E911 PROGRAMS

SOFTWARE SUBSYSTEM DESCRIPTION

2-WIRE NO. 1/1A ELECTRONIC SWITCHING SYSTEM

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1. GENERAL

INTRODUCTION

1.01 The E911 (enhanced 911) software programs collectively perform the control functions necessary for E911 tandem offices to selectively route 911 calls originated from any station in their 911 service area to the correct primary public safety answering point (PSAP) and provide specific E911 feature services.

1.02 When this section is reissued, the reason for reissue will be given in this paragraph.

1.03 Part 6 of this section provides a defined list of the abbreviations and acronyms as used herein.

PURPOSE OF E911 SOFTWARE PROGRAMS

1.04 The programs listed in Table A interface with each other in order to perform the functions indicated and to provide the feature services described in paragraph 2.02.

SCOPE OF SECTION

1.05 This section provides an introduction to the E911 software programs operating in a No. 1/1A Electronic Switching System (ESS). Information unique to specific system applications (No. 1 or No. 1A ESS) is so noted.

1.06 This section is based on the 1E5 (No. 1 ESS) and 1AE5 (No. 1A ESS) versions of the generic program.

TABLE A

E911 FEATURE PROGRAMS

MAJOR PIDENTS INVOLVED	
DCNT	Dialing connections/check for tandem or dedicated E911 trunks
ESCA	Call administration and translation interfaces
ESDR	Emergency service call set-up, digit reception, and related functions
ESMG	Error messages and error counts
ICAL	Digit analysis trunks
MFTL	Multifrequency transmitting control
TRBL	Line and directory number translations
TVBL	Translation verification messages
TVMN	Translation verification messages/Main Control Program
YAHA	Seizure and release of E911 registers, check E911 local choke
MINOR PIDENTS INVOLVED	
COPR	Report and miscellaneous subroutines
CXIC	Trunk digit analysis
CXDR	Originating digit analysis for CTX
DISC	Disconnect program
ISXS	Step-by-step incoming calls
OGTC	Outpulsing control
RCEN	Recent change—emergency service number E911
RCER	Recent Change—E911 selective routing
RCES	Recent change—ESCO
SASF	System audit/local choke
TTIA	TTY input messages
TTOI	TTY input messages
TTOJ	TTY output message

2. E911 OVERVIEW

DEFINITION

2.01 The number 911 is intended as a nationwide universal number which provides the public with direct access to a public safety answering point (PSAP). A PSAP is an agency or facility which is designated and authorized to receive and respond to emergency calls requiring one or more public services such as police, fire and/or ambulance services. Any one agency or a group of agencies may be designated as a PSAP.

SERVICES

2.02 The E911 feature provides enhanced 911 service capabilities and optional PSAP customer services for completing and handling 911 calls. With E911 service, a No. 1/1A ESS serves as an E911 tandem office for all 911 calls from other local offices in the 911 service area and as a local office for 911 calls originated by customers served by the E911 tandem office. The term "tandem" is used in this section to indicate the function of a "control office" for E911 calls. The E911 feature provides the capability for the E911 tandem office to serve several PSAPs existing within the 911 service area. The following services are available with the E911 feature:

(a) Selective routing

(b) Default routing

(c) Alternate routing (for traffic busy PSAPs, for PSAPs on night service, and for PSAPs which have a power failure)

(d) Central office transfer (selective, fixed, or manual transfer)

(e) Automatic Number Identification (ANI)

(f) Automatic Location Identification (ALI)/Data Management System (DMS)

(g) Forced disconnect

(h) Night service

2.03 ***Selective routing*** provides the capability to selectively route a 911 call to the primary PSAP associated with the originating station. Selective routing is based on either the office code, the number group (thousand's group), or the automatic number identification (ANI) telephone number (TN) of the originating station, rather than the digits dialed. The ANI TN is the billing TN of the originating station, which is used for normal toll or message rate billing. The ANI TN may not be the actual TN of the station. Selective routing is an optional E911 service which may be provided on a per office code, per number group, or per TN basis. Therefore, when selective routing is provided, each station in an E911 service area is associated (either indirectly via the station's office code or number group, or directly via the station TN) with a primary PSAP. Thus, selective routing automatically routes a 911 call to the correct primary PSAP designated to serve the originating station.

