FEATURE DOCUMENT

TANDEM TIE TRUNK SERVICE (NONSENDERIZED) FEATURE

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

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* Trademark

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INTRODUCTION

1. GENERAL INFORMATION

SCOPE

1.01 This document describes the Tandem Tie Trunk Service feature in a No. 1 or No. 1A Electronic Switching System (ESS). Tandem tie trunks are nonsenderized (or "cut-through") in their outpulsing operation. For information concerning senderized outpulsing operation of tie and foreign exchange (FX) trunks, see reference A(21) in Part 18. Only nonsenderized outpulsing operation of tie and FX trunks is documented herein. (The terms tie trunk and tie line as used in this feature document are to be considered synonymous.)

REASON FOR REISSUE

1.02 When this document is reissued, the reason for reissue will be stated in this paragraph.

FEATURE AVAILABILITY

1.03 Ordinary tandem tie line service, commonly called 1XX, is available in the generic program base in all active No. 1/1A ESS generic programs. Improved tandem tie line service (I1XX) is available beginning with the 1E6 No. 1 ESS generic program and the 1AE6 No. 1A ESS generic program, but requires optional feature groups and special dial repeating trunk circuits. Private network access line service (PNAL) is also available

with the 1E6/1AE6 and later generic programs. PNAL requires optional feature groups and a special dial repeating trunk circuit. Any mixture of 1XX, I1XX, and/or PNAL can be provided in a No. 1/1A ESS office equipped with the 1E6/1AE6 and later generic programs.

2. DEFINITION/BACKGROUND

DEFINITION

2.01 The Tandem Tie Trunk Service feature provides nonsenderized private line service for large business customers.

BACKGROUND

A. Nonsenderized Private Line Service

2.02 Nonsenderized private line service allows a large business customer to directly determine call routing at each switching point within its network. Customer-dialed access codes are used to connect to an outgoing trunk group of a network. Digits dialed after an access code go out over the outgoing trunk as though the outgoing office were not interposed. Digits dialed after an access code go out as soon as possible after each is dialed. These digits are not translated. Neither are any digits deleted or prefixed. A Centrex/ESSX-1 customer telephone set is effectively (sometimes literally) cut through directly to each of a series of offices, determined by previously dialed digits, until a terminating station number is dialed. (See Fig. 1.)

2.03 The uses of the Tandem Tie Trunk Service feature in a No. 1/1A ESS are of two types, on-network calling and off-network calling. On-network calls remain within a private line network in which the call was first originated. Off-network calls eventually reach the message telecommunication service network or a separate senderized private line network, such as an enhanced private switched communications service (EPSCS) network. For this reason, the off-network type of the Tandem Tie Trunk Service feature is often called access line service at the final switch of the original (nonsenderized) network.

B. Feature Perspective

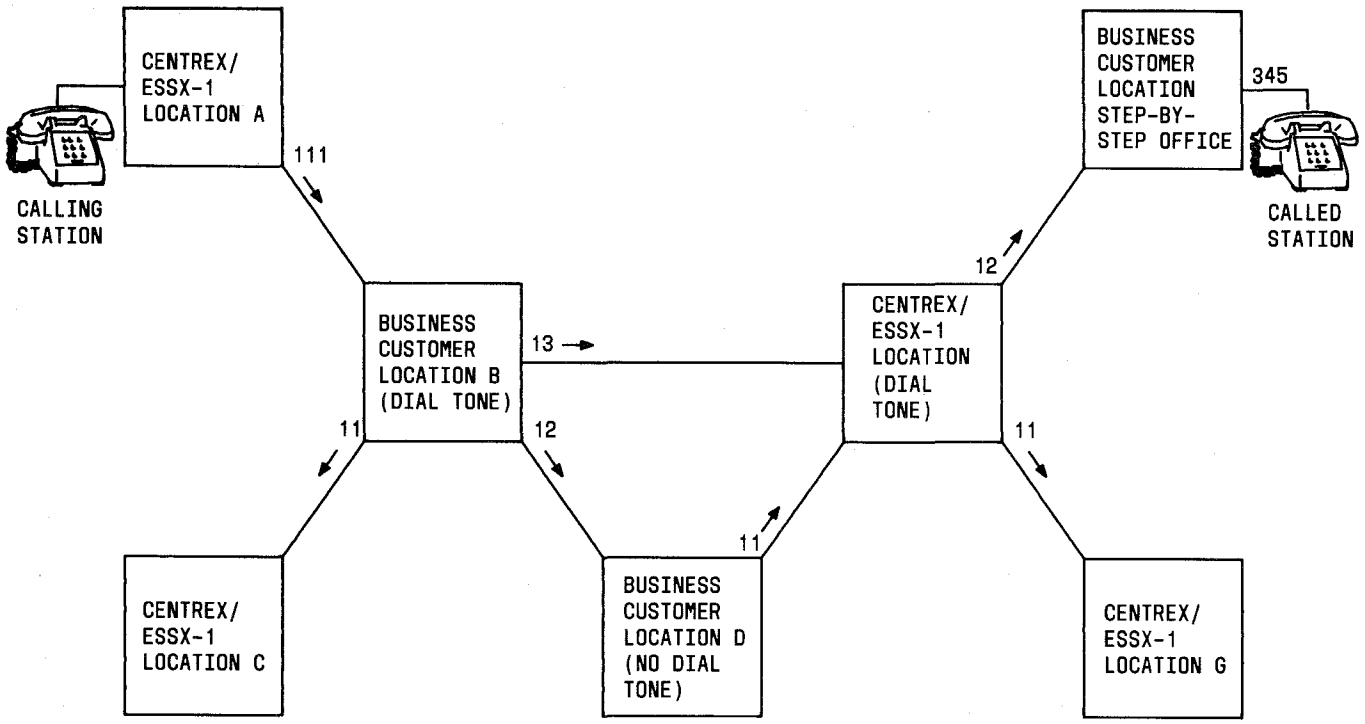
2.04 Large business customers with multiple geographical locations often prefer to have their locations linked by an economical private telephone network. The Tandem Tie Trunk Service feature often provides the most economical private line service to accommodate Centrex/ESSX-1 customers, but at the cost of a certain amount of inconvenience for the users on those calls which require a complicated tandem route. (A complicated tandem route is one which a user must determine by consulting a network map and then translating a route into a sequence of access codes to be dialed.)

2.05 The Tandem Tie Trunk Service feature offers an economical private line service. It also offers access line service as an accessory to the tie trunk network or independently. The Tandem Tie Trunk Service feature is also used to provide faster call completion for calls to dial pulse trunk groups from Centrex/ESSX-1 customer lines than a senderized group would provide.

2.06 In No. 1/1A ESS offices with generic programs prior to the 1E6/1AE6, the Tandem Tie Trunk Service feature is implemented by use of a simulated cut-through mechanism. No true cut-through service exists. A service circuit is used to collect digits and retransmit them—hence the term dial repeating. A consequence of simulated cut-through operation is that a loud click occurs when simulated cut-through dialing is terminated at end-of-dialing time-out (n seconds after the last received digit is outpulsed, where n is derived from the route index translation for that particular route—$4 \leq n \leq 12$). This click is caused by the removal of the service circuit from the call path when the network path is reconfigured. With the advent of the 1E6/1AE6 generic program, special dial repeating trunks can be used to eliminate the loud click. These special dial repeating trunks also provide private network access line service which features calling number outpulsing prior to cut-through. The Centrex/ESSX-1 customer incurs higher termination charges for these special dial repeating trunks than for trunks which do not have dial repeating capability built in.

C. Feature Purpose

2.07 The purpose of the Tandem Tie Trunk Service feature is to provide nonsenderized outgoing dial pulse service to large business (i.e., Centrex/ESSX-1) customers who are served by No. 1/1A ESS offices. The same trunks used for this nonsenderized dial pulse outgoing service can also be used for incoming



DIALING PROCEDURES: A. DT-111-DT-13-DT-12345#
B. DT-111-DT-1211-DT-12345#

LEGEND:

DT -- DIAL TONE
-- TOUCH-TONE DIGIT REQUIRED FOR I1XX

Fig. 1—Tandem Tie Trunk Service

service. Any trunk circuit allowed for the Tandem Tie Trunk Service feature has 2-way capability and can be used for such or can, if desired, be restricted to 1-way outgoing service.

2.08 The Tandem Tie Trunk Service feature is not available to calls which originate outside a Centrex/ESSX-1 customer group.

2.09 For purposes of documentation, three versions of the Tandem Tie Trunk Service feature are distinguished:

(1) Ordinary tandem tie line service (1XX)

(2) Improved tandem tie line service (I1XX)

(3) Private network access line service (PNAL).

1XX and I1XX may be used for nonsenderized on-network and/or off-network calling. PNAL pertains only to access line service where the calling number is multifrequency (MF) outpulsed before the nonsenderized operation begins. 1XX and I1XX may be used for access line service, but only PNAL provides calling number outpulsing. PNAL was designed specifically for access line service to an EPSCS network. I1XX and PNAL are tariffed as an advanced private line termination (APLT), and 1XX is tariffed as tandem tie trunk service.

D. Tandem Tie Trunk Networks

2.10 The tandem tie trunk network (TTTN) is the most commonly switched private line arrangement in the Bell System today. TTTNs are networks of trunks and switching machines that

interconnect the different locations of the large business customers they serve. TTTNs are capable of furnishing both voice and data service to intrastate and interstate traffic. (See Fig. 2.)

2.11 TTTNs range in size from those serving as few as three customer locations to networks interconnecting more than a hundred locations throughout the United States and Canada. Individual locations may be served by key telephone systems, private branch exchanges, or Centrex/ESSX-1. This document addresses the use of the No. 1/1A ESS Centrex/ESSX-1 in a TTTN as a large business customer service location or tandem switch.

2.12 Tie trunks are voice-grade private "lines" used to connect or tie two business customer service locations. Tandem switching—connecting two trunks in order to switch calls through a business customer location—is done by switching systems that also serve the individual large business customer service locations. Each tandem switch can serve several large business customer service locations, as well as being connected to other tandem switches. (See Fig. 3.)

2.13 The main purpose of a TTTN is to carry voice traffic among large business customer locations. Some TTTNs also carry low- or medium-speed data, and some are connected to the toll network for users to make calls to telephones which are not part of the TTTN (off-network service). Off-network traffic is carried between locations using the TTTN trunk groups and can also be connected to the message telecommunication service network using PBX central office trunks, foreign exchange trunks, "dial 9", and/or wide area telecommunications service (WATS) lines.

DESCRIPTION

3. USER OPERATION

CUSTOMER

3.01 The Tandem Tie Trunk Service feature users are Centrex/ESSX-1 stations, including attendants. Stations may be equipped for either dial pulse or TOUCH-TONE® dialing, but TOUCH-TONE stations for I1XX must have 12-button dials.

3.02 To place a call using 1XX or I1XX, the user first dials an access code. This code does not have to be of the form 1XX and does not have to be a 3-digit code; in fact, it may be any unused access code in the customer group dialing pattern. The term "1XX" is a carry-over from the older systems which used that form of access code. After the access code, another dial tone is returned. The user then dials the next (perhaps the only) leg of the call. If the office reached with the original access code allows through switching, another access code may be dialed, etc., or a station number may be dialed and the call terminated without through switching to another office. Another possibility is that the access code for message telecommunication service (usually 9) may be dialed, and after another dial tone, any allowable 7- or 10-digit telephone number may be dialed. (See Fig. 4.)

3.03 With PNAL, an access code is dialed (usually one digit, but no more than two digits). Another dial tone is returned, and the user dials the private network called number. If an authorization code is required by the private network, a special dial tone is returned to prompt for the authorization code (usually a 3- to 6-digit code). The PNAL call can be a direct access from a subtending business customer location or the terminating leg of a 1XX or I1XX call. (See Fig. 5.)

3.04 For 1E6/1AE6 and later generic programs, the customer has the option of I1XX service rather than 1XX. I1XX is available only on a network-wide basis so that all No. 1/1A switches in the network must have at least a 1E6/1AE6 generic program. Using I1XX, the troublesome click which can occur after answer with 1XX is eliminated in most cases. The user of TOUCH-TONE station equipment on an I1XX call is expected to dial the # digit immediately following the last dialed digit of the call. Otherwise, the troublesome click can occur even with I1XX. Dial pulse stations using I1XX simply dial the normal digits and do not get the click. TOUCH-TONE I1XX users must dial the # digit because the TOUCH-TONE signals are converted to dial pulses by using a service circuit. The click occurs when this service circuit is released. Dialing the # digit releases the service circuit immediately, rather than after an end-of-dialing time-out. Consequently, the click occurs well before answer and is not troublesome.

3.05 Centrex/ESSX-1 stations with call transfer can transfer calls to tandem tie lines and to private network access lines. Similarly, the related threeway conference and consultation hold

