customer Originated RC	112	592	704
9SIAC	9FRCAD	Increased RC Administration and Conrol	187	581	768
9STCM	9FTCM	Traveling Class Mark	141	563	704
9SMTTP	9FMTTP	Manual Trunk Test Position	428	1108	1536
9SCTRF	9FCTRF	Customer Traffic Data	94	1826	1920
9SCTRF	9FOPSW	Outpulsing Switching Routines	74	118	192
9SPIU	9FPIU	Processor Interface Unit	191	6785	6976
9SHL4W	9FHL4W	HILO 4-Wire Switching	237	8211	8448
9SLHTO	9FLHTO	Local and HILO TOUCH-TONE Outpulsing	117	1675	1792
9SACS	9FACS	Authorization Code Screening	148	2156	2304
9SAIOD	9FAIOD	Automatic Identified Outward Dialing	153	3175	3328
9SMPTY	9FMPTY	4/8 Party	149	811	960

(10) 1 word per DAL in the trunk network number-to-peripheral equipment number (TNN-to-PEN) subtranslator.

(b) Network Trunk Queueing feature:

(1) An 18-word unit type 55 auxiliary block per queue.

(2) A 4-word simulated facilities group (SFG) auxiliary block queue group.

(3) An 11-word screening LEN auxiliary block queue group.

(4) 1 word per trunk group in the trunk group supplementary auxiliary block (word E) plus an item (in word 0) indicating the presence of word E. Word 0 is included in the cost of providing the trunk group.

(c) Meet-Me Conferencing feature:

(1) 55 words per SD-1A399 circuit provided; 9 words for each of the six conference bridge ports [for a peripheral equipment number (PEN) auxiliary block] plus 1 primary translation word.

(2) 4 words per office for a trunk class code expansion.

(3) 8 words per SD-1A339 circuit provided; 2 words for a trunk network number-to-trunk group number (TNN-to-TGN) auxiliary block and 6 primary translation words.

(4) 5 words per SD-1A399 circuit provided; 4 words for a TGN auxiliary block and 1 primary translation word.

(5) 4 words per SD-1A399 circuit provided; 3 words for a TGN supplementary auxiliary block and 1 primary translation word.

(d) Network Attendant feature:

(1) 5 words for a screening LEN auxiliary block.

(2) 4 words per trunk group for trunk class code expansion for each trunk group unique to the Network Attendant feature.

(3) 2 words per route index expansion.

(4) 6 words per each 4-wire 3-port conference circuit for the PEN auxiliary block.

(5) 1 word in the TNN-to-TGN translator per each 4-wire 3-port conference circuit.

(6) 1 word in the supplementary trunk group auxiliary block per release link trunk group.

(e) Authorization code screening feature:

(1) 1 word in the LEN auxiliary block for each EPSCS trunk group with authorization code screening.

(2) 1 word in the chart column translator (1 chart column for each different AC entry pattern).

(3) 1 word in the trunk group supplementary auxiliary block for each trunk group.

(4) The AC head table is of variable length with a maximum length of 1025 words.

(5) 15 words are required for each interpreter table. Thus, for each AC index (ACI), 1 level takes 15 words, 2 levels take 30 to 165 words, and 3 levels take 45 to 1665 words.

(6) 250 words are required for each thousands block subtranslator.

(7) 25 words are required for each hundreds block subtranslator.

(8) 1 word is required for each ordered authorization code.

(9) The ordered list is of variable length with a minimum of 2 words and a maximum of 1025 words. See Table R for example of program store computation for ordered authorization codes.

(10) The private network customer head table is of variable length up to 225 words.

(11) 36 words are required for the CUSTID auxiliary block. The maximum number of CUSTID auxiliary blocks is 255.

(f) HILO 4-Wire Switching feature:

(1) 1 word per universal trunk

(2) 5 to 17 words per miscellaneous trunk

(3) 4 words per trunk group

(4) 2 to 4 words per route index expansion.

(g) Interface with the PIU feature:

(1) 1 type 4 MSN translator word per member number

(2) 5-word auxiliary block per member number for unit type translations

(3) 1 word per entry in the OPCODE transfer table.

(h) LHTO feature:

(1) 4 words per TOUCH-TONE transmitter provided

(2) 6 words required for each TOUCH-TONE transmitter test circuit provided.

(i) Traveling Class Mark feature:

(1) 1 SLEN auxiliary block containing at least 6 words (3 fixed plus LENCL3, LENCL4, and PNOW) is required per network access trunk, direct access line trunk, and FX direct connect trunk. The LENCL3 word may be shared with other features.

(2) 1 PNC supplementary auxiliary block containing at least 2 words (1 fixed plus optional word F) is required per EPSCS customer with multiple users.

(3) 1 TG supplementary auxiliary block containing at least 3 words (2 fixed plus optional word G) is required per trunk group number. These 3 words may be shared with other features.

(4) 1 CUSTID subtranslator containing 8, 50, or 100 words is required per private network customer.