2.04 ***Default routing*** is a standard arrangement with E911 service which provides the capability to automatically route a 911 call to a predesignated (default) PSAP (or some designated location) either when selective routing is not provided or when selective routing is provided but a particular 911 call cannot be selectively routed for any reason. Default routing is an inherent capability with the E911 feature.

2.05 ***Alternate routing*** is a standard service available for each PSAP and provides the capability for a traffic busy PSAP, a PSAP on night service, or a PSAP which has a power failure to have 911 calls alternate routed to a predesignated location. With alternate routing, if all trunks to a particular PSAP are traffic busy, or made busy for night service, or the PSAP is out of service due to a power failure, 911 calls normally routed to that particular PSAP are automatically alternate routed to the predesignated directory number (DN) assigned for that alternate location.

2.06 ***Central office transfer*** is a standard service available for each PSAP and provides the capability for an established 911 call to a PSAP to be transferred via the E911 tandem office to another PSAP or to some desired designation by the PSAP attendant. A call transfer is accomplished at the E911 tandem office via a 3-way conference connection, which permits a simultaneous 3-way connection to be established for the calling party, primary (or controlling) PSAP attendant, and the desired destination, which may be another PSAP or some other DN. Three types of central office transfer services

(selective, fixed, and manual) are available for a PSAP. Either selective transfer, fixed transfer, or manual transfer, or any combination of these transfer services may be provided for an E911 PSAP.

(1) ***Selective transfer*** service allows an established 911 call to be selectively transferred by the E911 tandem office from the primary PSAP to the correct secondary PSAP associated with the calling station ANI TN without the primary PSAP attendant having to determine and manually dial the digits for the correct destination. Each primary PSAP may have up to six secondary PSAPs associated with it for selective transfer. Selective routing is required if the selective transfer option is provided. To initiate selective transfer to the correct secondary PSAP, the PSAP attendant operates a key associated with the particular ***type*** (eg, fire department) of secondary PSAP desired. The E911 tandem office automatically determines the specific secondary PSAP designated (eg, fire department A) to serve the calling station and selectively transfers the 911 call to that secondary PSAP.

Note: A PSAP may be designated as primary or secondary, which refers to the order in which 911 calls are directed for answering. Primary PSAPs respond first; secondary PSAPs receive calls on a transfer basis only.

(2) ***Fixed transfer*** allows an established 911 call to be transferred by the PSAP attendant to another ***specific*** PSAP (eg, fire department A) or some other specific destination. Fixed transfer by the operation of a transfer key uses the speed calling feature of the E911 tandem office. Fixed transfer provides a call transfer to any of a limited number of specific destinations, which may be other PSAPs or some other destinations to which 911 calls may be transferred. With fixed transfer service, the PSAP attendant determines the specific destination desired and operates the particular key associated with the specific (fixed) destination.

(3) With the ***manual dial transfer*** service, the PSAP attendant determines the specific destination desired and manually dials the number of the destination or associated speed calling code (if speed calling is provided for manual dial transfer).

2.07 ***Automatic number identification (ANI)*** is an optional service which allows (for 911 calls only) the ANI TN of the calling station to be automatically forwarded to the PSAP and displayed at the answering PSAP attendant position on a special ANI display unit. When the ANI TN of the calling station is available, the display will indicate a numbering plan digit (NPD), which provides an indication of the numbering plan area of the calling station, and the 7-digit ANI TN of the calling station. In cases where the ANI TN is available but the call either cannot be properly routed by the E911 tandem office or the call requires special attention by the PSAP attendant, the ANI TN displayed may be optionally flashed to alert the answering PSAP attendant. In cases where the ANI TN is not available, the display provides an indication of the telephone office from which the call originated. Also, the display will indicate any anonymous call to a PSAP.

2.08 ***Automatic location identification (ALI)*** is an optional service which provides street address information for 911 calls to PSAPs to be displayed at the answering PSAP. An integral part of the ALI system is a ***Data Management System (DMS).*** The main functions of the DMS are maintenance of the E911 data base, the processing of telephone company and customer data for inclusion in the E911 data base, and the generation of selective routing update data.

2.09 ***Forced disconnect*** is an inherent capability with E911 service and is provided to prevent a calling station, which remains off-hook, from indefinitely holding the connection to a PSAP. Forced disconnect allows a PSAP attendant to release a 911 call connection even though the calling party has not hung up, thereby preventing a tie up or jamming of dedicated 911 facilities.