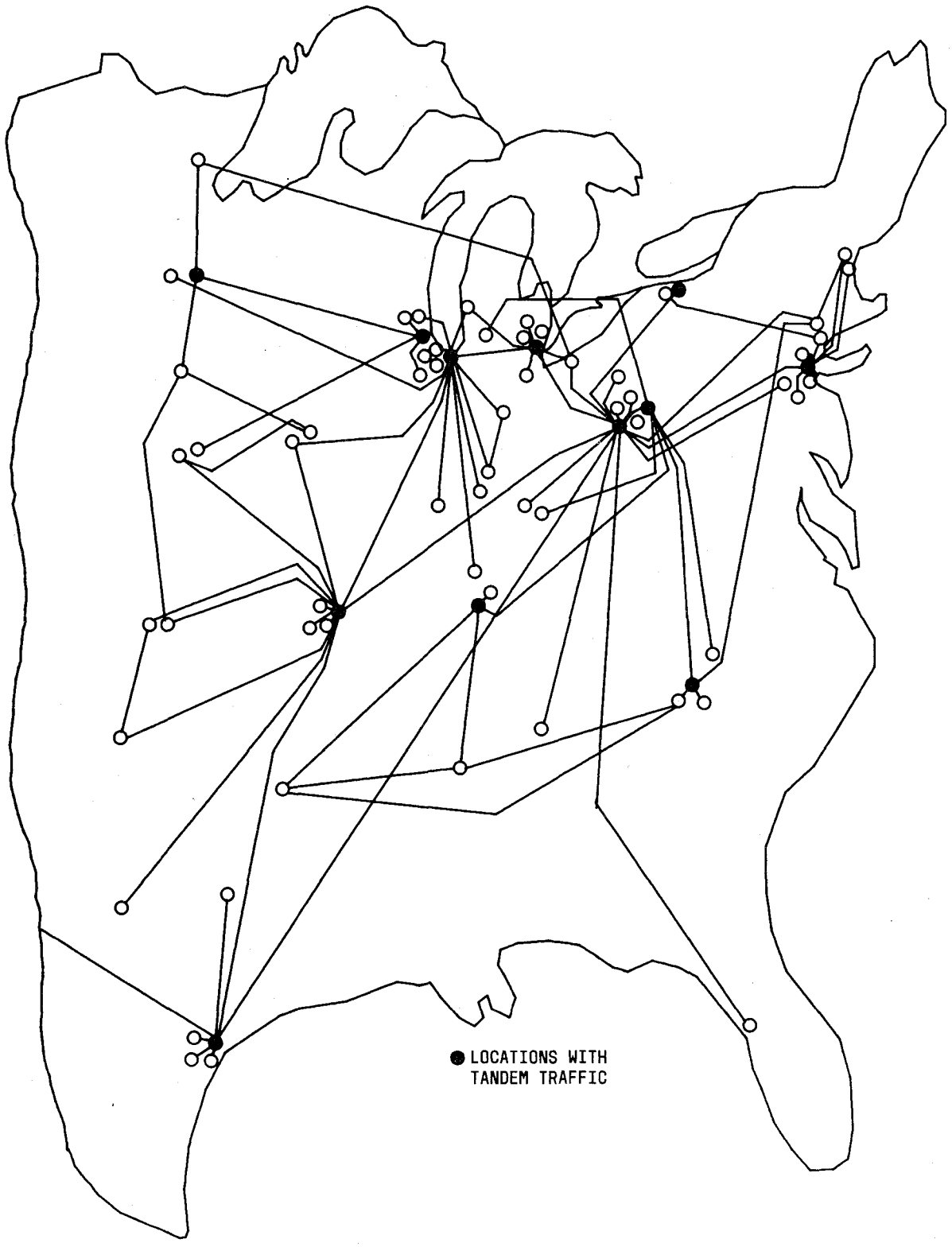


Fig. 2—Typical Tandem Tie Trunk Network

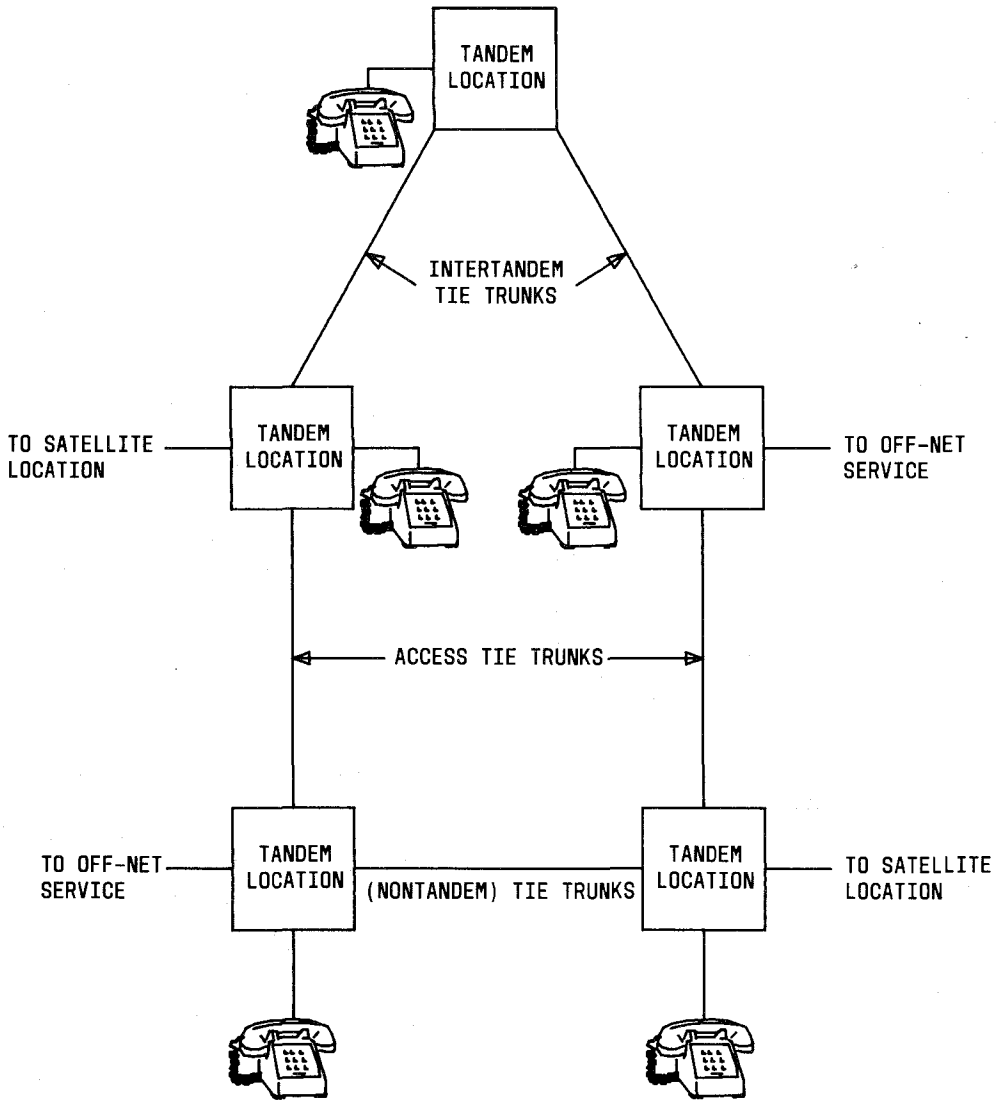
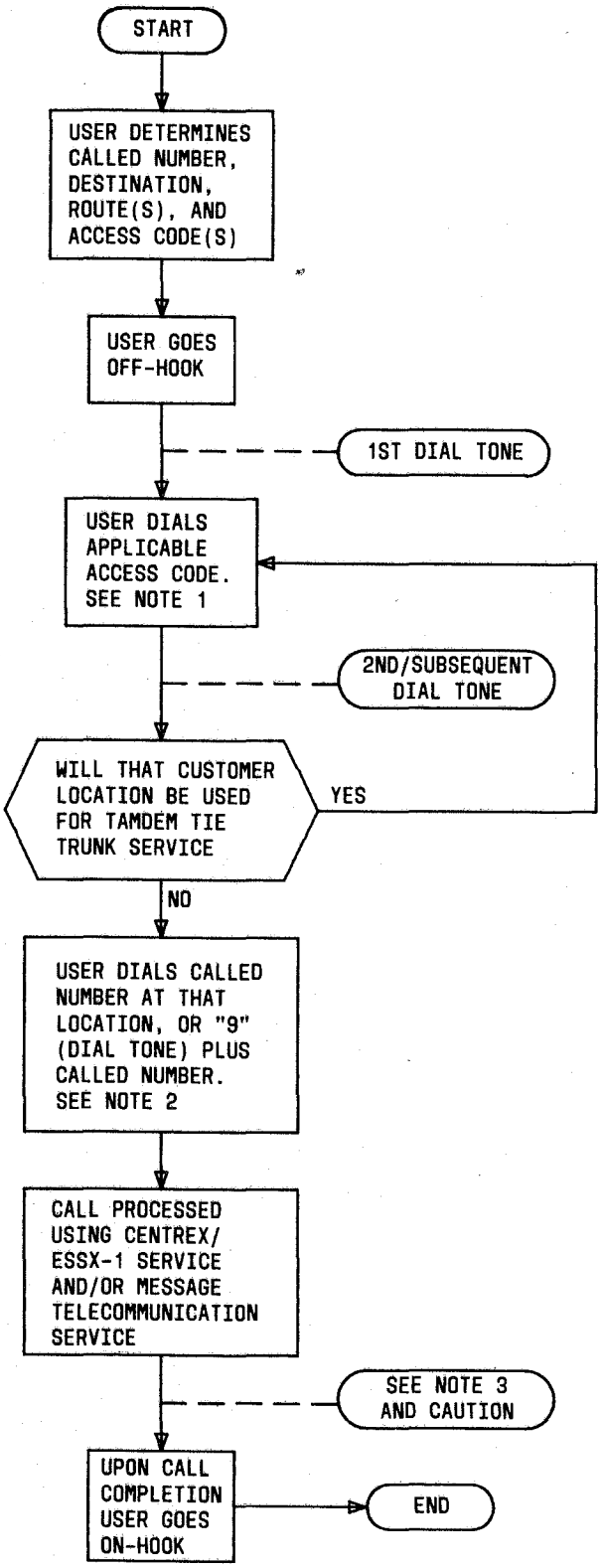


Fig. 3—TTTN Functional Segment Example

calls can be made. The user must not flash to connect the original party or hang up to allow the remaining two parties to finish the call until ringing of the new party is confirmed. Otherwise, a disconnect may result. Call transfer, threeway conference, and consultation hold calls are made in the normal manner when the new party is reached via a 1XX or I1XX tandem tie line or private network access line. See reference A(19) in Part 18.

TELEPHONE COMPANY

3.06 Not applicable.



NOTES:

1. DIGIT TIMING SCHEME:
   A. FIRST DIGIT AFTER ACCESS CODE MUST BE DIALED WITHIN TEN SECONDS AFTER SECOND/SUBSEQUENT DIAL TONE STARTS.
   B. SUBSEQUENT DIGITS MUST BE DIALED WITHIN N SECONDS AFTER ALL DIGITS COLLECTED SO FAR HAVE BEEN OUTPULSED. N IS EQUAL TO THE DROP BACK TIMING VALUE PROVIDED BY THE ROUTE INDEX EXPANSION TABLE. $4 \leq N \leq 12$
2. WHEN THE CALL IS TOUCH-TONE INTO THE ESS, I1XX USES THE STANDARD 1XX METHOD WHICH EMPLOYS A CONNECTION THROUGH WHAT IS ESSENTIALLY A TOUCH-TONE-TO-DIAL-PULSE CONVERTER. AT THE END OF DIALING, THIS CONNECTION IS REPLACED BY A DIRECT CONNECTION TO THE OUTGOING TRUNK. END OF DIALING IS RECOGNIZED EITHER BY THE RECEIPT OF A # DIGIT OR BY A TIME-OUT. FOR I1XX, ALL TOUCH-TONE PHONES SHOULD BE 12 BUTTON, WITH THE DIALER BEING INSTRUCTED TO DIAL A # DIGIT AS THE VERY LAST DIGIT DIALED. THIS WILL FORCE THE SWITCHING TO OCCUR BEFORE ANSWER. ANY OTHER ESS OFFICES IN THE CALL WILL RECEIVE DIAL PULSES AND WILL NOT DO ANY SWITCHING AT THE END OF DIALING.
3. A "CLICK" IS PROBABLY HEARD 4-12 SECONDS AFTER END OF DIALING UNLESS I1XX (WITH I1XX SOFTWARE, SERVICE CIRCUITS, AND TRUNKS) IS UTILIZED.

CAUTION
IF THIS CALL IS FOR DATA TRANSMISSION PURPOSES AND I1XX IS NOT USED, USER MUST AWAIT TIME-OUT, RECOGNIZED BY CLICK, BEFORE BEGINNING DATA TRANSMISSION

Fig. 4—User Operation—1XX or I1XX

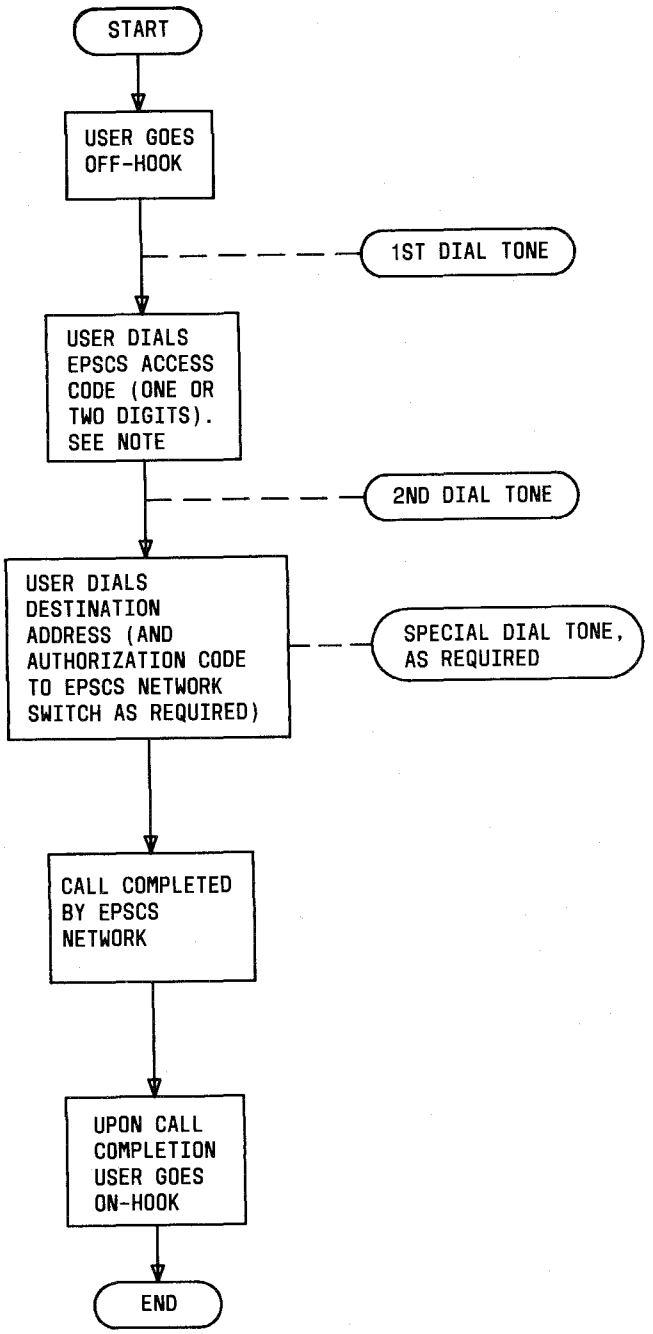


Fig. 5—User Operation—PNAL

4. SYSTEM OPERATION

HARDWARE

4.01 Hardware associated with the Tandem Tie Trunk Service feature is shown in Table A and Table B.

OFFICE DATA STRUCTURES

A. Translations

Introduction

4.02 Translation data for the Tandem Tie Trunk Service feature is discussed below. For detailed information on these translation words, as well as common translation data used to process a call, refer to references C(1), C(2), and/or C(3) in Part 18.

Centrex Translator

4.03 For the Tandem Tie Trunk Service feature, if the Message Detail Recording on Tie Trunks (TAMA) feature is provided, if the route index increment is greater than 63, or if special dial repeating trunks (SD-1A473, SD-1A474, SD-1A475, and SD-1A476) are specified, a digit interpreter auxiliary block is required for the data type 5, subtype 17 access code final data (Fig. 6). Specifying dial repeating trunks is required to provide I1XX treatment for the call, but has no effect if the I1XX feature is not loaded.

Route Index Expansion Table Translator

4.04 Access to a trunk group can be gained only through a route index. For the Tandem Tie Trunk Service feature, route indexes are required for outgoing tie trunk groups and for tandem tie line cut-through service circuits. All route index expansions require two words. For 1XX and I1XX, outgoing trunk groups require a word 0 and word 1 type 4. Cut-through service circuits require a word 0 and word 1 type 0. PNAL outgoing trunk groups require a word 0 and word 1 type 3. Refer to Fig. 7 for the layouts of the route index expansion table words required for the Tandem Tie Trunk Service feature. The transmitter type in word 1 type 3 must be marked for multifrequency for private network access line service. The ordinary wink bit must not be marked, and the second wink bit must be marked for PNAL.

Trunk Network Number to Peripheral Equipment Number (TNN-to-PEN) Translator

4.05 The Tandem Tie Trunk Service feature requires TNN-to-PEN auxiliary blocks. A 4-word auxiliary block, shown in Fig. 8, is used for tandem tie trunks. Two 7-word auxiliary blocks

are used for each tandem tie line cut-through service circuit. (See Fig. 9.) One 7-word auxiliary block is used for the receiver port (port 0), and another is used for the transmitter port.

Trunk Class Code Expansion Table Translator

4.06 The trunk class code expansion table translation words shown in Fig. 10 are required for the Tandem Tie Trunk Service feature.

Master Scanner Translator

4.07 The Tandem Tie Trunk Service feature requires the use of the master scanner translator to provide applicable trunk program indexes. The master scanner uses a primary translation word type 2. (See Fig. 11.)

B. Parameters/Call Store

4.08 Tandem tie line cut-through service circuits require 18-word (19-word for 1E6/1AE6 and later generic programs) outpulsing registers. They also require 9-word transmitter outpulsing annexes, 32-word digit receiver junior registers, 7-word trunk dial pulse transmitter junior registers, etc. These registers/annexes are engineered on a per office basis concerning all applicable features within a given No. 1/1A ESS office. The parameter set cards involved are listed in paragraph 9.02.

4.09 Another type of junior register, called an I1XX junior register, is needed for I1XX calls that involve local second dial tone and/or the TAMA feature. If the TAMA feature is not applicable within a given No. 1/1A ESS office and that office does not supply second dial tone, no I1XX junior registers are required. Parameter set card IXXJR defines the quantity of I1XX junior registers in a No. 1/1A ESS office. (See Fig. 12 and 13.)

4.10 Also, for I1XX calls, one hopper entry is provided for each I1XX junior register (excluding dummy registers). The quantity automatically provided is set equal to the IXXJR set card quantity supplied. (See Fig. 14.)

4.11 For I1XX calls originating locally from dial pulse stations, I1XX senior registers are required. When a locally originated I1XX call is initiated, an I1XX senior register is seized and held throughout dialing. This register is held until answer, abandon, or end-of-dial time-out. If the TAMA feature is applicable within the originating No. 1/1A ESS office, the I1XX senior register is timed out 12 seconds after the last dialed digit. Senior registers, which were formerly used only for step-by-step and foreign exchange trunk calls, now include I1XX senior registers as well. Set card IXXOR is used to indicate the additional number of senior call registers required for I1XX. (See Fig. 15.) Set card IXXOR affects only the SOR call store table.

4.12 I1XX can be loaded without any parameter set cards (except, of course, feature defining set cards). If I1XX is to be used before the next update of office parameters, IXXOR should be specified. If the TAMA feature and/or second dial tone is to be provided with I1XX, IXXJR should also be specified.

4.13 For more detailed information concerning parameter set cards, refer to references C(4) through C(7) in Part 18.

Call Store

4.14 The Tandem Tie Trunk Service feature requires the use of dial pulse outpulsing registers. Word 17 is modified for use by this feature. (See Fig. 16.)

FEATURE OPERATION

A. Station Call—Local Office Origination

4.15 A Centrex/ESS-1 station tandem tie trunk call begins like any other customer originating call up to the time the initial 1XX or I1XX access code is dialed. The line seizure is detected, normal dialing connection is established to the proper type customer digit receiver on the trunk link network, and dial tone is returned to the originating station. Digit collection is then initiated. (See Fig. 17A.)

4.16 Upon receipt of a valid access code, identified by a centrex data type 5 subtype 17 translation, the existing receiver connection is abandoned. The calling station is then connected to the receiver port of an idle tandem tie line cut-through service circuit for local origination. Fixed route index 148 is used for connection to the receiver port. An idle outgoing tandem tie trunk is seized and connected to the transmitter port (using TNN-to-PEN translator). In addition, a switching path is reserved to directly

TRUNK CIRCUITS USED FOR TANDEM TIE TRUNK SERVICE

USE	SD-NO.	PULSING										SUPR	J-NO.	TRK FR.	NO. OF CKTS PER UNIT	MTG PLT SPACE PER UNIT	REMARKS
		INPULSING					OUTPULSING										
		MF	DP	RP	TT/DP	NONE	MF	DP	RP	TT/DP	NONE						
Tie Trunk 2-Way DP	1A163	✓	✓		✓	✓	✓	✓		✓	✓	E&M	1A033CA 1A088CA	MT CMT	1 1	4″ Plug-in	
Tie Trunk 2-Way DP 4-Wire	1A237	✓	✓		✓	✓	✓	✓		✓	✓	E&M	1A033CC 1A088CC	MT CMT	1 1	6″ Plug-in	
Long Haul FX 4-Wire	1A240							✓			✓	GS	1A033CK	MT	1	6″	
Short Haul FX	1A241							✓			✓	GS	1A033CF	MT	1	2″	
Tie Trunk 2-Way Loop	1A264	✓	✓		✓	✓	✓	✓		✓	✓	Hilo out, Rev Bat in	1A033CG	MT	1	2″	Cannot be used with I1XX
Long Haul FX 4-Wire	1A415							✓			✓	GS	1A088CK	CMT	1	Plug-in	
Short Haul FX	1A416							✓			✓	GS	1A088CF	CMT	1	Plug-in	
Tie Trunk 2-Way DP 4-Wire	1A473	✓	✓		✓	✓	✓	✓		✓	✓	E&M	1A033CR	MT	1	6″	Similar to SD-1A237. Designed for I1XX & PNAL
Tie Trunk 2-Way DP	1A474	✓	✓		✓	✓	✓	✓		✓	✓	E&M	1A033CS	MT	1	4″	Similar to SD-1A163. Designed for I1XX
Long Haul FX 4-Wire	1A475							✓			✓	GS	1A033CT	MT	1	6″	Similar to SD-1A415. Designed for I1XX
Short Haul FX	1A476							✓			✓	GS	1A033CU	MT	1	4″	Similar to SD-1A416. Designed for I1XX

LEGEND:

Bat	—	Battery	MTG	—	Mounting
CMT	—	Combined miscellaneous trunk	PLT	—	Plate
DP	—	Dial pulse	PNAL	—	Private network access lines
FX	—	Foreign exchange	Rev	—	Reverse
GS	—	Ground start	RP	—	Revertive pulsing
I1XX	—	Improved cut-through feature	Supr	—	Supervision
MF	—	Multifrequency	Trk	—	Trunk
MT	—	Miscellaneous trunk	TT	—	TOUCH-TONE

TABLE B

SERVICE CIRCUITS USED FOR TANDEM TIE TRUNK SERVICE

USE	SD-NO. (See Note)	J-NO.	FRAME	CABLE LENGTH LIMIT	MTG PLT SPACE PER UNIT	NO. CKTS PER UNIT
Tandem Tie Line	1A172	1A033DC	MT	1190′	6″	1
Cut-Through Service	1A173	1A033DD	MT	355′	6″	1
Circuit—Local Office	1A179	1A033DL	MT	595′	6″	1
Originating	1A300	1A033JJ	MT	—	4″	1
Tandem Tie Line	1A178	1A033DH	MT	1190′	6″	1
Cut-Through Service	1A173	1A033DD	MT	355′	6″	1
Circuit—Distant Office	1A179	1A033DL	MT	595′	6″	1
Originations	1A300	1A033JJ	MT	—	4″	1

Note:
1A172 — Customer dial pulse receiver
1A173 — TOUCH-TONE call detector
1A178 — Trunk dial pulse receiver
1A179 — Trunk dial pulse transmitter
1A300 — Cut-through circuit

connect the station to the tandem tie trunk. (See Fig. 17B.)