(j) Network Message Detail Recording feature:

(1) 13 words for each MDR register provided

(2) 3 words per access line group (shared) in the LEN auxiliary block

(3) 1 word per EPSCS trunk group (shared) in the trunk group supplementary auxiliary block (optional word D).

(k) EPSCS feature:

(1) 1 word per EPSCS customer in the number group number-to-rate center table.

(2) 4 words minimum per trunk group to provide a screening LEN auxiliary block. There are 6 words required if the customer elects to use an external billing number for the MDR feature.

(3) 2 words per trunk group in the trunk network-to-trunk group number auxiliary block.

(4) 1 word per trunk group (shared) in the trunk group supplementary auxiliary block.

(5) 4 words per trunk class code for a trunk class code expansion.

(6) 1 word in the universal service order code translator for each EPSCS-related line class code utilized.

(7) 10 words in the normalized office code and number group number tables for each EPSCS office code (NNX) served in the office.

(8) 3 dedicated 3-digit translators per customer.

(9) Possibly 1 or more foreign area translators per customer, depending upon routing arrangements.

(10) Possibly 1 or more toll digit-by-digit translators per customer, depending upon routing arrangements.

(11) 1 word per customer in the rate and route pattern table for a call identification word (CIW).

(12) 5 words in the CIW auxiliary block for each unique rate and route pattern number yielded via digit translation.

(13) 1 or more chart column translators (32 or 64 words) per office, depending upon the number of customers. 1 word overhead, plus 1 word for each unique screening arrangement.

(14) 1 word in directory number translations for each screening LEN provided.

(15) 2 items (but zero words) are added by the TATO feature. These items, TATO and TOP, are contained in word 1 of the nonoutpulsing form of the route index expansion.

(l) Selected Traffic Data to Customer feature:

(1) 24 words for customer traffic group (CTFG) head table.

(2) 7 plus N words, where N equals the number of traffic counts requested. These words make up a CTFG auxiliary block.

(3) 2 words plus 1 word per indicated trunk network number for a nonusage trunk scan auxiliary block.

(m) ACSI feature:

(1) 1 word in trunk group supplementary auxiliary block (shared)

(2) 1 word in route index expansion table (shared).

(n) Off-Network Calling feature [the part of this feature relating on-network to off-network calling using TOUCH-TONE and dial pulse outpulsing is detailed in the documentation listed in reference A(7) in Part 18.] The memory requirements listed below are for all on- to off-network and off- to on-network calling and include the requirements given in the aforementioned documentation.

(1) 2 words per route index to provide a route index expansion for ONALs, plus 2 words if more than 4 prefix digit slots are utilized (resulting in a 4-word route index expansion).

(2) 2 words in the route index expansion table for access lines used for off-network calling if more than 4 prefix digit slots are utilized. (2 words in the route index expansion table are attributable to the access line.)

(3) 1 word in directory number translations for each screening LEN provided.

(4) 4 words for trunk class code expansion table for ONALs.

- Call Store:

(a) 1 word per box block entry with maximum number of words specified by parameter P2PPMC, for the PIU feature.

(b) 7 words are required per message block with the number of message blocks specified by set card PPMC for the PIU feature.

(c) 18 words for each outpulsing register provided for Off-Network Calling feature.

(d) 18 words per each MF junior register provided for off-network calling.

(e) 7 words per each DP junior register provided for off-network calling.

(f) 16 words required for customer identification table for the private network customer translator for the ACS feature.

(g) 1 word in the MDR register (shared) to indicate the ACSI feature.

(h) 34 words per 4-wire 3-port conference register for the Network Attendant feature.

(i) One 6-word conference assistance register (set card NAC) is required per 4-wire 3-port conference circuit for the Network Attendant feature.

DETERMINATION OF QUANTITIES

A. Program Store

11.05 In order to determine program store memory space allotted by the EPSCS features, refer to Table Q.

(a) To determine size of the authorization code index to treatment-group translator, estimate one word of program store memory per authorization code. This estimate covers both consecutive and ordered ACs.

(b) Each EPSCS customer requires one 3-digit toll translator. Additional 3- or 6-digit toll translators are needed where PBXs or CTXs share NXXs or if the customer desires route-pattern selection or special screening arrangements. The size of each toll digit translator may be approximated as 1000 left-side-only words. If the number of routes for any application is less than or equal to 8, then an abbreviated foreign area translator (ABBF) may be substituted. The ABBF translator uses only 258 left-side-only words.