2.10 ***Night service*** is a standard feature available for each PSAP. When night service is in effect for a PSAP, all 911 calls to that PSAP are automatically forwarded to the predesignated (alternate) DN assigned for that PSAP. The alternate DN may be associated with a secondary PSAP or some other alternate location.

Note: One predesignated (alternate) DN may be assigned for a particular PSAP. Therefore, if a PSAP is provided with alternate routing for a traffic busy condition, night service, and/or power failure condition, the same predesignated DN is used for alternate routing due to any of these conditions.

BACKGROUND

2.11 When E911 service is provided, a No. 1/1A ESS is used as the E911 tandem office for the E911 network (Fig. 1) to route all 911 calls to the correct (primary) PSAP designated to serve the calling station. It should be understood that the E911 tandem office (which must be a No. 1/1A ESS) serves as a tandem office for all 911 calls. The office can also serve as a regular class 5 local office. The E911 tandem office serves all PSAPs in the E911 service area. The E911 tandem office routes 911 calls from other offices and from customers served by the E911 tandem office to the PSAPs designated by the municipality to serve the customer stations.

2.12 The E911 feature was developed primarily to provide routing to the correct PSAP for all 911 calls. Selective routing allows a 911 call originated from a station located in a particular district, zone, town, etc, to be routed to the primary PSAP designated to serve the customer stations in that particular district regardless of wire center boundaries. Thus, selective routing eliminates the problem of wire center boundaries not coinciding with district or other political boundaries.

2.13 Selective routing may not be necessary for certain E911 service areas. For example, if telephone wire center and political boundaries coincide, selective routing may not be necessary, since in this case, proper routing to the correct PSAP can be accomplished using the default routing capability. However, if selective transfer is provided, selective routing must be provided since selective transfer requires selective routing data. The term "selective