4.17 Second dial tone is received either from the next office (if available) or from the originating office, but not from both. This is specified as an access code option and establishes the restriction that route advances are only allowed between trunk groups arranged for similar second dial tone operation. For 1XX and TOUCH-TONE I1XX, local second dial tone is provided before hunting the outgoing trunk. The outgoing trunk is hunted after this dial tone is removed in response to a dialed digit. If no idle trunk is available, overflow signal is returned at this point.

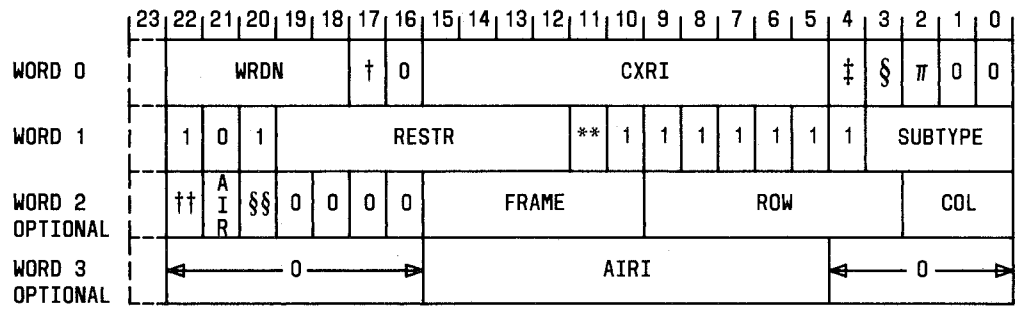
4.18 The calling party continues dialing the remaining access codes and/or called party number. Every dialed digit is repeated over the outgoing tandem tie trunk by the tandem tie line cut-through service circuit for 1XX and TOUCH-TONE I1XX. For dial pulse I1XX, the trunk repeats the dialed digits. Except for dial pulse I1XX, the service circuit is abandoned, and the final talking path is established after a 4- to 12-second time-out from the last dialed digit or, if available and used, upon receipt of a # digit from a TOUCH-TONE station. For dial pulse I1XX, the service circuit is removed as soon as a start-dial signal is received, or if the outgoing trunk must be yielded due to glare. See Fig. 17C.

4.19 If no idle tandem tie line cut-through service circuit for local origination and/or if no idle outgoing tandem tie trunk is available, the originating call is routed to a reorder signal. A reorder signal may also be returned from other offices in the tandem tie trunk network for lack of an idle tandem tie line cut-through service circuit for distant office origination and/or outgoing tandem tie trunk.

B. Attendant Call—Local Office Origination

4.20 If the attendant loop appears on the line link network (50A CPS interface), the originating tandem tie trunk call is processed as described in paragraphs 4.15 through 4.19. The following discussion addresses attendants with loops appearing on the trunk link network (51A CPS interface).

4.21 An attendant originating a tandem tie trunk call originates the call as any attendant call. Normal dialing connection is established to the proper type customer digit receiver on the trunk link network, and dial tone is returned. Digit



NOTE: BIT 23 EXISTS IN NO. 1A ESS ONLY.

```
WORD 0
  WRDN -- NUMBER OF WORDS IN AUXILIARY BLOCK
    †  -- ATTENDANT CONTROL OF FACILITIES; YES = 1, NO = 0
  CXRI -- ROUTE INDEX INCREMENT. EQUALS DIFFERENCE BETWEEN
          SPECIFIED ROUTE INDEX AND BASE ROUTE INDEX
    ‡  -- SAVE ACCESS CODE
    §  -- AUTOMATIC MESSAGE ACCOUNTING MESSAGE
          DETAIL RECORDING; YES = 1, NO = 0
    π  -- DIAL PULSE REPEATING TRUNK INDICATOR; YES = 1, NO = 0
WORD 1
 RESTR -- TREATMENT CODE = 1
   **  -- SECOND DIAL TONE TIE TRUNK = 1 IF PROVIDED BY THIS OFFICE,
          OTHERWISE 0
   SUB -- SUBTYPE BINARY CONVERSION (17)
  TYPE
WORD 2 OPTIONAL
    †† -- ATTENDANT CONTROL NIGHT RESTRICTION.
          EQUALS 1 IF ACOF USED, OTHERWISE 0
   AIR -- ATTENDANT CONTROL INTERCEPT ROUTING.
    §§ -- ANNOUNCEMENT FOR CALL FORWARDING OVER
          PRIVATE FACILITIES
 FRAME -- MASTER SCANNER NUMBER FRAME
 ROW   -- MASTER SCANNER NUMBER ROW
 COL   -- MASTER SCANNER NUMBER COLUMN
WORD 3 OPTIONAL
  AIRI -- ATTENDANT CONTROL INTERCEPT ROUTE INDEX
```

Fig. 6—Centrex Translator—Digit Interpreter Auxiliary Block

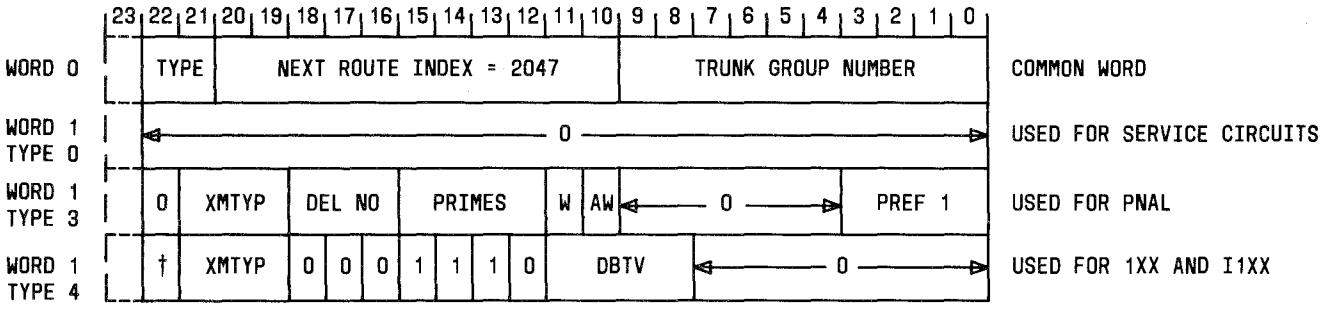
collection is then initiated. (See Fig. 18A.) Attendant access is through a screening LEN.

4.22 From this point, an attendant call is processed essentially in the same manner as a station originated call (paragraphs 4.16 through 4.19). See Fig. 18.

C. Incoming Call—Distant Office Origination

4.23 An incoming call on a tandem tie trunk is recognized by the supervisory scans. Via the appropriate fixed route index, a connection is established between the incoming tandem tie trunk and a trunk dial pulse receiver (with TOUCH-TONE applique). See Fig. 19A. (Refer to paragraph 4.17 for second dial tone operation.)

4.24 Upon receipt of a valid access code, identified through centrex data type 5 subtype 17 translations, the trunk digit receiver circuit is released. The incoming tandem tie trunk is then connected to the trunk receiver port of an idle tandem tie line cut-through service circuit for



NOTE: BIT 23 EXISTS IN NO. 1A ESS ONLY.

```
WORD 0
 TYPE -- TYPE OF ROUTE INDEX EXPANSION TABLE:
         CUT-THROUGH SERVICE CIRCUIT = 01
         CUT-THROUGH TYPE TRUNKS     = 10

WORD 1 TYPE 4
†      -- TRANSFER OKAY; YES = 1 , NO = 0
XMTYP -- TRANSMITTER TYPE:
         MULTIFREQUENCY = 001 (FOR PNAL ONLY)
         DIAL PULSE     = 010
 DBTV -- DROP BACK TIMING VALUE = 4 TO 12 SECONDS.
         SHOULD BE 6 SECONDS NOT USED FOR I1XX
         6 SECONDS. NOT USED FOR I1XX WITH DIAL
         PULSE USERS

WORD 1 TYPE 3
XMTYP -- TRANSMITTER TYPE:
         MULTIFREQUENCY = 001
         DIAL PULSE     = 010
DEL NO -- DIGITS DELETED = 000
PRIMES -- NUMBER OF PRIMES
     W -- WINK = 0
    AW -- APPLICATION OF WINK = 1
PREF 1 -- PREFIX DIGIT 1 = 0000
```

Fig. 7—Route Index Expansion Table Translator—Route Index Expansion Tables

distant originations. Route index 149 is used for connection to the receiver port. An idle outgoing tandem tie trunk is seized and connected to the transmitter port (using TNN-to-PEN translator). A switching path is reserved to directly connect the incoming tandem tie trunk to the outgoing tandem tie trunk. (See Fig. 19B.)

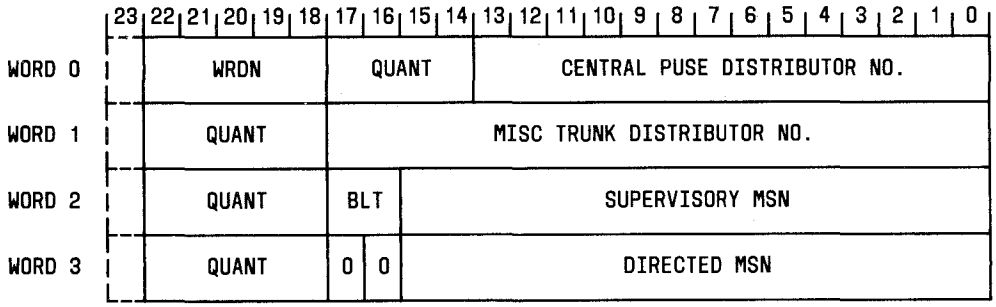
4.25 The calling party continues dialing the remaining access codes and/or called party number. Every digit dialed on the incoming tandem tie trunk is repeated over the outgoing tandem tie trunk by either the tandem tie line cut-through service circuit for distant originations for 1XX and TOUCH-TONE I1XX, or by the trunk itself for dial pulse I1XX. Except for dial pulse I1XX, the service circuit is abandoned, and the final talking path established after a 4- to 12-second time-out from the last dialed digit, or if available and used, upon receipt of a # digit from a TOUCH-TONE caller. For dial pulse I1XX, the service circuit is removed as soon as a start-dial signal is received, or if the outgoing trunk must be yielded due to glare. (See Fig. 19C.)

4.26 If no idle tandem tie line cut-through service circuit for distant orginations and/or no idle outgoing tandem tie trunk is available, reorder signal is returned over the incoming tandem tie trunk.

D. Station Access to a Private Network

4.27 When the Automatic Calling Station Identification (ACSI) feature is applicable, private network access line service must be used to access a private network such as EPSCS. (Otherwise, 1XX or I1XX can be used as described above.) For EPSCS access, an SD-1A473 trunk circuit must be used for a Centrex/ESS-1 station with the ACSI feature applicable at the EPSCS. If the ACSI is not applicable, SD-1A473 trunk circuits are not required, though they still may be used.

4.28 When the ACSI feature applies, the following sequence of actions occur for an originating call. The calling party goes off-hook and is connected to an idle customer digit receiver (Fig. 20A). The calling party dials the EPSCS network code. An SD-1A473 outgoing trunk circuit is seized, wink



NOTE: BIT 23 EXISTS IN NO. 1A ESS ONLY

WORD 0
WRDN -- NUMBER OF WORDS IN AUXILIARY BLOCK = 4
QUANT -- QUANTITY OF CENTRAL PULSE DISTRIBUTOR POINTS FOR THE MISCELLANEOUS TRUNK ASSOCIATED WITH THE TRUNK NETWORK NUMBER

WORD 1
QUANT -- QUANTITY OF SIGNAL DISTRIBUTOR POINTS

WORD 2
QUANT -- QUANTITY OF SUPERVISORY MASTER SCANNER LEADS
BLT -- BY-LINK TRUNK ITEM. SET TO EITHER 00 OR 01

WORD 3
QUANT -- QUANTITY OF DIRECTED MASTER SCANNER POINTS

LEGEND:
BLT -- BY-LINK TRUNK
MISC -- MISCELLANEOUS
MSN -- MASTER SCANNER NUMBER
NO. -- NUMBER
QUANT -- QUANTITY
WRDN -- WORD NUMBER

Fig. 8—TNN-to-PEN Translator—TNN-to-PEN Auxiliary Blocks Used for Outgoing Tie Trunks

signal returned from the far-end office, and automatic number identification sent forward via multifrequency (MF) signals (Fig. 20B). After MF outpulsing is completed, the MF transmitter is released, along with the customer digit receiver. The station is then connected to the outgoing SD-1A473 tie trunk (Fig. 20C). Note that in this case, no tandem tie line cut-through service circuit is used. Glare resolution is accomplished via the MF transmitter.

4.29 Subsequent user dialing in response to second dial tone (from EPSCS network) proceeds directly over the tie trunk. Second dial tone is delayed approximately 1 second due to MF signaling. The user then dials the private network number of the called party. If an authorization code is required, the EPSCS network prompts with recall dial tone after the called number has been received. The authorization code consists of three to six digits.

E. Dial Pulse Station Extending an Incoming Call to EPSCS Network With Automatic Calling Station Identification Feature

4.30 Figure 21 shows the various network connections that occur for the case of a dial pulse station extending an incoming call to an EPSCS network with the Automatic Calling Station Identification feature. A 3-port conference circuit is used as an intermediary circuit between an incoming trunk and an SD-1A473 outgoing tie trunk. Since dial pulses cannot be repeated through a 3-port conference circuit, a tandem tie line cut-through service circuit for local origination is used during the dialing period.

4.31 The incoming trunk is initially connected to a called (dial pulse) station (Fig. 21A). The called station flashes to begin the processes of extending the incoming trunk call onto the EPSCS network. This action results in the connection of

RECEIVER PORT AUXILIARY BLOCK (PORT 0)

WORD	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0		0	0	1	1	1	◄																	►
1		QUANT					MISC. TRUNK DISTRIBUTOR NO.																	
2		0	1	0	0	0	0	1	SUPERVISORY MSN															
3		QUANT					DIRECTED MSN																	
4		0	0	1	0	0	0	0	1	OTHER PORT TNN														
5		0	0	0	1	0	MASTER SCANNER FAST POINTS																	
6		0	0	0	1	0	COMMON SIGNAL DISTRIBUTOR POINTS																	

TRANSMITTER PORT AUXILIARY BLOCK (PORT 1)

WORD	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0		0	0	1	1	1	0	0	0	1	CENTRAL PULSE DISTRIBUTOR NO.													
1		0	0	0	1	1	MISC. TRUNK DISTRIBUTOR NO.																	
2		◄																						►
3		0	0	0	1	0	DIRECTED MSN																	
4		0	0	1	◄					0				►	OTHER PORT TNN									
5		◄																						►
6		0	0	0	1	0	COMMON SIGNAL DISTRIBUTOR POINTS																	

NOTE: BIT 23 EXISTS IN NO. 1A ESS ONLY.

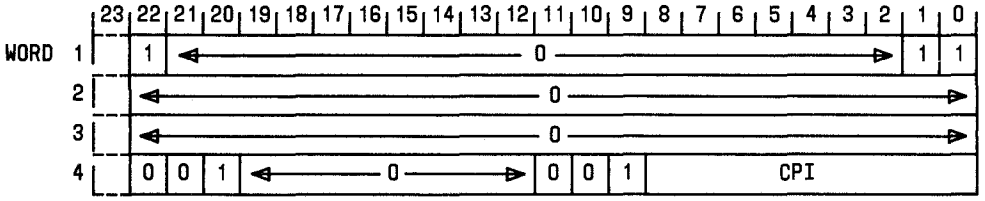
PORT 0
WORD 1
  QUANT - QUANTITY OF SIGNAL DISTRIBUTOR POINTS:
          LOCAL ORIGINATION = 5 (00101)
          DISTANT ORIGINATION = 3 (00011)

WORD 3
  QUANT - QUANTITY OF DIRECTED MASTER SCANNER POINTS:
          LOCAL ORIGINATION = 00001
          DISTANT ORIGINATION = 00000

LEGEND:
  MISC. - MISCELLANEOUS
    MSN - MASTER SCANNER NUMBER
    NO. - NUMBER
  QUANT - QUANTITY
    TNN - TRUNK NETWORK NUMBER

Fig. 9—TNN-to-PEN Translator—TNN-to-PEN Auxiliary Blocks Used for Tandem Tie Line Cut-Through Service Circuits

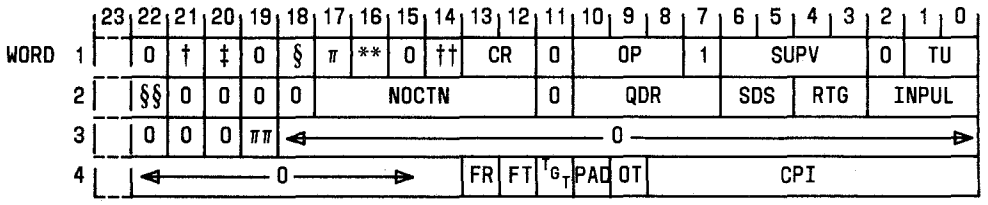
the incoming trunk call to an idle 3-port conference circuit and also of the called station to an idle line receiver. A path between the called station and the 3-port conference circuit is also reserved (Fig. 21B). Upon dial tone, the called station dials the EPSCS network access code. An SD-1A473 outgoing tie trunk circuit is seized, a wink is returned, and automatic number identification is sent forward via MF signaling. After MF outpulsing, the MF transmitter and line receiver are released. The called station is then connected to the receiver port of an idle tandem tie line cut-through service circuit for local origination, and the transmitter port is connected to the SD-1A473 outgoing tie



NOTE: BIT 23 EXISTS IN NO. 1A ESS ONLY.