B. Call Store

11.06 DAL ringing registers are allocated via parameter set card NRR3. The set card

TABLE R

EXAMPLE OF PROGRAM STORE COMPUTATION FOR ORDERED AC ASSIGNMENTS

EXAMPLE			PROGRAM STORE COMPUTATION		
ACI	AUTHORIZATION CODES	1	(ACI)	51	(Subtotal)
				15	(Digit Interpreter Level 1)
17	8XX	25	(100's)	66	Total
	9XX	25	(100's)		
		51	Subtotal		
		1	(ACI)	326	(Subtotal)
				15	(Digit Interpreter Level 1)
20	623XX	25	(100's)	30	(Digit Interpreter Level 2)
	724XXX	250	(1000's)	30	(Digit Interpreter Level 3)
	8XX	25	(100's)	401	Total
	9XX	25	(100's)		
		326	Subtotal		
		1	(ACI)	301	(Subtotal)
				15	(Digit Interpreter Level 1)
21	1XX	25	(100's)	15	(Digit Interpreter Level 2)
	32XX	25	(100's)	15	(Digit Interpreter Level 3)
	386XX	250	(1000's)	346	Total
		301	Subtotal		

value is determined according to P.001 blocking computed as follows:

(a) The number of DAL trunk circuits times (b) the average number of call attempts per hour per DAL times (c) the average holding time per attempt (default value is 13 seconds when exact data is not available) times (d) the call peak factor (high day/average busy season) times (e) 0.01 (CCS) factor.

11.07 The limit of DAL ringing register queue entries is specified via parameter set card DRQ. The set card value is determined in accordance with Table S.

11.08 MF junior registers, dial pulse junior registers, and originating registers (to serve as outpulsing control registers) are required for TOUCH-TONE outpulsing. The quantity of registers required is indicated via parameter set cards NMF (number of MF junior registers), NAX (number of junior registers), NDO (number of trunk dial pulse junior registers), and NOR (number of originating registers). Set cards are engineered per the documentation listed in references C(1) and (2) in Part 18.

11.09 Parameter word P2PPMSG builds call store blocks required to receive incoming messages from the PIU. The maximum number of blocks available is determined by set card PPMB. The total call store required for message blocks is 7 (the number of words per block) times the value of PPMB. The value of PPMB is 6 + 14N, where N is the number of EPSCS customers in the office for the engineering period. Parameter P2PPMC specifies the maximum number of call store words required for control of the message blocks; 15 words are specified for the 1E6 and later generic program.

11.10 A new translator of length up to 100 right-side-only words is required for TCM. One translator is constructed at every EPSCS switch for each customer with TCM. When network satellite links are provided, a nonsatellite route index is required for each satellite route index, and two chart class columns are required for each potential satellite facility.

11.11 The number of AMA/MDR registers is determined by set card NAM. The value of set card NAM can be engineered by the following default holding times:

(a) Originating record—60 seconds (from dialing of the first digit until answer or abandon, including time on queue).

(b) Terminating record—30 seconds (from end of outpulsing until answer or abandon).

(c) Calls off-network via PBX—200 seconds (held for entire call).

11.12 Call blockage does not occur as a result of the lack of an AMA/MDR register. If an AMA/MDR register is not available for either an originating or terminating message, the call is allowed to complete.

PROCESSOR TIME

11.13 The real time required to switch an EPSCS call (trunk-to-trunk) through the office is given in Table T.

11.14 The real time required for authorization code screening is given in Table U.

11.15 Additional real-time additives to the basic EPSCS calls are listed by feature in Table V if provided.

FEATURE DEFINING SET CARDS

11.16 The feature defining set cards are listed in Table Q except for the following generic program feature set cards: 9GEPSC, 9GHL4W, 9GCTRF and 9GA10D.

12. DATA ASSIGNMENTS AND RECORDS

TRANSLATION FORMS

12.01 The ESS translation forms listed below are applicable to the EPSCS feature. A complete description of the forms is given in the documentation listed in reference C(3) in Part 18.

(a) ESS 1101—Directory Number Record—Records DN assignments for screening and DALs. If the originating major class is 34 or 35, originating priority may apply to EPSCS screening LENs. EPSCS entries that are OMAJ class 34 or 35 have no associated centrex number on this

TABLE S

RINGING REGISTER QUEUE SIZE

QUANTITY OF DAL RINGING REGISTERS	QUEUE SIZE	QUANTITY OF DAL RINGING REGISTERS	QUEUE SIZE
3	3	54	23
5	4	57	24
7	5	60	25
9	6	64	26
11	7	67	27
13	8	71	28
15	9	74	29
17	10	78	30
20	11	82	31
22	12	85	32
25	13	89	33
28	14	92	34
30	15	96	35
33	16	100	36
36	17	103	37
39	18	107	38
42	19	111	39
45	20	115	40
48	21	120	41
51	22	or more	

form. OMAJ classes 34 and 35 may also contain an inhibit trunk queueing assignment. OMAJ classes 28, 33, 34, and 35 have entries for message detail. Direct access lines require a second directory number in addition to the DN associated with the screening LEN. This second DN is associated with a route index used to terminate a call to the DAL.

(b) ESS 1102—Line Equipment Record—Provides screening LEN assignments for EPSCS incoming or 2-way trunk groups.

(c) ESS 1107—Supplementary Information Record—Provides for the entry of digit 2 (direct-connect entry) in the speed-calling list for any 7-digit EPSCS number. Also, a 7-digit external billing number, when used, is indicated by a type 14 entry and is associated with the screening LEN. When a type 14 entry is used, the ESS 1101 screening LEN entry must be set for message detail.