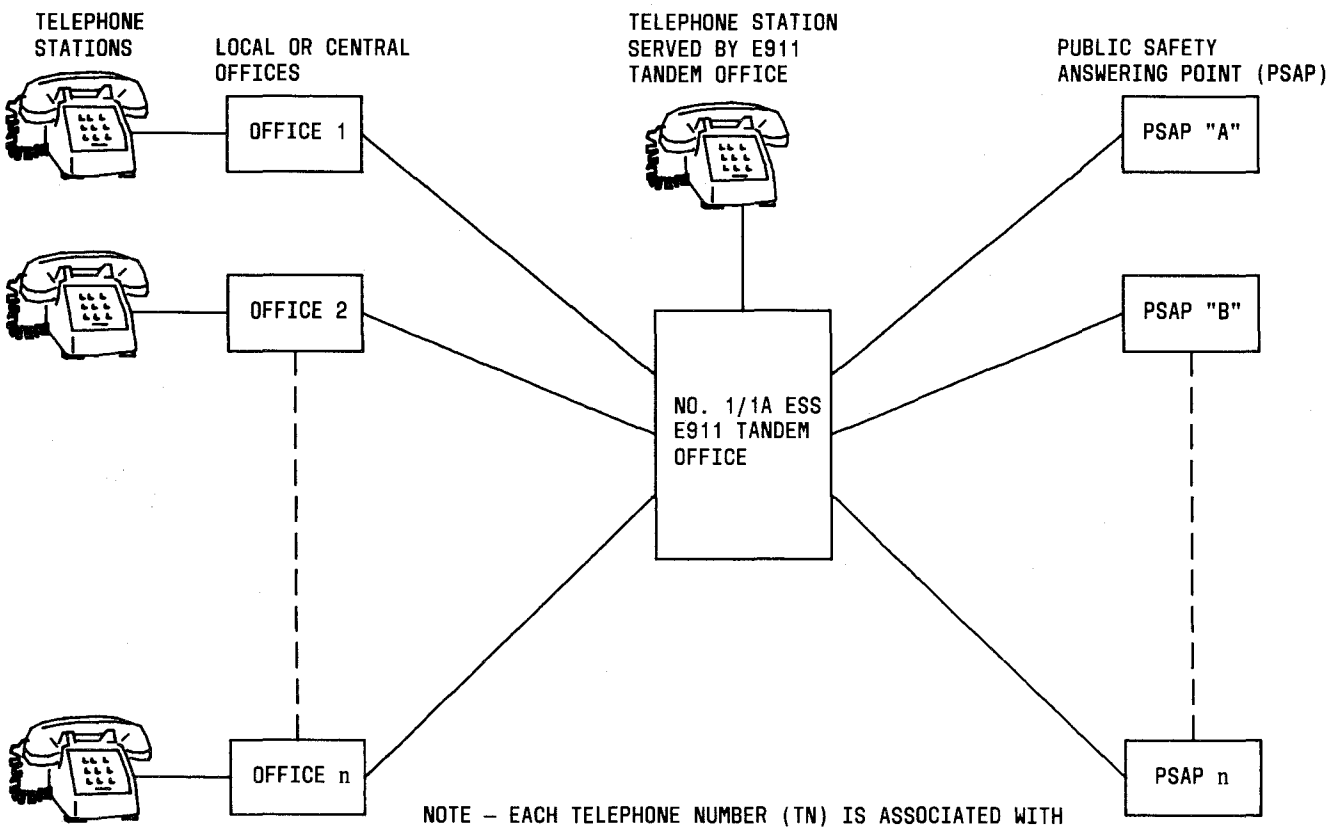


Fig. 1—E911 Network Diagram

routing" refers to the E911 tandem office capability to route the call based on information concerning the calling station (ie, ANI TN, number group, or office code) rather than the dialed address digits. Selective routing and the completion of a 911 call to a PSAP are separate functions of the E911 tandem office. The selective routing translation data provides a local directory number (DN) or list of local DNs served by E911 tandem office to which a particular 911 call should be routed. The DN can be any valid local DN which typically leads (translates) to a dedicated outgoing 911 trunk group to a PSAP.

2.14 The majority of 911 calls in an E911 network will be from stations served by local offices other than the E911 tandem office. Generally, a 911 call, when both ANI and selective routing are provided, is completed as follows:

(1) Local office (or E911 tandem office) customer dials 911.

(2) Local office (or E911 tandem office) obtains ANI TN of originating station.

(3) Local office seizes a dedicated outgoing 911 trunk (capable of sending ANI) to the E911 tandem office and sends the ANI information to the E911 tandem office.

(4) The E911 tandem office receives and uses the ANI information as an input for selective routing to obtain the correct emergency service number and DN of the primary PSAP designated for the calling station. If the 911 call was originated by a customer served by the E911 tandem office, the E911 tandem office provides the TN used for selective routing.

(5) After the DN of the correct primary PSAP is obtained, the E911 tandem office translates the DN to obtain the route index and routes the call via a dedicated outgoing 911 trunk to that PSAP. If ANI display service is provided for that PSAP, the ANI TN of the calling station is transmitted to the PSAP, where the ANI information is displayed at the answering PSAP attendant position.

2.15 The selective routing service makes use of dividing a 911 service area into cells called emergency service zones (ESZs). The ESZ may include coincident boundaries of various selective agencies (eg, police, fire). Each ESZ is assigned a distinct number called an emergency service number (ESN). Each ESZ has a primary PSAP (which is assigned a primary ESN) and possibly one or more secondary PSAPs (which are assigned secondary ESNs). Secondary PSAPs are only provided with selective transfer. All telephone numbers (TNs) assigned for stations located within an ESZ are associated with the primary ESN assigned for that ESZ. Therefore these connections are based on the ANI TN to ESN assignment.

2.16 Selective transfer is based on the selective routing capability. Selective transfer allows an established 911 call to be transferred from the primary PSAP to the correct secondary PSAP designated to serve the calling station without the PSAP attendant having to determine which is the correct PSAP, then dialing the correct digits.