WORD 4:
CPI - CIRCUIT PROGRAM INDEX: TANDEM TIE LINE CUT-THROUGH SERVICE CIRCUIT - LOCAL ORIGINATION = 027
TANDEM TIE LINE CUT-THROUGH SERVICE CIRCUIT - DISTANT ORIGINATION = 028

A. FOR CUT-THROUGH SERVICE CIRCUIT



NOTE: BIT 23 EXISTS IN NO. 1A ESS ONLY.

WORD 1:
† - CONFERENCE RESTRICTED; YES = 1, NO = 0
‡ - START DIAL SIGNAL TIMING; YES = 1, NO = 0
§ - START DIAL SIGNAL ON OGT; YES = 1, NO = 0
π - WINK START DIAL = 1; DELAY DIAL = 0
** - FLASH EXPECTED; YES = 1, NO = 0
†† - STOP-GO FINAL HEAVY POSITIVE PULSE;
YES = 1, NO = 0
CR - COMPENSATING RESISTANCE: 00 - NONE OR NO DIAL PULSE
01 - 300 OHM
10 - 600 OHM OR DIAL PULSE
11 - 900 OHM
OP - OUTPULSING: 001 - MULTIFREQUENCY (SD-1A473 I1XX AND PNAL ONLY)
010 - DIAL PULSE
SUPV - SUPERVISION: 0011 - E&M
0100 - HILO REV BAT
1011 - GROUND START
TU - TRUNK USAGE: 00 - OUTGOING
01 - INCOMING
10 - TWO-WAY (RECOMMENDED)
11 - MISCELLANEOUS

WORD 2
§§ - CHARGE ON FREE NUMBER; YES = 1, NO = 0
NOCTN - NORMALIZED OFFICE CODE NUMBER OR TABLE
QDR - QUANTITY OF DIGITS RECEIVED:
0000 - NONE, 2, OR 3
0100 - 4
0101 - 5
0111 - 7

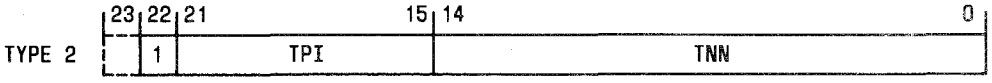
WORD 2 (CONTINUED)
SDS - START DIAL SIGNAL: 00 - NONE
01 - DELAY DIAL
10 - WINK
11 - DIAL TONE
RTG - ROUTING; NONE = 00, LOCAL = 01
INPUT - INPULSING: 001 - MULTIFREQUENCY
010 - DIAL PULSE
101 - TOUCH-TONE/DIAL PULSE

WORD 3
ππ - CIRCUIT MODIFIED FOR TANDEM TIE LINE;
YES = 1, NO = 0

WORD 4
FR - FLASH REPEATING; YES = 1, NO = 0
FT - FLASH TIMING; YES = 1, NO = 0
TGT - TRUNK GUARD TIMING; LONG = 1,
REGULAR = 0
PAD/OT - 000 - SERVICE, TONE & ANNOUNCEMENT
001 - NOT USED
100 - MESSAGE TRUNK
110 - SWITCHABLE 2DB PAD
CPI - CIRCUIT PROGRAM INDEX:
SD-1A163-02 - 049 SD-415-05 - 162
SD-1A163-05 - 049 SD-416-05 - 163
SD-1A237-02 - 022 SD-473-01 - 173
SD-1A237-05 - 022 SD-474-01 - 174
SD-1A240-01 - 030 SD-475-01 - 175
SD-1A241-01 - 031 SD-476-01 - 176
SD-1A264-01 - 024

B. FOR TIE & FOREIGN EXCHANGE TRUNK

Fig. 10—Trunk Class Code Expansion Table Translator—Trunk Class Code Expansion Tables



NOTE: BIT 23 EXISTS IN NO. 1A ESS ONLY.

LEGEND:
TPI - TRUNK PROGRAM INDEX. SEE TABLE BELOW
TNN - TRUNK NETWORK NUMBER

TPI TABLE

SD NO.	2-WAY TRUNK		OUTGOING TRUNK	
	SC 0	SC 1	SC 0	SC 1
1A163	26	25	26	15
1A237	26	25	26	15
1A240	22	21	22	60
1A241	22	21	22	60
1A264	26	25	22	60
1A415	22	21	22	60
1A416	22	21	22	60
1A473	26	25	26	15
1A474	26	25	26	15
1A475	22	21	22	60
1A476	22	21	22	60

Fig. 11—Master Scanner Translator—Type 2 Primary Translation Word

trunk. The called station now dials into the EPSCS network via the tandem tie line cut-through service circuit and the SD-1A473 outgoing tie trunk. Connection of the called station to the 3-port conference circuit occurs upon time-out from the last dialed digit or flash, whichever occurs first. The flash should not occur before ringing is heard in order to avoid the possibility of a disconnect. At that time, the tandem tie line cut-through service circuit connections are released, and the SD-1A473 outgoing tie trunk is connected to the 3-port conference circuit (Fig. 21C).

4.32 TOUCH-TONE called stations can dial through a 3-port conference circuit. Therefore, no tandem tie line cut-through service circuit is used for extending an incoming trunk call to an EPSCS network with the Automatic Calling Station Identification feature by a TOUCH-TONE equipped calling station. The operation is similar to that described above. (See Fig. 22.)

4.33 A line-to-line call may similarly be extended to an EPSCS network with the Automatic Calling Station Identification feature.

F. Access to EPSCS Network Without Automatic Calling Station Identification Feature

4.34 SD-1A473 outgoing tie trunks accessed as manual outgoing trunks can be used for EPSCS access when the Automatic Calling Station Identification feature is not used. However, a call cannot be extended to EPSCS by a dial pulse station in this arrangement. In order to allow extended calls from dial pulse stations in this arrangement, the access code must be translated as 1XX or I1XX, using the SD-1A237 or SD-1A473 trunks, respectively.

CHARACTERISTICS

5. FEATURE ASSIGNMENT

5.01 The Tandem Tie Trunk Service feature is assigned on a per access code basis in each large business customer (Centrex/ESSX-1) group.

6. LIMITATIONS

OPERATIONAL

6.01 Trunk dial transfer to a tandem tie line or private network access line is not available. That is, a tie trunk is not allowed to flash and initiate a transfer, threeway conference, or consultation hold call to 1XX, I1XX or PNAL routes. Only attendants and stations can do this. Also, for these calls, flashing to recall the held party or hanging up after initiating a transfer must not be done before ringing is heard.

ASSIGNMENT

6.02 PNAL access codes are limited to one or two digits.

6.03 The Tandem Tie Trunk Service feature requires precise dial tone at all locations which send dial tone back to the caller. Otherwise, callers may receive wrong numbers when the TOUCH-TONE receiver in the tandem tie line cut-through service circuit receives spurious digits from imprecise dial tone frequencies which appear to be valid TOUCH-TONE digits.

6.04 Route advance is seldom done for 1XX and I1XX routes. If route advance is done, the alternate route(s) should have the same second dial tone arrangement as the primary route.

6.05 All TOUCH-TONE stations which can reach I1XX routes should be equipped with 12-button TOUCH-TONE dials so that the caller can dial the # (end-of-dial) digit as the very last digit to avoid the click problem.

6.06 I1XX must be provided on a total network basis if the customer is to have "click-free" tandem tie trunk service. This means that all No. 1/1A ESS switches in the network must have a 1E6/1AE6 or later generic program, the necessary feature package groups, special dial repeating trunk circuits, and the improved tandem tie line cut-through service circuits. All No. 2 ESS switches in the network must be arranged for E&M supervision on those trunks which are part of an I1XX network. Crossbar, step-by-step, and panel offices should need no changes to provide I1XX rather than 1XX.

6.07 The Tandem Tie Trunk Service feature cannot be provided to telephones which are not part of a Centrex/ESSX-1 customer group.

6.08 Prefixing and/or deleting of digits is not permissible, regardless of any information stored in translation data. A 1- or 2-digit speed calling list cannot be used for any dialing of Tandem Tie Trunk Service feature calls.

7. INTERACTIONS

7.01 Not applicable.

8. RESTRICTION CAPABILITY

8.01 The Attendant Control of Trunk Group Access feature, also referred to as the Attendant Control of Facilities (ACOF) feature, allows the attendant to restrict dial access of all stations to certain centrex trunk groups, simulated facilities, and special services by operating specific keys. When ACOF is activated, calls to these facilities may be routed to the attendant for subsequent completion, to a record announcement, or to an intercept tone trunk. See reference A(18) in Part 18.

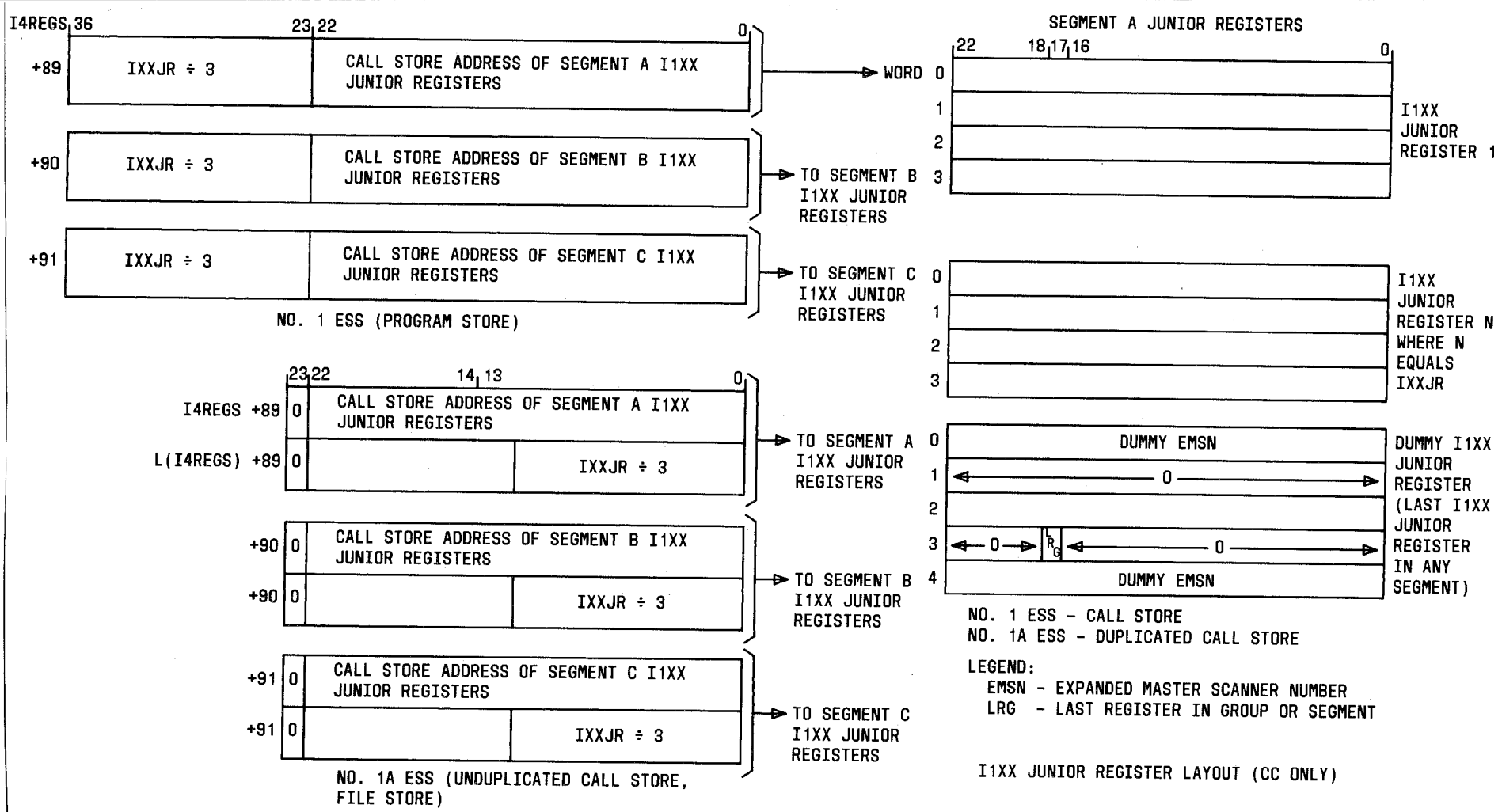
INCORPORATION INTO SYSTEM

9. INSTALLATION/ADDITION/DELETION

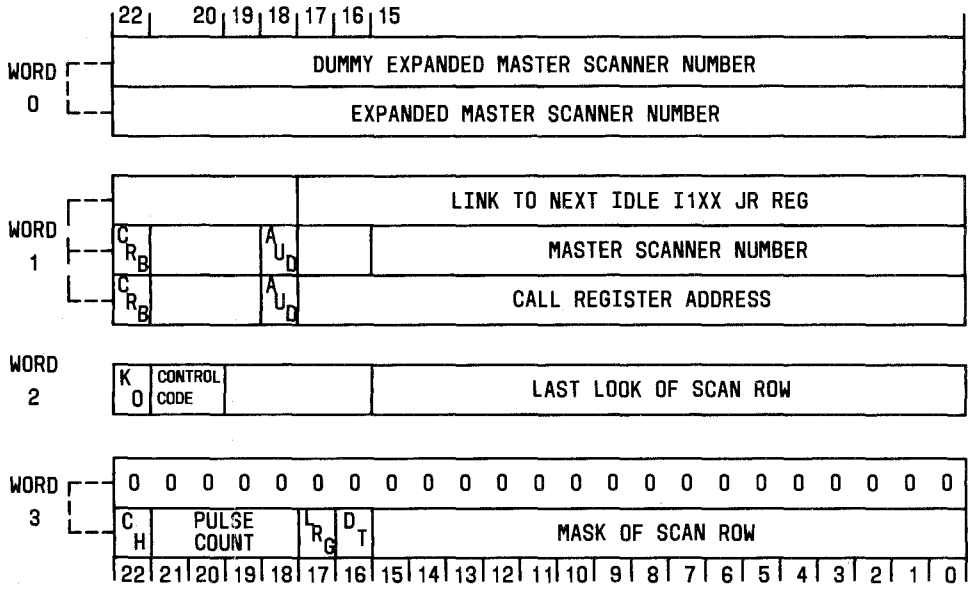
9.01 Applicable hardware such as trunk circuits, service circuits, plug-ins, and network cross-connections are normally installed by an installation force per telephone company order. In conjunction with hardware installation, telephone company personnel input software data supplied by Western Electric on Growth Recent Change forms. Refer to reference C(8) in Part 18, and applicable recent change BSP documentation Section 231-048-XXX, Section 231-118-XXX, and Section 231-318-XXX referenced in Part 18A. (See Fig. 23.)

9.02 The following parameter set cards are applicable to the Tandem Tie Trunk Service feature:

9FCX1X	Centrex Tandem Tie Line Service
9SI1XX	Improved Tandem Tie Line Service
9FI1XX	Same as above


I4REGS 36
23 22
0
+89
IXXJR ÷ 3
CALL STORE ADDRESS OF SEGMENT A I1XX JUNIOR REGISTERS
+90
IXXJR ÷ 3
CALL STORE ADDRESS OF SEGMENT B I1XX JUNIOR REGISTERS
+91
IXXJR ÷ 3
CALL STORE ADDRESS OF SEGMENT C I1XX JUNIOR REGISTERS
NO. 1 ESS (PROGRAM STORE)
23 22
14 13
0
I4REGS +89
0
CALL STORE ADDRESS OF SEGMENT A I1XX JUNIOR REGISTERS
L(I4REGS) +89
0
IXXJR ÷ 3
+90
0
CALL STORE ADDRESS OF SEGMENT B I1XX JUNIOR REGISTERS
+90
0
IXXJR ÷ 3
+91
0
CALL STORE ADDRESS OF SEGMENT C I1XX JUNIOR REGISTERS
+91
0
IXXJR ÷ 3
NO. 1A ESS (UNDUPLICATED CALL STORE, FILE STORE)
IXXJR = TOTAL QUANTITY OF I1XX JUNIOR REGISTERS REQUIRED FOR I1XX (1-18) LESS DUMMIES
WORD 0
TO SEGMENT B I1XX JUNIOR REGISTERS
TO SEGMENT C I1XX JUNIOR REGISTERS
TO SEGMENT A I1XX JUNIOR REGISTERS
TO SEGMENT B I1XX JUNIOR REGISTERS
TO SEGMENT C I1XX JUNIOR REGISTERS
SEGMENT A JUNIOR REGISTERS
22
18 17 16
0
0
1
2
3
I1XX JUNIOR REGISTER 1
I1XX JUNIOR REGISTER N WHERE N EQUALS IXXJR
DUMMY EMSN
0
0
LRG
0
DUMMY EMSN
DUMMY I1XX JUNIOR REGISTER (LAST I1XX JUNIOR REGISTER IN ANY SEGMENT)
NO. 1 ESS - CALL STORE
NO. 1A ESS - DUPLICATED CALL STORE
LEGEND:
EMSN - EXPANDED MASTER SCANNER NUMBER
LRG - LAST REGISTER IN GROUP OR SEGMENT
I1XX JUNIOR REGISTER LAYOUT (CC ONLY)

I1XX JUNIOR REGISTER LAYOUT (CC ONLY)