(d) ESS1120—Customer Identification Record—This form is used to build the EPSCS customer translator which relates the 32 possible treatment groups to screening LENs as required. Also, it provides the route index for tone and announcement on unassigned TRTGs and the quantity of routing

TABLE T

CC CYCLE COUNTS FOR EPCS CALLS

FROM \ TO	NETWORK TRUNK	ACCESS LINE	DIRECT ACESS LINE	ONAL
Network Trunk	6541	6500	9260*	7480†
Acess Line	8232	7950	10, 780*	8250†
Direct Acess Line	8000	7900	10, 700*	8200†
ONAL	7400	7300	9570	Not Applicable

Note: These base cycle counts include traffic measurements and message details.

* Assumes 2 rings. Add 430 cycles for each additional ring.

† Note that if any of the ONALs terminate on the 2-wire side of the EPSCS switch, calls using these facilities generate calls on the 2-wire side which must be considered in the processor capacity estimation.

TABLE U

AUTHORIZATION CODE CYCLE COUNT

NUMBER OF DIGITS	CYCLE COUNT
3	1386
4	1753
5	1778
6	1806

TABLE V

ADDITIONAL REAL-TIME ADDITIVES TO THE BASIC EPSCS CALLS

FEATURE	CYCLE COUNT
ACSI-ANI	2400
With Screening	2900
ACSI-AIOD	650
With Screening	1700
IAC	2500
NEAT	16,000
TCM	650
MDAL	50

patterns in addition to the base routing pattern for the route pattern selection feature.

(e) ESS 1202—Trunk Group Record—Provides TNN-to-TGN and trunk member number translations for all trunks and establishes trunk groups of HILO-outgoing or 2-way trunk circuits. This form establishes the trunk groups of TOUCH-TONE transmitters and TOUCH-TONE transmitter test circuits in conjunction with the TOUCH-TONE outpulsing feature. The assignment of one trunk group for each conference bridge is accomplished via this form.

(f) ESS 1204—Trunk Class Code Data—Specifies data for trunk class code expansion tables. Trunk class codes are established for each trunk group associated with the TOUCH-TONE pulsing feature. It is via this form that increased trunk guard timing is achieved (by setting bit 11 of the fourth word). The private network trunk bit (in the fourth word) must be set for all EPSCS/CCSA customers.

(g) ESS 1206—Recording Completing Trunk and Conference Bridge Record—An office record designating whether trunks are recording-completing or conference bridge trunks. Entries are for the major port only and include TGN, member number (always 000), TCC, TNN, and trunk order code (14900).

(h) ESS 1208—Trunk Screening Group Record—This form is used for assigned unique screening LENs to all EPSCS trunk groups.

(i) ESS 1216—Trunk Group Supplementary Record—Specifies miscellaneous trunk group information. A type of entry 04/01 is required for EPSCS.

(j) ESS 1303 A/B/C/D—Trunk and Service Circuit Route Index Record—Specifies data for RI expansion table entries for outgoing or 2-way trunk groups. In conjunction with the TOUCH-TONE outpulsing feature for the route index of the outgoing trunk group, D1 through D6 (KP columns 30 through 35) are used to indicate a pause during outpulsing as well as the length of the pause and the type of outpulsing. This form also establishes pseudo-route index 019 for TOUCH-TONE transmitters, pseudo-route index 052 for TOUCH-TONE transmitter test circuits, and their associated nonfixed route indexes. Pseudo-route index 055 is used to intercept unassigned directory numbers associated with EPSCS customers only. If the TATO feature is applicable, a 1-digit entry is required in KP column 55 as follows:

- Blank or 0—No TATO provided
- 1—TATO with 60-90 second time-out
- 5—TATO with 90-120 second time-out
- 7—TATO with 120-150 second time-out.

(k) ESS 1304—Rate and Route Chart—Provides rate and route information for all columns assigned on form 1306. All columns need not have the same number of screening codes. All columns for a given customer must be the same size; however, the size may vary between customers even through they are in the same chart. All EPSCS customers on a given switch can share a single chart since each customer has dedicated 3-digit translators.

(l) ESS 1306—Line Class Code Record—Entries on this form are required as to: various combinations of dialing patterns, routing, and charging requirements for a given customer. Valid originating major classes for EPSCS are 28, 33, 34, or 35. Directory numbers associated with the trunk group screening LENs must be terminating major class of 24.

(m) ESS 1311—Toll 3/6-Digit Translations—Lists all possible combinations of 3-digit codes used for EPSCS 3-digit translators and provides a rate and route pattern for each.

(n) ESS 1312—Local/Toll Abbreviated 6-Digit Translations—Defines the abbreviated 6-digit foreign area translators used. These translators conserve program store and should be used whenever possible.

(o) ESS 1406—Customer Traffic Group Record—Indicates that for the CTRF feature, traffic counts are to be transmitted and call store provided to hold the counts.

(p) ESS 1407—Nonusage Trunk Scan Record—Indicates the TNNs for which nonusage will be reported.

(q) ESS 1500A—Office Option Record—Enter the highest EPSCS customer identification number to be used in the office. Enter the highest authorization code index to be used in the office.