3. SOFTWARE DATA STRUCTURES

TRANSLATIONS

3.01 Generally, 911 calls to a PSAP are completed using standard trunk translations for the incoming and outgoing E911 trunks and regular 3/6-digit, rate and route pattern (RRP), DN, and route index (RI) translations for routing determination. Selective routing, default routing, and selective transfer services require special 911 translations to obtain the emergency service central office (ESCO) number, NPD, TN-to-ESN, and ESN data. Only those translations unique to E911 are discussed in this part. For detailed information concerning translations and translation data structures, refer to items D(1) through D(3) in Part 7. Due to the types and complexity of the translations used for E911, the translations and translation data structures are presented functionally rather than describing each translator separately. Translations required for 911 calls at the E911 tandem office include the following functions:

(a) Receiving and routing E911 incoming trunk calls

(b) Routing locally originated E911 calls

(c) ESCO derivation

(d) ESCO to NPD and/or default ESN translation

(e) NPD and TN-to-ESN translation

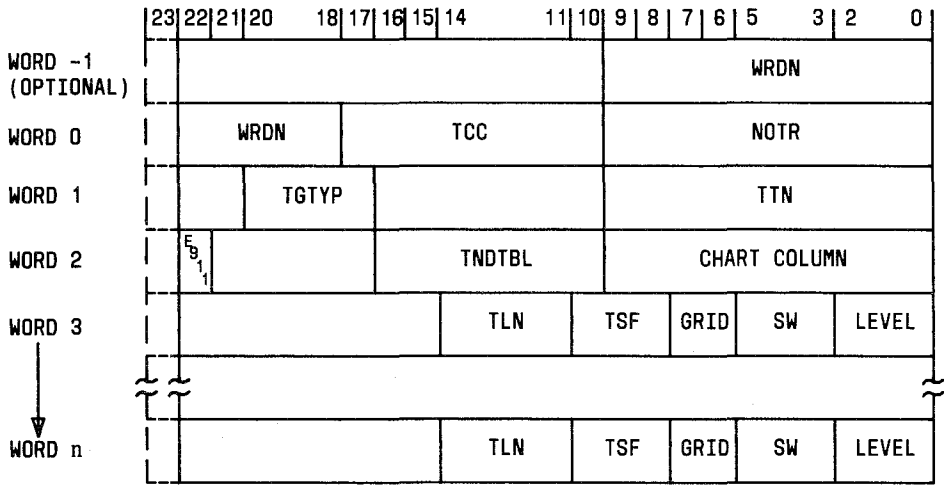
(f) ESN to PSAP DN translation

(g) PSAP DN translation

(h) Routing and trunk translations for E911 outgoing trunks to PSAPs.

A. Dedicated E911 Incoming Trunk 911 Calls

3.02 A dedicated E911 tandem trunk group is designated as such in the local tandem trunk group auxiliary block with item E911 = 1 in word 2 as shown in Fig. 2. Dedicated E911 incoming trunk groups must also have the Q option word in the supplementary TGN auxiliary block as shown in Fig. 3.



NOTES:
1. BIT 23 EXISTS IN NO. 1A ESS ONLY.
2. THE LIST OF 2-WAY TRUNK NETWORK NUMBERS (WORDS 3 THROUGH n) WILL NOT EXIST IF ITEM E911 = 1 IN WORD 2.

WORD −1 WRDN – NUMBER OF WORDS IN THE AUXILIARY BLOCK. THIS WORD AND FIELD EXIST ONLY WHEN THE NUMBER OF WORDS IN THE AUXILIARY BLOCK IS GREATER THAN 31.

WORD 0 WRDN – NUMBER OF WORDS IN THE AUXILIARY BLOCK (IF LESS THAN 32).

TCC – TRUNK CLASS CODE

NOTR – NUMBER OF TRUNKS IN THE TRUNK GROUP

WORD 1 TGTYP – TRUNK GROUP TYPE = 15 (FOR INCOMING TANDEM TRUNKS)

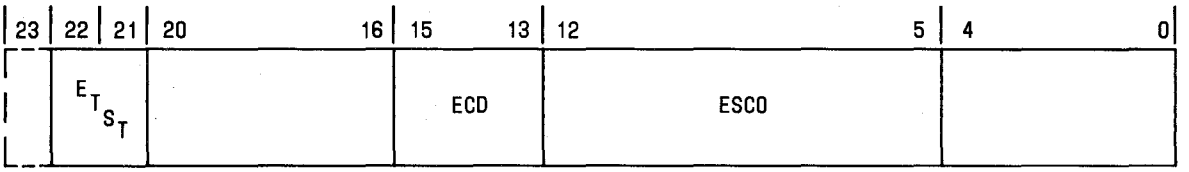
TTN – TEST TABLE NUMBER (WHEN FURNISHED FOR THE TRUNK GROUP)

WORD 2 E911 – IF A DEDICATED E911 TRUNK GROUP, E911 = 1; OTHERWISE, E911 = 0 FOR LOCAL TANDEM INCOMING TRUNK GROUP.