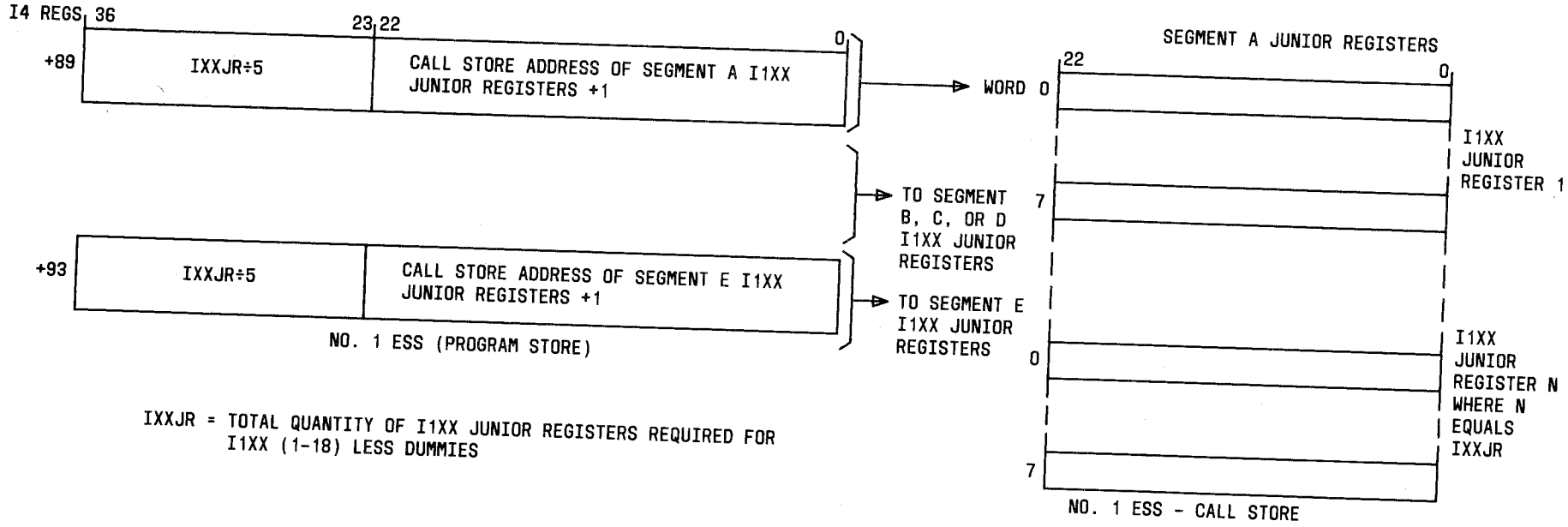


WORD 1:
- CRB - CALL REGISTER ACTIVITY BIT
- AUD - AUDIT BIT

WORD 2:
- KO - KICK-OUT BIT

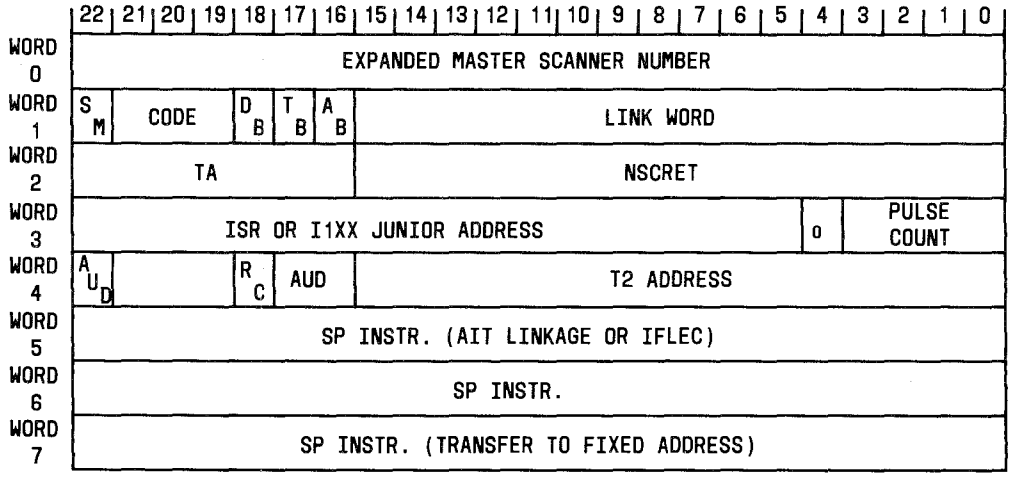
WORD 3:
- CH - CHANGE BIT
- LRG - LAST REGISTER IN GROUP OR SEGMENT
- DT - 2ND DIAL TONE BIT

Fig. 12—Parameter Word IXXJR—Quantity of I1XX Junior Registers for I1XX, Central Control Only



IXXJR = TOTAL QUANTITY OF I1XX JUNIOR REGISTERS REQUIRED FOR I1XX (1-18) LESS DUMMIES

I1XX JUNIOR REGISTER LAYOUT (SP)



WORD 1:
- SM - SCANNER MATCH BIT
- CODE - TASK CODE
- DB - DECISION BIT
- TB - DECISION BIT
- AB - DECISION BIT

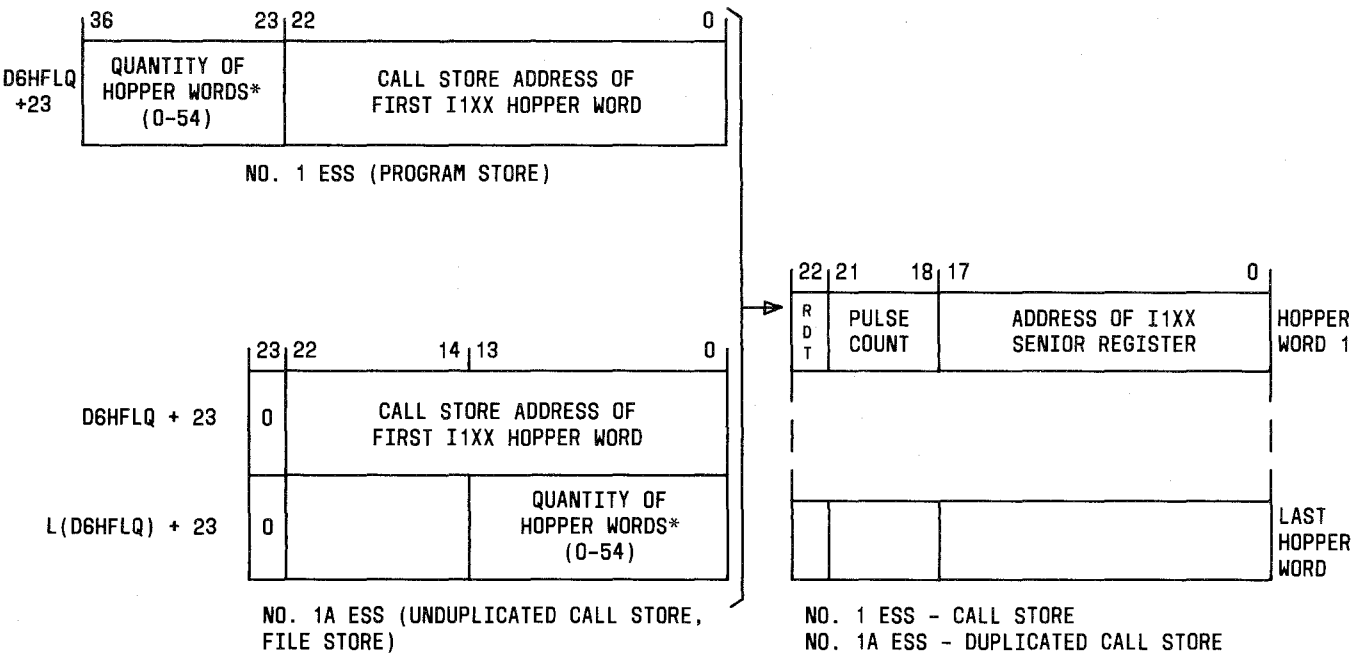
WORD 2:

- TA - SIGNAL PROCESSOR (SP) INSTRUCTION
- NSCRET - SP INSTRUCTION

WORD 3:

- AUD - SALK AUDIT BIT
- RC - REORDER CONNECTED

Fig. 13—Parameter Word IXXJR—Quantity of I1XX Junior Registers Required for I1XX, Central Control With Signal Processor



* QUANTITY OF HOPPER WORDS = IXXJR * MARK(9FI1XX)

LEGEND:
RDT - REMOVE DIAL TONE BIT

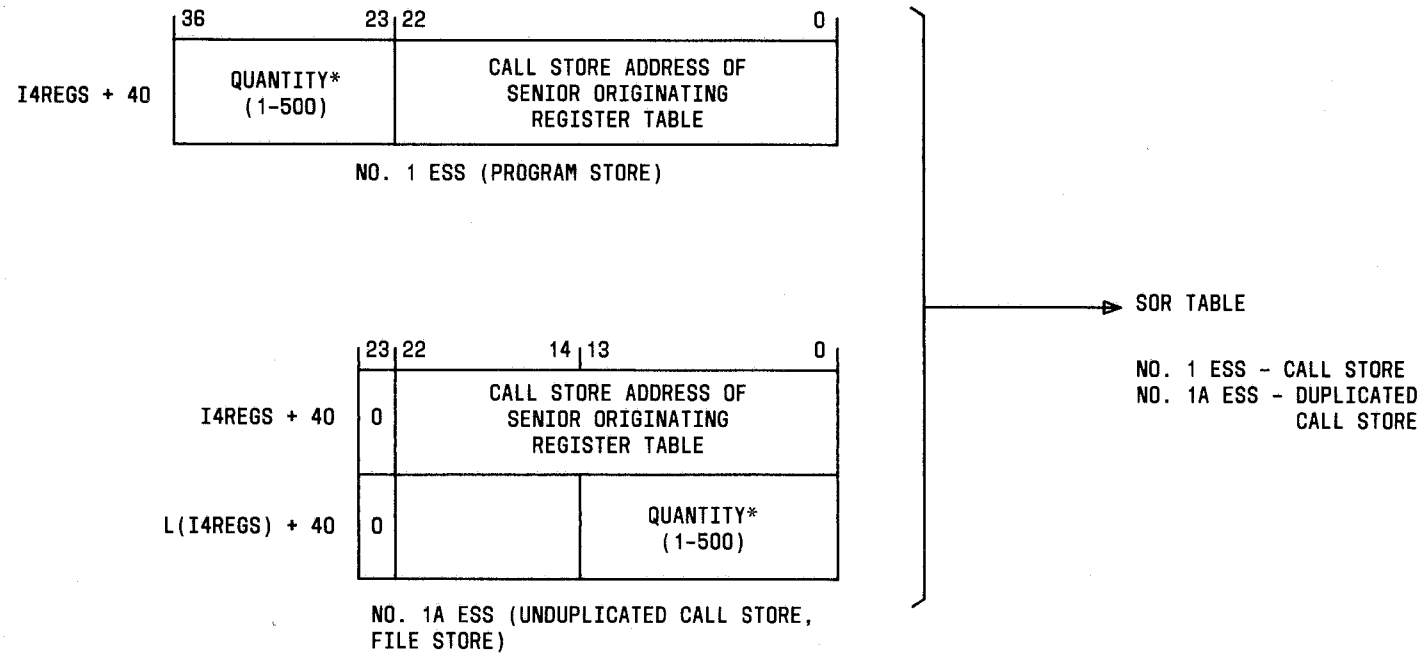
NOTE:
IF I1XX IS NOT LOADED AND/OR IXXJR SET CARD DOES NOT EXIST, THEN NO HOPPER WORDS SHALL BE BUILT. I1XX CAN BE LOADED WITHOUT ANY HOPPERS.

Fig. 14—I1XX Hopper Words

9FDPRPX	Dial Pulse Repeating Trunk Diagnostics for Foreign Exchange Trunks
9SDPRP	Dial Pulse Repeating Trunk Diagnostics
9FDPREP	Same as above.

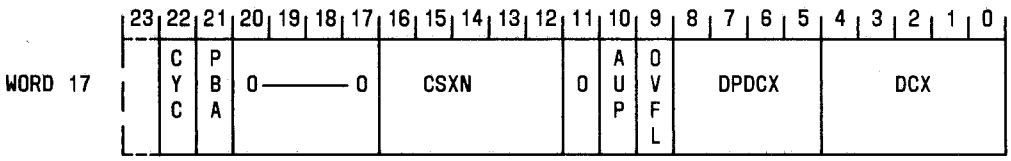
9.03 In addition to the parameter set cards discussed above, the Tandem Tie Trunk Service feature affects the following set cards:

DOH	Trunk Dial Pulse Outpulse Report Hopper Entries
DPH	Customer Dial Pulse Digit Receiver Hopper Entries
DRR	Master Scanner Rows Used for Receiver Circuits
IXXJR	I1XX Junior Registers
IXXOR	Improved Tandem Tie Line Senior Registers
NAX	Transmitter Outpulsing Annexes
NDO	Trunk Dial Pulse Transmitter Junior Registers



* QUANTITY = QUANTITY OF STEP-BY-STEP BYLINK REGISTERS
(ΣIXXOR + FXOR + SXOR)

Fig. 15—Parameter Word I4REGS + 40—Quantity of Step-by-Step Bylink Registers



NOTE: BIT 23 EXISTS IN NO. 1A ESS ONLY.

LEGEND:

CYC -- CYCLIC DIGIT MODE INDICATOR; CYC = 1 WHEN SPECIAL CUT-THROUGH OVERLAP MODE OF CYCLIC DIGIT COLLECTION AND OUTPULSING IS MACHINE PROCESSED
PBA -- PERIPHERAL ORDER BUFFER ACTIVE; PBA = 1 WHEN POB IS ACTIVE
CSXN -- CONFIGURATION INDEX
AUP -- BIT SET TO 1 WHEN SD-1A300 A RELAY IS OPERATED
OVFL -- CYCLIC DIGIT OVERFLOW INDICATOR; OVFL = 1 WHEN ATTEMPT TO STORE MORE THAN 12 DIGITS
DPDCX -- DIAL PUSE DONE CYCLIC DIGIT COUNT
DCX -- CYCLIC DIGIT COUNT