(r) ESS 1500D—Office Option Record—Contains translation information relating to a number of hardware and memory items engineered or assigned by personnel responsible for traffic orders, equipment orders, trunk assignments, routing, and charging arrangements. Care must be exercised so that customer changeable speed calling is not prohibited.

(s) ESS 1501—Office Code Record—Defines the rate center numbers associated with the DN and 3-digit translators. The base rate center is the only one required on this form to assign the required thousands (1000s) block of directory numbers.

(t) ESS 1507—Supplementary Rate Center Record—Used in conjunction with the ESS 1501 form to associate the EPSCS customer identification number (EPSID) with consecutive rate centers whenever route pattern selection is provided. A check should be entered for code blocking/calling times identification (column 29) for all rate centers with off-net routing. Leave columns 30 through 32 blank ("have NPA of rate center").

RECENT CHANGES

12.02 The following RC messages are affected by the EPSCS feature:

RC Message	Function
RC:LINE	Builds line translation entries using keywords MSGD, QINH, EBN, TNN and FRL. Refer to reference A(29) in Part 18 for entire message format.
RC:RI	Builds route index translation entries using keyword TT. For entire message format see reference A(34) in Part 18.
RC:NOGRAC	Builds number group to rate center translation entries using keyword EPSID. Refer to reference A(34) in Part 18 for entire message format.
RC:CCOL	Builds chart column translation entries using keyword AC. Refer to reference A(34) in Part 18 for entire message format.
RC:TG	Builds trunk group translation entries using keywords EPSID, ICUP, PNTYP, ACI, QN, and SLEN. Refer to reference A(35) in Part 18 for entire message format.
RC:TGMEM	Builds trunk group member translation entries using keyword CB. Refer to reference A(35) in Part 18 for entire message format.
RC:CFTRK	Builds trunk translation entries using keyword MMCF. Refer to reference A(35) in Part 18 for entire message format.
RC:TRFHC	Builds traffic measurement translation entries using keywords CNTX, INDX, S1, S2, and S3. Refer to reference A(25) in Part 18 for entire format.
RC:CTRF	Builds traffic measurement translation entries using keywords EPSID, and NCTS. Refer to reference A(25) in Part 18 for entire format.
RC:ACTABL RC:AC RC:SAC	These messages are used with the authorization code translations. See reference A(31) in Part 18 for further details.
RC:CUSTCB	Builds private network translation entries using keywords MFRL, TRTG, and ACLIM. Refer to reference A(31) in Part 18 for entire message format.
RC:TCM	Builds traveling class mark translation entries. Refer to reference A(31) in Part 18 for further details.

13. TESTING

13.01 Teletypewriter input and output messages found within document references on Table J may be used to verify the EPSCS translations as follows:

(a) VFY-LEN input message verifies features associated with a line. System response should be a TR03 output message.

(b) VFY-UTCH input message verifies supervisory program index assignments. System response is TR11 output message.

(c) TAG-TNN-TCL input message verifies features associated with trunk class code expansion entries. System response is TR21 output message.

(d) T-READ input message verifies features associated with tables used by EPSCS. System response is TW02 output message.

(e) VFY-TKGN input message verifies features associated with trunk circuit data. System response is TR10 output message.

(f) VFY-EXP input message verifies features associated with route index data. System response is TR05 output message.

(g) VFY-XDGNT input message verifies features associated with the digit interpreter tables. System response is TR18 output message.

(h) V-ACS input message verifies features associated with authorization codes. System response is TR68 output message.

(i) V-CUSTID-CCB input message verifies features associated with the EPSCS common block. System response is TR67 output message.

(j) VFY-TNN input message verifies features associated with trunk translations. System response is TR14 output message.

(k) V-CUSTID-TCM input message verifies features associated with facility restriction levels. System response is TR90 output message.

(l) VFY-ACBLK input message verifies features associated with the IAC feature. System response is TR79 or TR80 output messages.

(m) V-TCM input message verifies features associated with traveling class marks. System response is TR88 output message.

13.02 Test calls may be made to verify that the EPSCS features are operating properly.

14. OTHER PLANNING TOPICS

A. General

14.01 The EPSCS feature is implemented in a limited number of No. 1 ESS offices. The planning involved for a particular EPSCS customer's network is dependent on whether or not EPSCS has already been installed at all proposed nodes in the network.

14.02 The routing of the EPSCS network, selection of EPSCS network, selection of EPSCS switching centers, and the determination of the CNCC data link route is decided jointly with AT&T, Long Lines, and the operating telephone companies. An EPSCS network is administered by Long Lines. A Customer Service Administrative Control Center, which has sufficient status and real-time data to centralize administrative functions, serves as a single point of contact for trouble reporting on the network. Trouble reports may be originated by station users, the CNCC, or identified by automatic tests or analysis data.

14.03 The EPSCS transmission plan is given in reference C(5) in Part 18.

B. Training

14.04 The EPSCS application requires additional personnel training in the following areas:

(a) The operation and maintenance of the 3A auxiliary processor and its operating system. This training should include theory and hands-on experience.