Fig. 16—Dial Pulse Outpulsing Register—Word 17 Format

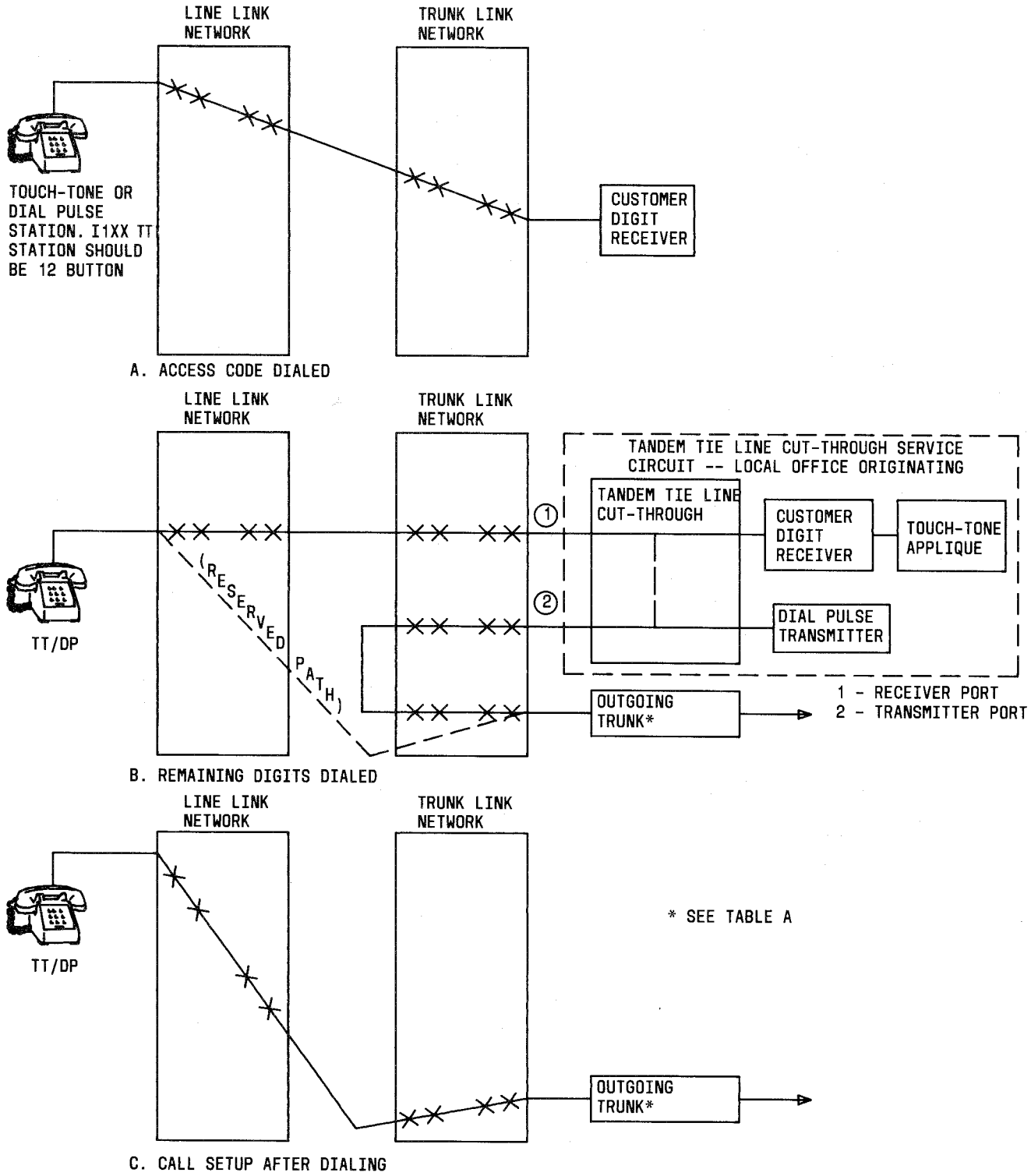


Fig. 17—Station Call—Local Office Origination

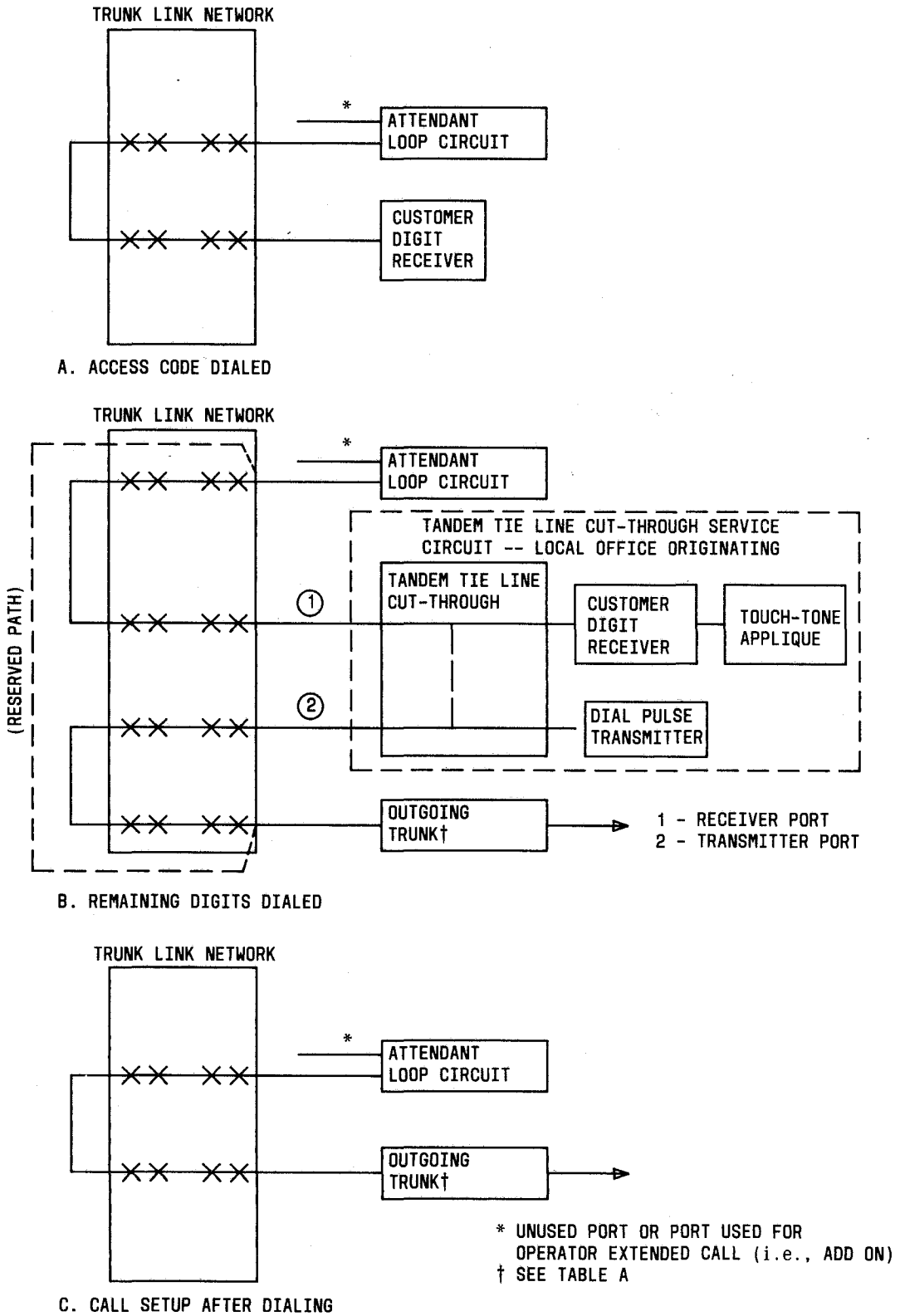


Fig. 18—Attendant (Trunk Link Network Appearance) Call—Local Office Origination

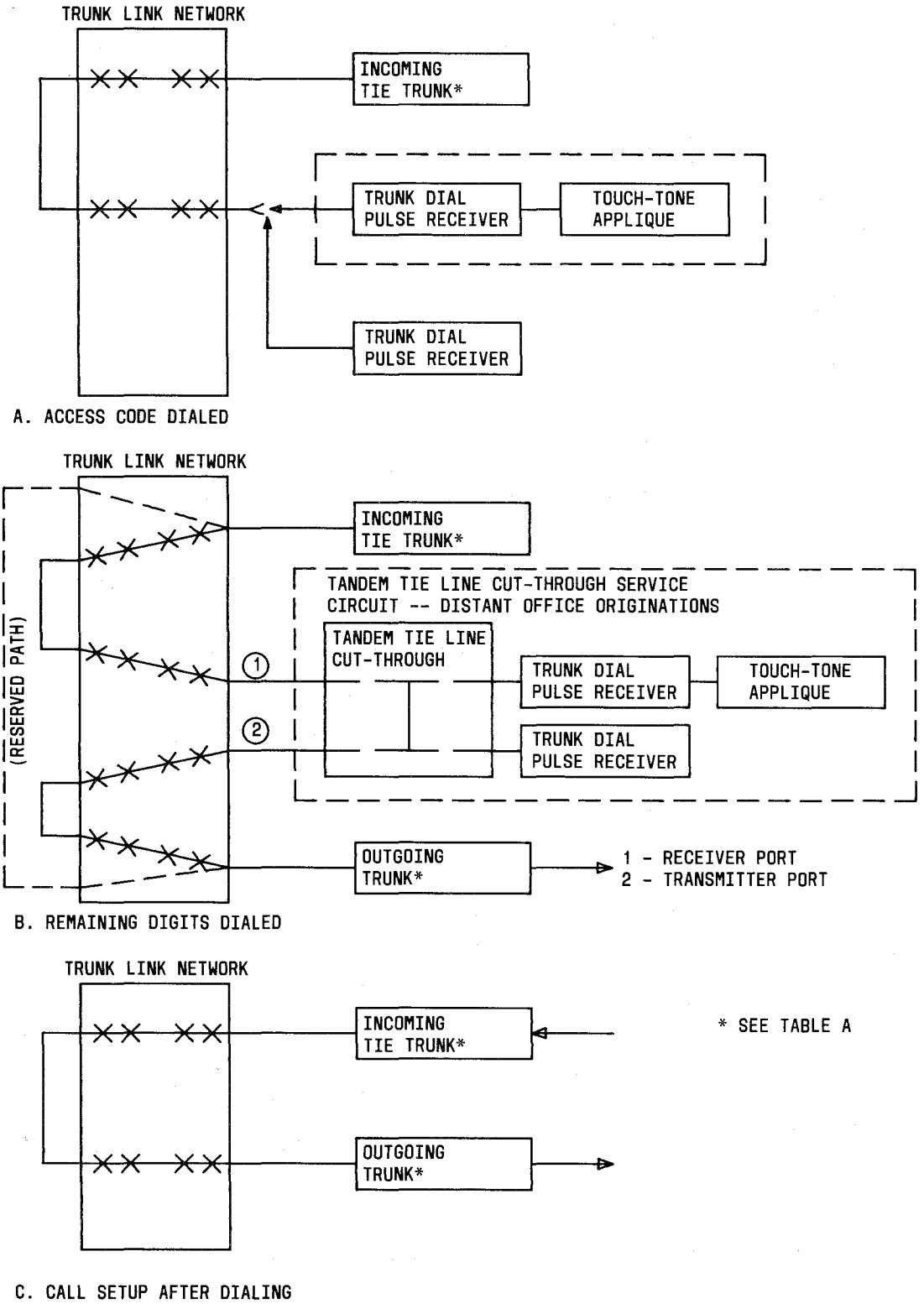
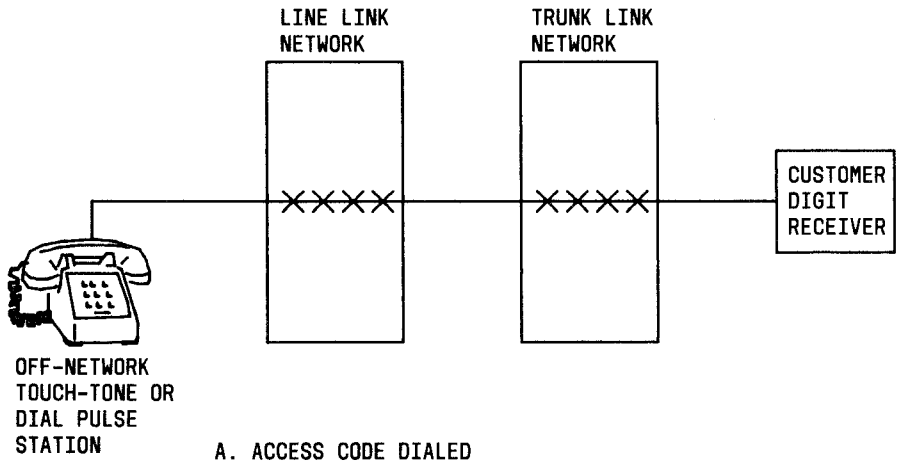
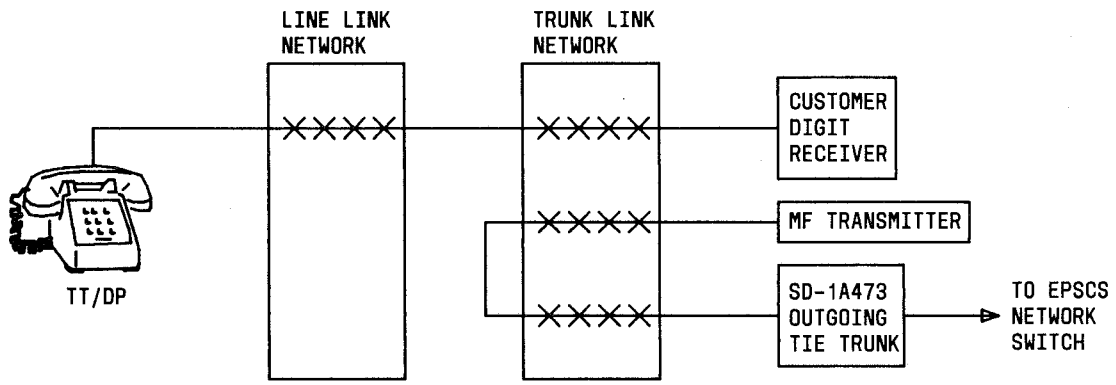


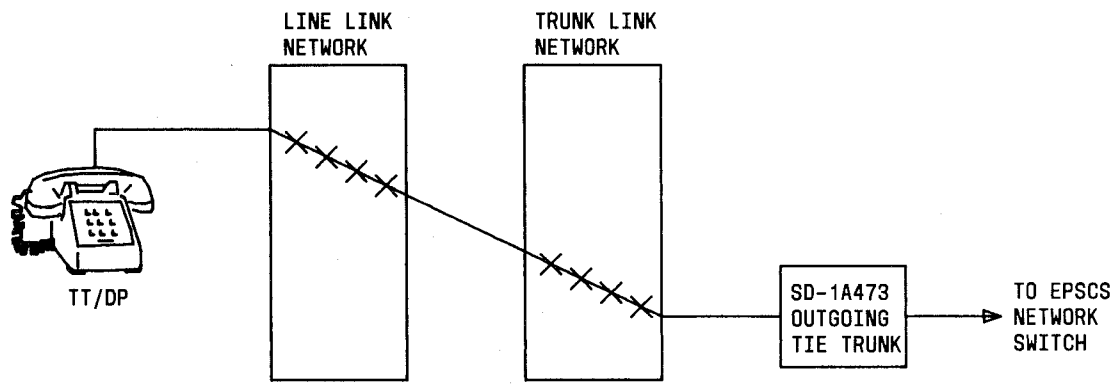
Fig. 19—Incoming Call—Distant Office Origination



A. ACCESS CODE DIALED



B. TRUNK SEIZED, WINK RETURNED, ANI INFORMATION SENT FORWARD



C. SERVICE CIRCUITS RELEASED. STATION DIALS DESTINATION ADDRESS AND AUTHORIZATION CODE (OPTIONAL) TO EPSCS NETWORK

LEGEND:
DP - DIAL PULSE
EPSCS - ENHANCED PRIVATE SWITCHED COMMUNICATION SERVICE
MF - MULTIFREQUENCY
TT - TOUCH-TONE

Fig. 20—Station Call to EPSCS Network With Automatic Calling Station Identification Feature

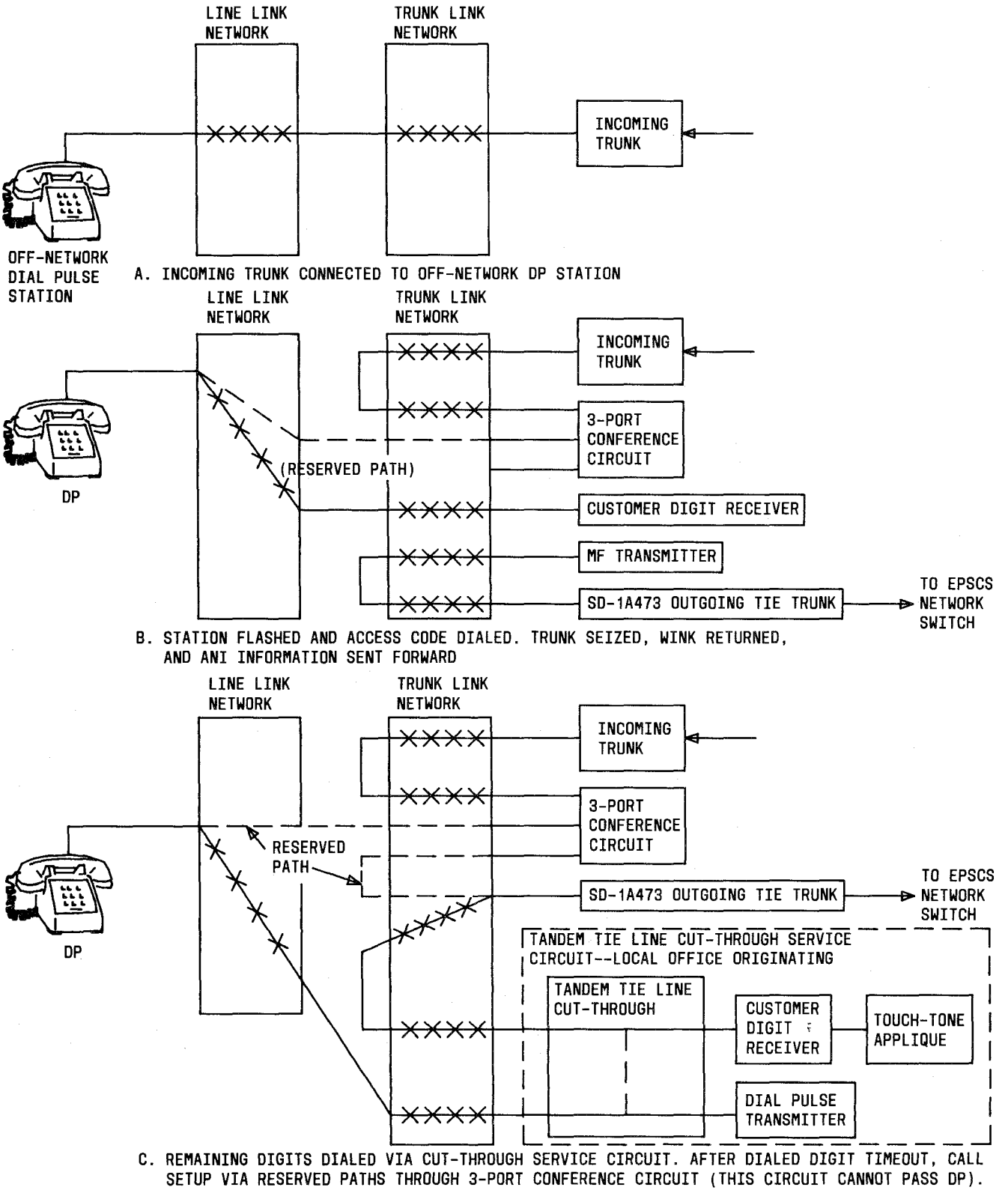
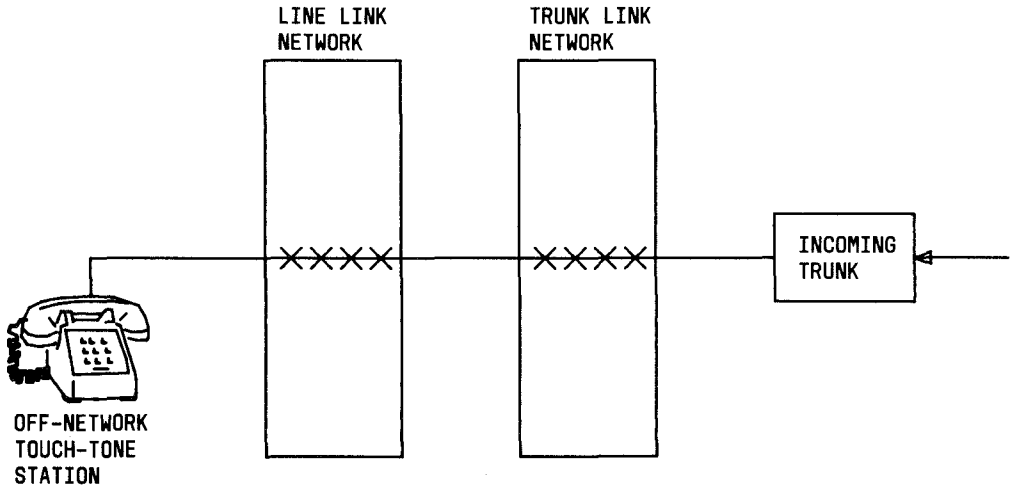
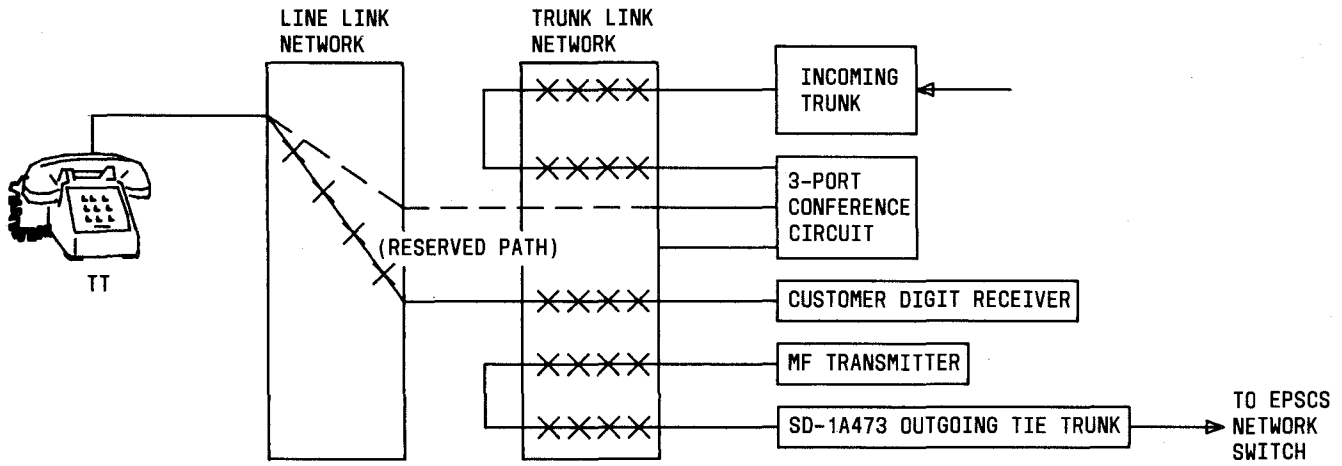


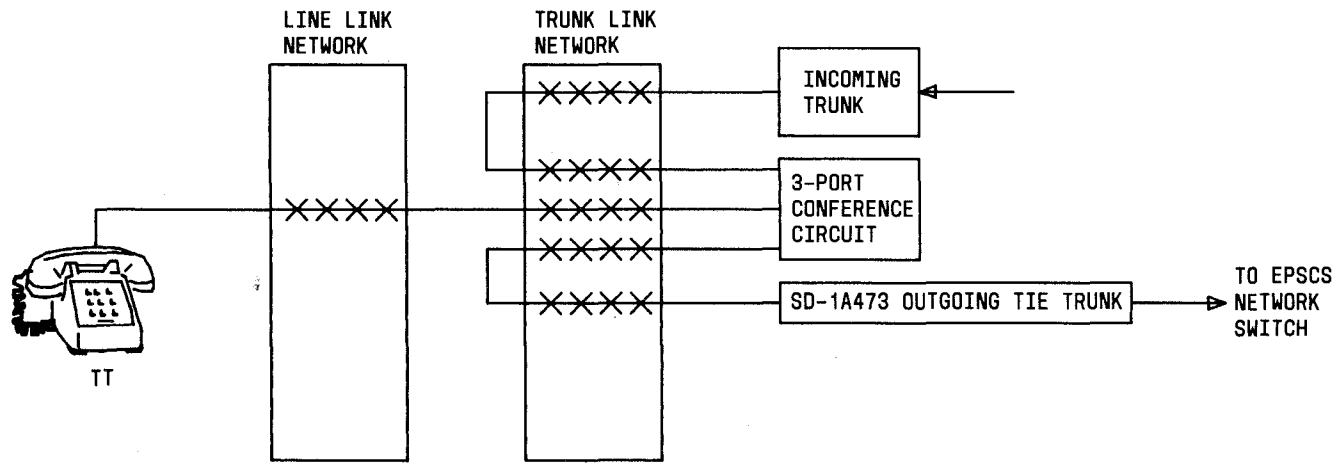
Fig. 21—Dial Pulse Station Extending an Incoming Call to EPSCS Network With Automatic Calling Station Identification Feature



A. INCOMING CALL CONNECTED TO OFF-NETWORK TT STATION

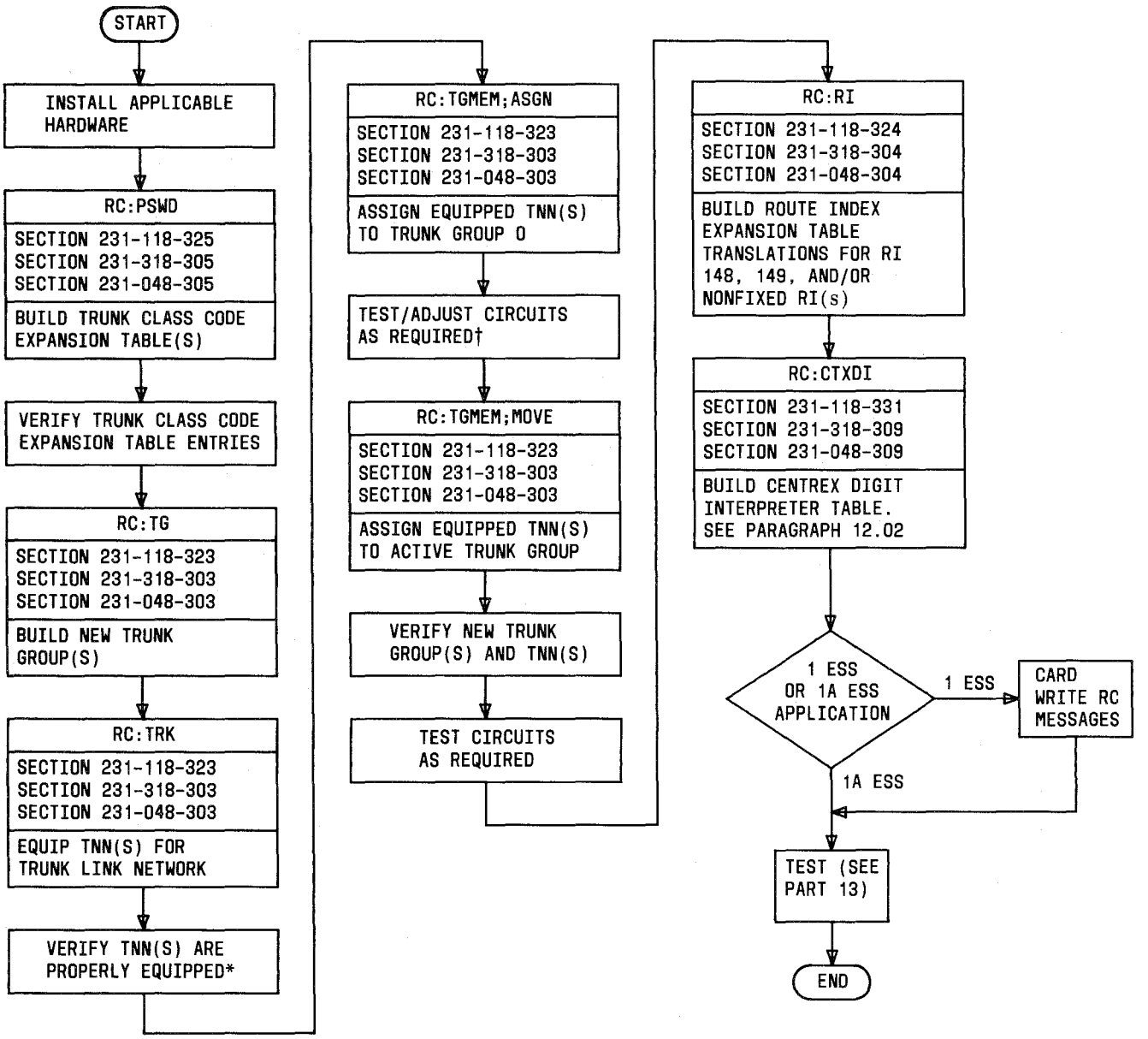


B. STATION FLASHED AND ACCESS CODE DIALED. TRUNK SEIZED, WINK RETURNED, AND ANI INFORMATION SENT FORWARD



C. REMAINING DIGITS DIALED AND CALL SETUP TO EPSCS NETWORK

Fig. 22—TOUCH-TONE Station Extending an Incoming Call to EPSCS Network With Automatic Calling Station Identification Feature



* USE VFY-TNN MESSAGE

† USE T-TNN-MB TO PLACE TRUNKS ON OUT-OF-SERVICE LIST BEFORE PROCEEDING.

Fig. 23—Procedure to Install Tandem Tie Trunk Service

TDH	Trunk Dial Pulse Digit Receiver Hopper Entries	TLL	Tie Line Cut-Through Local Office
TLD	Tie Line Cut-Through Distant Office	TQQ	Trunk TOUCH-TONE Receiver Queues

TQT	Incoming Tie Trunk and Cut-Through Rows
TRR	Ringing Circuits Test
TTH	TOUCH-TONE Hopper Entries
TTQ	TOUCH-TONE Receiver Queue Entries.

10. HARDWARE REQUIREMENTS

Note: This part contains cost factors and determination of quantities. Central Office Equipment Engineering System (COEES) Planning and Mechanized Ordering Modules are the recommended procedures for developing these requirements. However, for planning purposes or if COEES is not available, the following guidelines may be used.

HARDWARE USAGE COSTS

10.01 Hardware usage costs for the Tandem Tie Trunk Service feature are shown in Table C.

HARDWARE CONFIGURATIONS

10.02 Table D shows the hardware configurations used for the Tandem Tie Trunk Service feature. Notice that all trunk order codes ending in "1", except 16201, are designed for I1XX.

HARDWARE QUANTITIES

A. Trunk Circuits

10.03 Total quantities and types of trunk circuits used for the Tandem Tie Trunk Service feature are based upon the nonsenderized special service requirements of Centrex/ESSX-1 customers within a No. 1/1A ESS office. General requirements are addressed in paragraphs 2.02 through 2.13. Trunk circuit engineering is to be done in conjunction with network administration practices detailed in references A(7), A(10), A(11), and A(16) in Part 18.

B. Service Circuits

10.04 Refer to reference A(6) in Part 18.

11. SOFTWARE REQUIREMENTS

Note: This part contains cost factors and determination of quantities. Central Office Equipment Engineering System (COEES) Planning and Mechanized Ordering Modules are the recommended procedures for developing these requirements. However, for planning purposes or if COEES is not available, the following guidelines may be used.

MEMORY

A. No. 1 ESS

Fixed

11.01 The following memory is required whether or not the Tandem Tie Trunk Service feature is used:

- ***Generic (program store):*** See Table E.
- ***Translations (program store):*** 16 words per No. 1 ESS office for trunk class code expansion tables for tandem tie line cut-through service circuits.

Conditional

11.02 The following memory is required when the Tandem Tie Trunk Service feature is activated but not yet applied:

- ***Generic (program store):*** See Table E.
- ***Call Store:***

  (a) In a signal processor office, 200 call store words are required for I1XX.

  (b) I1XX requires I1XX junior registers if the TAMA feature and/or local second dial tone is provided in a No. 1 ESS office. In a central control only office, one I1XX junior register consists of four call store words. Each I1XX dummy register consists of five call store words. In a signal processor office, one I1XX junior register consists of eight call store words. No dummy registers are used. Parameter set card IXXJR defines the quantity of I1XX junior registers.

TABLE C

TANDEM TIE TRUNK SERVICE FEATURE HARDWARE USAGE COSTS

SD NO.	TRUNK ORDER CODE	MS PAIRS PER CKT			SIGNAL DISTRIBUTOR POINTS PER CIRCUIT	NETWORK APPEARANCES PER CIRCUIT	CURRENT DRAIN IN AMPERES			CKTS PER UNIT
		S	D	F			+24V	-48V TALK	-48V SIG	
1A237-02	02209	2	1	—	5	1	.027	.070	—	1
1A237-05	02212	2	1	—	5	1	—	—	—	1
1A264-01	02400	2	—	—	5	1	.161	.124	—	1
1A179-01	02770 or 02771	—	1	—	3	—	.585	.104	—	1
1A300-01		—	—	—	2	2				1
1A173-01		—	4	1	—	—				1
1A172-01		—	—	1	5	—				1
1A179-01	02870 or 02871	—	1	—	3	—	.585	.125	—	1
1A300-01		—	—	—	2	2				1
1A173-01		—	4	1	—	—				1
1A178-01		—	—	1	3	—				1
1A240-01	030A0	2	1	—	5	1	.027	.087	—	1
1A241-01	03122	2	1	—	5	1	—	.060	—	1
1A163-02	04906	2	1	—	5	1	—	.075	—	1
1A163-05	04910	2	1	—	5	1	—	—	—	1
1A415-05	16201	2	—	—	5	1	.006	.034	—	1
1A416-05	16300	2	—	—	5	1	.010	.035	—	1
1A473-01	17301	2	1	—	6	1	.027	.090	—	1
1A474-01	17401	2	1	—	6	1	.038	.094	—	1
1A475-01	17501	2	1	—	6	1	.027	.058	—	1
1A476-01	17601	2	1	—	6	1	—	.047	—	1

LEGEND:

CKT(s)	—	Circuit(s)	S	—	Supervisory
D	—	Direct	SD	—	Schematic diagram
F	—	Fast	SIG	—	Signal
MS	—	Master scanner	V	—	Volt

(c) If applicable, one I1XX digit hopper word is provided for each I1XX junior register (excluding dummy registers).

(d) I1XX requires I1XX senior originating registers only for dial pulse originating calls. Parameter set card IXXOR is used to indicate the additional number of senior originating registers and affects only the SOR call store table. A senior originating register consists of 19 call store words.

(e) Parameter set card TLD, requiring one call store word, sets the quantity of tandem tie line cut-through service circuits for distant originations in a No. 1 ESS office.

(f) Parameter set card TLL, requiring one call store word, sets the quantity of tandem tie line cut-through service circuits for local originations in a No. 1 ESS office.

(g) Refer to Part 9 for a list of other set cards affected by this feature. Set cards are engineered per reference C(6) in Part 18 on a per office basis.

Variable

11.03 The following memory is required when the Tandem Tie Trunk Service feature is applied:

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

(a) 4 words per access code for centrex digit interpreter auxiliary block, if required.

(b) 2 words per outgoing trunk group for each route index expansion.

(c) 4 words per outgoing trunk for each TNN-to-PEN auxiliary block.

(d) 14 words per tandem tie line cut-through service circuit for TNN-to-PEN auxiliary block.

(e) 4 words for the route index expansion for route indexes 148 and 149. Route index 148 points to the trunk group for tandem tie line cut-through service circuits for local originations. Route index 149 points to the trunk group for tandem tie line cut-through service circuits for distant originations.

(f) 4 words per tandem tie trunk service trunk group for the trunk class code expansion table.

(g) 3 words per tie trunk for the master scanner words.

B. No. 1A ESS

Fixed

11.04 The following memory is required whether or not the Tandem Tie Trunk Service feature is used:

- ***Generic (program store, file store):*** See Table F.

- ***Translations (unduplicated call store, file store):*** 16 words per No. 1A ESS office for trunk class code expansion tables for tandem tie line cut-through service circuits.

Conditional

11.05 The following memory is required when the Tandem Tie Trunk Service feature is activated but not yet applied:

- ***Generic (program store, file store):*** See Table F.

- ***Duplicated Call Store:***

(a) I1XX requires I1XX junior registers if the TAMA feature and/or local second dial tone is provided in a No. 1A ESS office. One I1XX junior register consists of four call store words. Each I1XX dummy register consists of five call store words. Parameter set card IXXJR defines the quantity of I1XX junior registers.

(b) If applicable, one I1XX digit hopper word is provided for each I1XX junior register (excluding dummy registers).

TABLE D

TANDEM TIE TRUNK SERVICE FEATURE HARDWARE CONFIGURATIONS

ITEM	SD NO.	1XX		I1XX	PNAL
I. Generic Program	—	1E5/1AE5 and earlier	1E6/1AE6 and later	1E6/1AE6 and later	1E6/1AE6 and later
II. Trunk Order Codes:					
A. Trunks					
02209	1A237-02	YES	YES	NO	NO
02212	1A237-05	↓	↓	↓	↓
02400†	1A264-01				
030A0	1A240-01				
03122	1A241-01				
04906	1A163-02				
04910	1A163-05				
16201	1A415-05				
16300	1A416-05				
17301	1A473-01	NO	NR	YES	YES
17401	1A474-01	↓	↓	↓	NO
17501	1A475-01				↓
17601	1A476-01				
B. Service Circuits‡:					
02770/02771	1A172-01 1A173-01 1A179-01 1A300-01	YES/NO	NR*/YES	NR*/YES	NR*/YES
02870/02871	1A173-01 1A178-01 1A179-01 1A300-01	YES/NO	NR*/YES	NR*/YES	NR*/YES
III. Station Set:					
DP	—	YES	YES	YES	YES
TT-10 button	—	↓	↓	NO	YES
TT-12 button	—			YES	YES

* Recommended for transition purposes ***only.***

† Manufacture discontinued.

‡ TOCs 02770 and 02870 are used for pre-1E6/1AE6 offices supplying 1XX. TOCs 02771 and 02871 are required for I1XX and PNAL. In other words, for No. 1/1A ESS offices supplying APLT (1E6/1AE6 and later generic programs).

LEGEND:

DP — Dial pulse
NR — Not recommended
TOC — Trunk order code
TT — TOUCH-TONE

TABLE E

NO. 1 ESS GENERIC PROGRAM WORDS

GENERIC PROGRAM STORE	FIXED	CONDITIONAL		
Feature Package Designation (No.)	CX1X(15)	I1XX(115)	DPREP(134)	DPRPX(137)
Prior to 1E6 Generic Program	1850	—	—	—
Effective with 1E6 Generic Program	1850	768	896	448

Note:

For 1XX, use feature package CX1X.
For I1XX, use optional feature packages I1XX, DPREP, and DPRPX.
For PNAL only, use optional feature package I1XX and DPRPX.
Any mixture of 1XX, I1XX, and/or PNAL can be provided in a No. 1 ESS office equipped with a 1E6 or later generic program.

TABLE F

NO. 1A ESS GENERIC PROGRAM WORDS

GENERIC PROGRAM STORE	FIXED	CONDITIONAL		
Feature Package Designation (No.)	CX1X (15)	I1XX (115)	DPREP (134)	DPRPX (137)
Prior to 1AE6 Generic Program	2410	—	—	—
Effective with 1AE6 Generic Program	2410	736*	1440	704

Note: For 1XX, use feature package CX1X.
For I1XX, use optional feature packages I1XX, DPREP, and DPRPX.
For PNAL only, use optional feature package DPREP.
Any mixture of 1XX, I1XX, and/or PNAL can be provided in a No. 1A ESS office equipped with a 1AE6 or later generic program.

* This quantity is less than the comparable No. 1 ESS quantity due to the deletion of EPSCS programming.

(c) I1XX requires I1XX senior originating registers only for dial pulse originating calls. Parameter set card IXXOR is used to indicate the additional number of senior originating registers and affects only the SOR call store table. A senior originating register consists of 19 call store words.

(d) Parameter set card TLD, requiring one call store word, sets the quantity of tandem tie line cut-through service circuits for distant originations in a No. 1A ESS office.

(e) Parameter set card TLL, requiring one call store word, sets the quantity of tandem tie line cut-through service circuits for local originations in a No. 1A ESS office.

(f) Refer to Part 9 for a list of other set cards affected by this feature. Set cards are engineered per reference C(7) in Part 18 on a per office basis.

Variable

11.06 The following memory is required when the Tandem Tie Trunk Service feature is applied:

- ***Translations (unduplicated call store, file store):***

  (a) 4 words per access code for centrex digit interpreter auxiliary block, if required.