(b) PDSP software and PIF circuit design and maintenance philosophy.

C. Floor Plans

14.05 The EPSCS floor plan considerations almost totally pertain to the PDSP hardware. The PDSP complex consists of the following frames:

(a) 1 - J6A003A-1 DS40 K/D TTY frame

(b) 1 - J1C060A-1 DS40 ROP maintenance frame

(c) 1 - J1C106B-1 3A processor frame

(d) 2 - Supplemental main store frames (space reserved for future)

(e) 1 - J1A093-1 processor interface frame.

14.06 The PDSP complex should be in the vicinity of the No. 1 ESS maintenance center.

14.07 The auxiliary 3A processor frame is 1 foot 6 inches deep by 4 feet 4 inches wide. This frame requires a minimum aisle clearance of 4 feet and a wiring aisle clearance of 2 feet. Where possible, a wider maintenance aisle should be provided.

14.08 The supplementary main store frame is 1 foot 6 inches deep by 2 feet 2 inches wide. Space for 2 of these frames, 1 on each side of the auxiliary 3A processor frame, should be provided.

14.09 The maintenance frame associated with the 3A CC is 1 foot 6 inches deep by 2 feet 2 inches wide. The recommended location for this frame is next to the leftmost supplementary main store frame.

14.10 The PIF is 1 foot deep by 2 feet 2 inches wide. It is recommended that this frame be as close as possible to the auxiliary 3A processor complex. This frame must not, however, be next to a frame equipped with a teletypewriter. Three cable-length restrictions must be considered when selecting a location for this frame.

(a) The PIU connects to the No. 1 ESS call store bus and must be within 175 cable feet of the most remote CC frame.

(b) The PIU connects to one of the parallel channel buses associated with the auxiliary 3A Processor. The maximum cable length is 60 feet, as measured between the PIU and the most remote 3A CC circuit.

(c) The data link controllers on the PIF connect to data sets which must be located within 50 cable feet.

14.11 Where a frame lineup contains both 1-foot 6-inch deep and 1-foot deep frames, the following general rules apply:

(a) The fronts of the frames must be aligned.

(b) Proper wiring aisle dimensions are measured from the rear of the 1-foot 6-inch frames to the rear of the frames in the next lineup.

(c) Base "build-out" and associated base covers are required on the rear of all 1-foot frames in the mixed lineup. This brings the rear base covers on the 1-foot frames in line with those on the 1-foot 6-inch frames and eliminates safety hazards associated with the uneven lineup.

14.12 It is recommended that whenever possible, some frame space be reserved in the area of the PDSP complex for possible future feature additions.

ADMINISTRATION

15. MEASUREMENTS

15.01 Normal trunk group measurements that are available for the HILO feature are applicable to EPSCS.

15.02 Additional office traffic counts are available on the S, H, C, and DA15 schedules. These counts are also included in the list of office counts with a type measurement code (TMC) of 05.

15.03 A description of the EPSCS traffic measurements and the equipment group or office count number (EGO) required to request the measurements are given below.

EGO	Description
393	***No. 1 ESS messages to the PDSP***—This is a count of the number of messages that come from the No. 1 ESS through the PIU to the PDSP.

394 ***PDSP messages to the No. 1 ESS***—This is a count of the number of messages from the PDSP to the No. 1 ESS.

395 ***Errors on PDSP messages to the No. 1 ESS***—This is a count of the number of errors encountered on messages from the PDSP to the No. 1 ESS.

396 ***Entries terminated to message processing program***—This is a count of the number of entries to the message processing program (a class C main program entry) that were terminated because of a lack of idle message blocks.

398 ***Direct access line ringing register (RR3) usage***—This is a count that measures usage of the ringing register (RR3) used to ring EPSCS DALs. It is provided on a 10-second scan basis.

399 ***Direct access line ringing register peg count***—This is the number of attempts to seize an idle ringing register (RR3) used to ring EPSCS DALs.

400 ***Direct access line ringing register overflow***—This is the number of attempts to seize an idle ringing register (RR3) that failed because all registers were busy.

401 ***HILO TOUCH-TONE transmitter time-outs***—This is a count of the number of times a HILO TOUCH-TONE transmitter times out while waiting for a start-dial signal from the distant end.

16. CHARGING

AUTOMATIC MESSAGE ACCOUNTING

16.01 Automatic message accounting records for off-network calls are made in the message telecommunications service (MTS) office that terminates the ONAL. Call detail information is transmitted to the CNCC via the PDSP/monitoring and control network.

UNIFORM SERVICE ORDER CODES

16.02 The uniform service order codes (USOCs) applicable to EPSCS may be found in the USOC manual and/or Tariff F.C.C. No. 260. The USOC for a particular feature may be found in the feature document references in Part 18.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

Automatic Alternate Routing—EPSCS networks of three or more switching centers are generally engineered so that high usage channel groups carry most network calls. Should these primary routes become busy, overflow traffic may be routed automatically via alternate network routes.

By-Pass Access Lines—If traffic patterns indicate the need, calls from an originating EPSCS switching center to a certain distant location can be completed directly over one-way channels. The call that would normally route from calling station to the originating EPSCS switching center to a tandem or a terminating EPSCS switching center, instead, routes from the calling station to its originating EPSCS switch and then directly to the distant location.

CCSA-Common Control Switching Arrangement—A private line network that serves a customer by means of dedicated access lines and trunks and is interconnected by switching machines located on telephone company premises. The use of these machines may be shared with other types of telecommunication services.

CNCC-Customer Network Control Center—A dedicated facility located on customer premises. The CNCC allows the customer to monitor and control the network use and cost. The CNCC is used by the customer to exercise control of some network operations and to obtain usage and status information automatically or on demand.

CSACC-Customer Service Administrative Control Center—A shared, centrally located facility used by the telephone companies and Long

Lines to monitor and control the operation of all EPSCS networks. CSACC serves as a single maintenance contact point for customers; it responds to all problems and questions related to service operations. From this location, all network installation and rearrangement activity is controlled. CSACC personnel direct network testing and maintenance activity and, with the use of automated equipment, perform many of the routine transmission tests for the Bell System provided facilities.

CUSTID-EPSCS Customer Identification—CUSTID is a national customer identification; i.e., it is unique for the entire country. Since a given EPSCS switch may service more than one EPSCS customer and since route pattern selection may be provided for a given customer, the CUSTID is required to insure proper translations.

DAL-Direct Access Lines—This feature package provides for a 4-wire connection to individual telephone stations, key telephone stations, or voice frequency data sets. The stations, which are normally remotely located with respect to the switch, are connected on the TLN via a carrier system.

Day/Night Routing—Calls entering the EPSCS network via an off-network access line are automatically routed to some predefined destination on the network. This destination is specified by a 7-digit private number associated with the ONAL and is dependent on the time mode of the ONAL. For example, when the ONAL is in one mode (day) one 7-digit destination is reached; when the ONAL is in the other mode (night) another 7-digit destination is reached. The day/night time designations are arbitrary in that any other time basis for switching could be selected. Selection is done by the customer from the CNCC.

EPSID-EPSCS Customer Identification—EPSID is a national customer identification; i.e., it is unique for the entire country. Since a given EPSCS switch may service more than one EPSCS customer and since route pattern selection may be provided for a given customer, the EPSID is required to insure proper translations.

MTTP-Manual Trunk Test Position—A test position for HILO offices. The MTTP is designed for application during high-volume trunk testing, such as toll and tandem switching. The MTTP is compatible with the supplementary trunk test panel (STTP) and the trunk and line test panel (TLTP). The installation of an MTTP in an office does not require the removal of STTPs.

NAL-Networks Access Lines—Circuits between the network switch and a private branch exchange (PBX) or centrex switch. The centrex switch may be another No. 1 ESS switch or the same switch providing EPSCS switching.

Network Trunks—Circuits between two network switches.

ONAL-Off-Network Access Line—Circuits between the EPSCS HILO trunk link network and a 2-wire line link network in a class 5 MTS office for the purpose of off- to on-network and on- to off-network calling.

RAC-Rate Center—A geographical area covering possibly several office codes in which all flat rate MTS customers have the same free calling area. Since No. 1 ESS uses a separate 3-digit translation for each rate center in an office, the item used to select the appropriate 3-digit translator is also called a RAC. An ESS normally serves only one rate center, but may serve more, as with EPSCS [which requires its own dedicated rate center(s)].

Recall Dial Tone—Three short bursts of tone (100 ms on, 100 ms off) followed by steady dial tone. Recall dial tone is used to request the caller to dial authorization code.

18. REFERENCES

A. Bell System Practices

(1) Section 231-190-128—Feature Document—Meet-Me Conferencing Feature—Enhanced Private Switched Communications Service—2-Wire No. 1 Electronic Switching System

(2) Section 231-190-129—Feature Document—Network Trunk Queueing (NTTQ)—Enhanced Private Switched Communications Service—2-Wire No. 1 Electronic Switching System

(3) Section 231-190-130—Feature Document—Network Message Detail Recording Feature—Enhanced Private Switched Communication Service—2-Wire No. 1 Electronic Switching System

(4) Section 231-190-131—Feature Document—Interface with Customer Network Control Center Feature—Enhanced Private Switched Communications Service—2-Wire No. 1 Electronic Switching System

(5) Section 231-190-132—Feature Document—Network Data Transmission Feature—Enhanced Private Switched Communications Service—2-Wire No. 1 Electronic Switching System

(6) Section 231-190-133—Feature Document—4-Wire Direct Access Line Feature—2-Wire No. 1 Electronic Switching System, Issue 2

(7) Section 231-190-134—Feature Document—Off Network Calling Using "TOUCH-TONE" and Dial Pulse Outpulsing—Enhanced Private Switched Communications Service—2-Wire No. 1 Electronic Switching System

(8) Section 231-090-135—Feature Document—User Dialed Authorization Codes—Enhanced Private Switched Communications Service—2-Wire No. 1 and No. 1A Electronic Switching Systems