  (b) 2 words per outgoing trunk group for each route index expansion.

  (c) 4 words per outgoing trunk for each TNN-to-PEN auxiliary block.

  (d) 14 words per tandem tie line cut-through service circuit for TNN-to-PEN auxiliary block.

  (e) 4 words for the route index expansion for route indexes 148 and 149. Route index 148 points to the trunk group for tandem tie line cut-through service circuits for local originations. Route index 149 points to the trunk group for tandem tie line cut-through service circuits for distant originations.

  (f) 4 words per tandem tie trunk service trunk group for the trunk class code expansion table.

  (g) 3 words per tie trunk for the master scanner words.

REAL TIME IMPACT

11.07 Real time requirements for the Tandem Tie Trunk Service feature are shown in Table G for No. 1 ESS and Table H for No. 1A ESS. Cycle time for No. 1 ESS is 5.5 microseconds, and for No. 1A ESS it is 0.7 microsecond.

12. DATA ASSIGNMENTS AND RECORDS

TRANSLATION FORMS

12.01 ESS translation forms, found in reference C(1) in Part 18, requiring completion are as follows:

(a) ESS 1101—Directory Number Record: This form is used to record directory number assignments and other related information.

(b) ESS 1109A/B—Centrex Group Record: These forms contain centrex class information plus access code data for a centrex group.

(c) ESS 1201A/B—Miscellaneous Trunk Frame Record: These forms relate the equipment location on a frame basis with the trunk network number, trunk group, trunk number, trunk class code, signal distributor points, and supervisory scan points.

(d) ESS 1202—Trunk Group Record: This form provides trunk group number to trunk network number and trunk member number translations.

(e) ESS 1203—Trunk Network Number Record: This form relates the trunk network number to the trunk group and trunk frame location.

(f) ESS 1204—Trunk Class Code Record: This form specifies data for the trunk class code expansion tables.

(g) ESS 1208A/B—Trunk Screening Group Record: These forms associate trunk groups with pseudo line equipment numbers.

(h) ESS 1303A/B/C—Trunk and Service Circuit Route Index Record: These forms specify data for the route index expansion table entries.

(i) ESS 1306—Line Class Code Record: This form provides major originating and terminating class information, as well as rate and route chart column information.

(j) ESS 1400—Traffic Register Assignment Record: This form provides type measurement counts for peg, usage, and overflow counts.

TABLE G

NO. 1 ESS PROCESSOR TIME
NUMBER OF PROCESSOR CYCLES

	1XX		11XX		PNAL	
	LOCAL	DISTANT	LOCAL	DISTANT	LOCAL	DISTANT
Fixed Cycles per Call (Two-Digit Access Code)	6267	6659	6078	7746	3980	5724
Extra Cycles for Local Second Tone	78	78	376*	376*	NA†	NA†
Cycles Per Digit Dialed After Access Code	141	250	0	0	0	0
Extra Cycles Fixed for TAMA Feature	767	1996	754	1290	NA†	NA†
Extra Cycles Per Digit Dialed After Access Code If TAMA Feature Applies	40	51	84	84	NA†	NA†

* Subtract 171 cycles if call uses both second dial tone and TAMA feature.

† NA - Not applicable.

RECENT CHANGES

12.02 There are no new or unique recent change (RC) messages used for the Tandem Tie Trunk Service feature. However, the Tandem Tie Trunk Service feature uses unique keywords with the Centrex/ESSX-1 recent change message and RC:CTXDI for data type 5 entries. Keyword unit STYP 17 is used to provide tandem tie line access. Keyword unit RI rrrr is used to specify the appropriate route index. If the TAMA feature applies, keyword unit AMAT is used to allow automatic message accounting detailed telephone number recording for tie trunks and foreign exchange trunks. Keyword unit DRPT is to specify dial repeating. Refer to reference A(4), A(27), and A(37) in Part 18.

13. TESTING

13.01 Verification that the Tandem Tie Trunk Service feature has been properly installed and assigned can be accomplished by the following input/output messages (abbreviated from the appropriate input/output message manual referenced in Part 18B). System responses should be checked against the applicable ESS translation form data.

- For No. 1 ESS, TAG-TNN and T-READ input messages are used to verify trunk class code expansion table entries. System response should be the TR21 and TW02 output messages. For No. 1A ESS use DUMP:CSS,ADR- to verify the call indicator words. The system response is DUMP:CSS output message.

TABLE H

NO. 1A ESS PROCESSOR TIME
NUMBER OF PROCESSOR CYCLES

	1XX		11XX		PNAL	
	LOCAL	DISTANT	LOCAL	DISTANT	LOCAL	DISTANT
Fixed Cycles per Call (Two-Digit Access Code)	12,534	13,318	12,156	15,492	7,960	11,448
Extra Cycles for Local Second Tone	156	156	752*	752*	NA†	NA†
Cycles Per Digit Dialed After Access Code	282	500	0	0	0	0
Extra Cycles Fixed for TAMA Feature	1,534	3,992	1,508	2,580	NA†	NA†
Extra Cycles Per Digit Dialed After Access Code If TAMA Feature Applies	80	102	168	168	NA†	NA†

* Subtract 342 cycles if call uses both second dial tone and TAMA feature.

† NA - Not applicable.

- VFY-EXP input message is used to verify route index entries. System response should be a TR05 output message.
- VFY-MSN input message is used to verify master scan translations. System response should be a TR12 output message.
- VFY-TKGN input message is used to verify one or all trunk group numbers. System response should be a TR10 output message.
- VFY-TNN input message is used to verify a trunk network number translation. System response should be a TR14 output message.
- VFY-XDGNT input message is used to verify access codes. System response should be a TR18 output message.

13.02 Tandem Tie Trunk Service feature calls should be made over the applicable trunk groups to verify proper operation of the feature when a No. 1/1A ESS is used to originate calls. These calls should be made both from Centrex/ESSX-1 stations and from attendant positions. Tandem Tie Trunk Service feature calls over applicable incoming trunk groups should also be executed to verify proper operation of the feature when a No. 1/1A ESS is used to tandem an incoming call through the office.

13.03 The tandem tie line cut-through service circuits are diagnosed routinely and on demand by a No. 1/1A ESS. Routine testing is done through automatic progression testing. Demand testing is accomplished from an ESS test position or teletypewriter.

13.04 Testing of trunks used with the Tandem Tie Trunk Service feature is done manually, via test positions, on a periodic and/or trouble report basis. The special dial repeating trunk circuits SD-1A473, SD-1A474, SD-1A475, and SD-1A476 can be diagnosed by a No. 1/1A ESS as a matter of routine (unless 2-way), and on demand request resulting from a call failure if 9SDPRP = 1.

14. OTHER PLANNING TOPICS

14.01 Refer to Table A and Table B for mounting space requirements and to Table C for current drain data.

14.02 Signaling compatibility among different noncentrex business customer locations and centrex business customer locations is a major problem area in tandem tie trunk networks (TTTNs). Certain combinations of noncentrex business customer locations have compatibility problems which can impair service during call setup, even though all equipment individually functions properly. Impairments range from inconveniences to misdirected and high-and-dry calls. Reference C(9) in Part 18 provides basic technical information on signaling compatibility among all types of business customer locations used in TTTNs.

ADMINISTRATION

15. MEASUREMENTS

15.01 Certain traffic measurements are available for I1XX. See Table I. These counts are available on the H, C, DA15, S1, S2, and S3 schedules.

TABLE I

TRAFFIC MEASUREMENTS AVAILABLE WITH I1XX

		TMC	EGO
I1XX	Junior Register Usage	05	392
I1XX	Junior Register Overflow	05	460
I1XX	Senior Register Peg Count	05	389
I1XX	Senior Register Overflow	05	390

Legend:
EGO — Equipment group or office count number

TMC — Type measurement code

15.02 The I1XX junior register usage measures the usage of these registers by I1XX. This is accomplished by an automatic fast-scan register (10 second). It is not necessary to assign this register to the first 128 registers of the H schedule.

15.03 The I1XX senior register peg count is incremented by one by each attempt to seize an I1XX senior register. The I1XX senior register overflow is incremented by one each time a senior register is not available for an I1XX call.

16. CHARGING

AUTOMATIC MESSAGE ACCOUNTING

16.01 Charging does not apply to the Tandem Tie Trunk Service feature. However, the Message Detail Recording on Tie Trunks (TAMA) feature provides an automatic message accounting record of tie trunk or foreign exchange trunk call originations on a per access code basis. Refer to reference A(23) in Part 18.

UNIFORM SERVICE ORDER CODES

16.02 Due to the varieties and diverse applications of the Tandem Tie Trunk Service feature, refer to the Uniform Service Order Code (USOC) Manual and/or the telephone company USOC coordinator.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

Advanced private line termination (APLT)—A tariff term which includes improved tandem tie line service (I1XX) and private network access line service (PNAL).

Cut-through—As used in this feature document, a synonym for nonsenderized switching mode. (True "cut-through" is a signaling scheme in which the T and R leads are metallically connected through a trunk circuit.)

Improved tandem tie line service (I1XX)—A version of the Tandem Tie Trunk Service feature which provides improved noise and transmission characteristics.

Nonsenderized—A switching method whereby a business customer user directly controls, in stages, the routing of an outgoing call over tie or foreign

exchange trunk facilities through the originating, as well as any intermediate switches. A user is said to "cut through" these offices.

Ordinary tandem tie line service (1XX)—A version of the Tandem Tie Trunk Service feature which has inherent operating noise and sometimes, poor transmission quality.

Private network access line service (PNAL)—A version of the Tandem Tie Trunk Service feature which allows access line service where the calling number is multifrequency outpulsed before nonsenderized operation begins.

Tandem tie trunk network—A private network of tie trunks and switching locations that interconnect the locations of a large business customer. On the network, the switching mode is nonsenderized.

Tandem Tie Trunk Service feature—A No. 1/1A ESS feature that provides nonsenderized private line service for Centrex/ESSX-1 customers.

Tie trunk (also called tie line)—A voice grade channel used to connect or tie two business customer service locations.

18. REFERENCES

18.01 The following documentation contains information pertaining to or affected by the Tandem Tie Trunk Service feature.

A. Bell System Practices

(1) Section 231-048-303—Trunk Translations Recent Change 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

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

(3) Section 231-048-305—Recent Change Formats for GENT, PSBLK, PSWD, and SUBTRAN (1E6 and 1AE6 Generic Programs), 2-Wire No. 1 and No. 1A Electronic Switching Systems

(4) Section 231-048-309—Centrex-CO, and ESSX-1 Recent Change Formats for CTXCB, CTXDI, CTXEXR, CXDICH, DITABS, DLG, FLXDG, FLXRD, and FLXRS (1E6 and 1AE6 Generic Programs), 2-Wire No. 1 and No. 1A Electronic Switching Systems

(5) Section 231-048-310—Recent Change Formats for ANIDL, CAMA, CFG, CPD, CLAM, JUNCT, MSN, NMTGC, PLM, ROTL, SIMFAC, TMBCGA, LRE, PUC, RSSCB, RSSCH, and RSP (1E6 and 1AE6 Generic Programs), 2-Wire No. 1 and No. 1A Electronic Switching Systems

(6) Section 231-060-210—Service Circuits—Network Switching Engineering—No. 1 and No. 1A Electronic Switching Systems

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

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

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

(10) Section 231-061-510—Centrex General Description, Network Administration—No. 1/1A Electronic Switching Systems (when published)

(11) Section 231-061-850—Network Design Worksheets—Centrex—No. 1/1A Electronic Switching Systems

(12) Section 231-062-460—Processor Community Engineering, Program Stores, Network Design—No. 1A Electronic Switching System

(13) Section 231-062-465—Processor Community Engineering, Duplicated Call Store, Network Design—No. 1A Electronic Switching System (when published)

(14) Section 231-062-470—Processor Community Engineering, Unduplicated Call Store, Network Design—No. 1A Electronic Switching System

(15) Section 231-062-475—Processor Community Engineering, File Stores, Network Design—No. 1A Electronic Switching System

(16) Section 231-070-630—Centrex and ESSX-1 General Description—Network Administration—No. 1/1A Electronic Switching Systems

(17) Section 231-070-635—Centrex Planning and Cutover—Network Administration—No. 1/1A Electronic Switching Systems

(18) Section 231-090-058—Feature Document—Attendant Control of Trunk Group Access Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(19) Section 231-090-079—Feature Document—Call Transfer—2-Wire No. 1 and No. 1A Electronic Switching Systems

(20) Section 231-090-145—Feature Document—Full ESSX-1 Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(21) Section 231-090-256—Feature Document—Tie Trunk and Foreign Exchange Trunk Service—2-Wire No. 1 and No. 1A Electronic Switching Systems

(22) Section 231-090-359—Feature Document—Semirestricted Centrex Station Class—2-Wire No. 1 and No. 1A Electronic Switching Systems

(23) Section 231-090-417—Feature Document—Message Detail Recording on Tie Trunks Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(24) Section 231-118-323—Trunk Translation Recent Change Procedures for TG, TGBVT, TRK, CFTRK, and TGMEM (CTX-6 through 1E5 Generic Programs), 2-Wire No. 1 Electronic Switching System

(25) Section 231-118-324—Rate and Route Translation Recent Change Procedures for NOCNOG, DNHT, NOGRAC, RATPAT, DIGTRN, TOLDIG, CCOL, RI, CHRGX, DITABS, TNDM, IDDD, and TDXD (CTX-6 through 1E5 Generic Programs), 2-Wire No. 1 Electronic Switching System

(26) Section 231-118-325—RC Procedures for PSWD, GENT, PSBLK, SUBTRAN (CTX-6 through 1E5 Generic Programs), 2-Wire No. 1 Electronic Switching System

(27) Section 231-118-331—Centrex-CO RC Procedures for CTXCB, CTXDI, CTXEXR, CXDICH, DITABS, DLG, FLXDG, FLXRD, and FLXRS (CTX-6 through 1E5 Generic Programs), 2-Wire No. 1 Electronic Switching System

(28) Section 231-118-333—Overall procedures for Adding or Removing a Centrex-CO or PBX-CO Customer (All Generic Programs), 2-Wire No. 1 Electronic Switching System

(29) Section 231-118-335—Line Recent Change Procedures—for Line, TWOPTY, MPTY, SCLIST, MLHG, ACT, and CFV (CTX-7, CTX-8, 1E4, and 1E5 Generic Programs), 2-Wire No. 1 Electronic Switching System

(30) Section 231-118-337—RC Procedures for ANIDL, CAMA, CFG, CPD, MSN, NMTGC, PLM, ROTL, SIMFAC, and TMBCGA (CTX-6 through 1E5 Generic Programs), 2-Wire No. 1 Electronic Switching System

(31) Section 231-128-541—Foreign Exchange Trunk Circuit—SD-1A241-01—Operational Test

(32) Section 231-130-101—Trunk Test Capabilities Description, 2-Wire No. 1 Electronic Switching System

(33) Section 231-190-127—Feature Document—Enhanced Private Switched Communications Service (EPSCS) Description, 2-Wire No. 1 Electronic Switching System

(34) Section 231-318-303—Trunk Translation Recent Change Procedures for TG, TGBVT, TRK, CFTRK, TGMEM, CCIS, and TKCONV (Through 1AE5 Generic Program), 2-Wire No. 1A Electronic Switching System

(35) Section 231-318-304—Rate and Route Translation Recent Change Procedures for NOCNOG, DNHT, NOGRAC, RATPAT, DIGTRN, TOLDIG, CCOL, RI, CHRGX, DITABS, TNDM, IDDD, and TDXD (Through 1AE5 Generic Program), 2-Wire No. 1A Electronic Switching System

(36) Section 231-318-305—RC Procedures for PSWD, PSBLK, SUBTRAN, and GENT (Through 1AE5 Generic Program), 2-Wire No. 1A Electronic Switching System

(37) Section 231-318-309—Centrex-CO ESSX-1 Recent Change Procedures for CTXCB, CTXDI, CTXEXR, CXDICH, DITABS, DLG, FLXDG, FLXRD, and FLXRS (Through 1AE5 Generic Program), 2-Wire No. 1A Electronic Switching System

(38) Section 231-318-310—RC Procedures for ANIDL, CAMA, CFG, CPD, JUNCT, MSN, NMTGC, PLM, ROTL, SIMFAC and TMBCGA, and CLAM (Through 1AE5 Generic Program)—2-Wire No. 1A Electronic Switching System

(39) Section 660-440-010—Codes—Test Line Circuits and Communications Trunks Nationwide Distance Dialing Plan

(40) Section 759-100-000—Index of Central Office Equipment Estimation System (COEES) Practices

(41) Section 851-300-100—Transmission Design Considerations and Objectives—Switched Special Services and Private Branch Exchange (PBX)/Automatic Call Distribution (ACD)/Centrex Station Services

(42) Section 851-300-170—Standard Design of Switched Special Services Circuits—Signaling Range Information

(43) Section 981-010-100—Private Branch Exchange Tie Trunk Circuits—General Description Information

(44) Section 996-102-100—2-Wire No. 1 and No. 1A Electronic Switching System—Business Customer Service—General Description.

B. TTY Input and Output Manuals

(1) Input Message Manual IM-1A001, No. 1 Electronic Switching System

(2) Input Message Manual IM-6A001, No. 1A Electronic Switching System

(3) Output Message Manual OM-1A001, No. 1 Electronic Switching System

(4) Output Message Manual OM-6A001, No. 1A Electronic Switching System.

C. Other Documentation

(1) Translation Guide TG-1A, No. 1—Electronic Switching System—2-Wire

(2) Translation Output Configuration PA-591003, No. 1 Electronic Switching System

(3) Translation Output Configurations PA-6A002, No. 1A Electronic Switching System

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

(5) Office Parameter Specification PA-6A001, No. 1A Electronic Switching System

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

(7) Parameter Guide PG-1A, No. 1A Electronic Switching System, 2-Wire

(8) Growth Recent Change (GRC) Form Manual, 2-Wire No. 1 and 1A Electronic Switching System, PA-591099

(9) American Telephone and Telegraph Company General Letter 74-11-030, Dated November 8, 1974; Subject: Tandem Tie Trunk Network PBX Compatibility

(10) American Telephone and Telegraph Company Information Letter 79-01-095, Dated January 15, 1979; Subject: No. 1/1A ESS—Advanced Private Line Termination in 1E6/1AE6 Generic Program.