(9) Section 231-090-137—Feature Document—Automatic Time-Out of Announcements and Tones—2-Wire No. 1 and No. 1A Electronic Switching Systems

(10) Section 231-190-136—Feature Document—Interface With Peripheral Data Processor Feature—Enhanced Private Switched Communications Service—2-Wire No. 1 Electronic Switching System

(11) Section 231-090-340—Feature Document—Selected Traffic Data to Customer Feature—Enhanced Private Switched Communications Service—2-Wire No. 1 and No. 1A Electronic Switching Systems (changes planned)

(12) Section 231-090-085—Common Control Switching Arrangement Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(13) Section 231-090-173—Manual Line Service—2-Wire No. 1 and No. 1A Electronic Switching Systems

(14) Section 231-032-020—Manual Trunk Test Circuit and Auxiliary Manual Test Circuit—General Description—2-Wire No. 1 and 1A Electronic Switching Systems

(15) Section 231-130-320—Manual Trunk Test Position and Auxiliary Manual Test Position—Method of Operation—2-Wire No. 1 Electronic Switching System

(16) Section 231-090-219—Feature Document—Remote Office Test Line (ROTL) and Processor Controlled Interrogator (PCI) Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(17) Section 231-090-098—Feature Document—Code 100 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(18) Section 231-090-100—Feature Document—Code 101 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(19) Section 231-090-101—Feature Document—Code 102 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(20) Section 231-090-094—Feature Document—Code 103 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(21) Section 231-090-342—Feature Document—Code 104 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(22) Section 231-090-099—Feature Document—Code 105 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(23) Section 231-090-404—Feature Document—Code 108 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(24) Section 231-090-366—HILO 4-Wire Switching Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(25) Section 231-118-329—Traffic Measurement Recent Change Procedures for DIGTRN, TRFSLB, TRFLCU, TRFHC, TNCTX, CTRF, and NUTS—(CTX-6 Through 1E5 Generic Programs)—2-Wire No. 1 Electronic Switching System

(26) Section 231-090-138—Feature Document—Traveling Class Mark Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(27) Section 231-090-254—Feature Document—Tandem Tie Trunks Service (Non-Senderized)—2-Wire No. 1 and No. 1A Electronic Switching Systems

(28) Section 231-132-101—Automatic Identified OutwardDialing(AIOD)—Description—2-Wire No. 1 Electronic Switching System

(29) Section 231-118-343—EPSCS II RC Procedures (1E6 Generic Program) 2-Wire No. 1 Electronic Switching System

(30) Section 231-190-139—Feature Document—Automatic Calling Station Identification—2-Wire No. 1 Electronic Switching System

(31) Section 231-048-308—RC Formats for AC, ACTABL, CUSTCB, DALNK, DAMBI, DAMSK and DATER, ESCO, ESN, SAC, TCM, TNESN (1E6 and 1AE6 Generic Programs)—2-Wire No. 1 and No. 1A Electronic Switching Systems

(32) Section 231-190-140—Feature Document—Network Attendant Feature—2-Wire No. 1 Electronic Switching System

(33) Section 231-090-102—Feature Document—Code 107 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(34) Section 231-048-304—Rate and Route Translation RC Formats for NOCNOG, DNHT, NOGRAC, RATPAT, DIGTRN, CCOL, RI, CHRGX, DITABS, TNDM, IDDD, TDXD, and RLST (1E6 and 1AE6 Generic Programs). 2-Wire No. 1 and No. 1A Electronic Switching Systems

(35) Section 231-048-303—Trunk Translation RC Formats for TG, TGBVT, TRK, CFTRK, TGMEM, CCIS, and TKCONV (1E6 and 1AE6 Generic Programs) 2-Wire No. 1 and No. 1A Electronic Switching Systems

(36) Section 230-100-074—Switching Systems Management Transaction Network—Network Administration and Maintenance Measurements

(37) Section 231-061-450—Program Stores, Network Switching Engineering, No. 1 Electronic Switching System

(38) Section 231-061-460—Call Stores, Network Switching Engineering, No. 1 Electronic Switching System

(39) Section 231-061-010—Introduction Network Switching Engineering—2-Wire No. 1 Electronic Switching System

(40) Section 231-060-210—Service Circuits, Network Switching Engineering, No. 1 and No. 1A Electronic Switching System

(41) Section 231-060-220—Trunks and Miscellaneous Circuits, Network Switching Engineering, No. 1 and No. 1A Electronic Switching Systems.

B. Teletypewriter Input and Output Message Manuals

(1) Input Message Manual IM-1A001—2-Wire No. 1 Electronic Switching System

(2) Output Message Manual OM-1A001—2-Wire No. 1 Electronic Switching System.

C. Other Documentation

(1) Office Parameter Specification PA-591001—No. 1 Electronic Switching System

(2) Parameter Guide PG-1—2-Wire No. 1 Electronic Switching System

(3) Translation Output Configuration PA-591003—No. 1 Electronic Switching System

(4) Translation Guide TG-1A

(5) GL 78-04-163B—Enhanced Private Switched Communications Service (EPSCS) Transmission Plan.