TNDTBL – TANDEM TABLE NUMBER

WORDS 3 THROUGH n (SEE NOTE 2) TLN – TRUNK LINK NETWORK
TSF – TRUNK SWITCH FRAME
GRID – TRUNK SWITCH FRAME GRID
SW – TRUNK SWITCH FRAME SWITCH
LEVEL – TRUNK SWITCH FRAME LEVEL

Fig. 2—TGN Auxiliary Block for Local Tandem and Dedicated E911 Incoming Trunks



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

ETST – E911 TRUNK TEST CODE
0 = NO TEST CODES
1 = TEST CODE NOT FOLLOWED BY ANI
2 = TEST CODE ACCOMPANIED BY ANI
3 = UNASSIGNED

ECD – EMERGENCY CALL DIGITS
0 = UNASSIGNABLE
1 = DIGIT "1" FOLLOWED BY ANI
2 = DIGITS "11" FOLLOWED BY ANI
3 = DIGITS "911" FOLLOWED BY ANI
4 = ANI ONLY
5 = NO DIGITS AND NO ANI (I.E., MANUAL SEIZURE)
6-7 = UNASSIGNED

ESCO – EMERGENCY SERVICE CENTRAL OFFICE

Fig. 3—Supplementary TGN Auxiliary Block Option Word Q

3.03 On incoming 911 calls (excluding test calls) a 1- or 8-digit ANI number (in the standard ANI format) is always expected, but it may be preceded by the digit(s) 1, 11, or 911 as indicated by the emergency call digit (ECD) item shown in Fig. 3. A 1-digit only ANI number provides an information digit. An 8-digit ANI number provides an information digit plus the ANI TN. If the ANI contains a TN, the ANI TN and the ESCO number obtained from the TGN supplementary auxiliary block (word Q) are used for selective routing. Otherwise, if no ANI TN is available (eg, rural, party, QZ billing, or ANI failure), the 911 call is routed to the default ESN associated with the ESCO number. The default ESN is obtained from the ESCO translator.

> ***Note:*** If a local office in an E911 service area serves two NPAs, two separate dedicated E911 trunk groups must be used because the ESCO, assigned on a per trunk group basis in the E911 tandem office, determines the NPD.

3.04 For dedicated E911 incoming trunks, start dial conventions similar to Centralized Automatic Message Accounting (CAMA) are used. If item ECD = 4 (ANI only) in option word Q (Fig. 3), then the TCC start dial signal = 0 and steady off-hook is returned to prompt ANI. For MF trunks, if item ECD $\neq$ 4, then TCC start dial signal = 2 (wink). In this case a wink signal is used to prompt the emergency call digit(s) 1, 11, or 911 or test code digits. Following the wink signal and subsequent digit reception, a steady off-hook signal is used to prompt ANI (except for a test call with item ETST = 1). If item ECD $\neq$ 4 and the trunks are bylink trunks from an SXS office, the digits are immediate dial dial pulse (DP) digits. Following the reception of the DP digits, a steady off-hook signal is used to prompt ANI.

> ***Note:*** If item ECD has the value 4 or 5, then the incoming start dial item in TCC word 2 equals 00 (no) regardless of the title of the trunk class data layout. If, in addition, the trunk group is composed of incoming bylink trunks, the inpulsing type in TCC word 2 will be 001 (MF), not 010 (DP). For complete TCC data, refer to item D(1) in Part 7.

B. Dedicated E911 Incoming Trunk Test Calls

3.05 Two methods are available for test calls on dedicated E911 incoming trunks. One method uses an assigned 3-digit test code (either followed or not followed by ANI). The other method uses ANI in lieu of a 3-digit test code. Some types of local offices send ANI following the test code and some do not.

Item ETST is used to distinguish these. No ANI follows the test code if ETST = 1. If item ETST = 2, the ANI digits received following a test code are absorbed by the ESS E911 tandem office. Typically, ETST = 1 for an incoming trunk group from any type of ESS local office and ETST = 2 for an incoming trunk group from a No. 5 X-Bar local office.

(a) Assigned test codes are used if item ETST = 1 (test code not followed by ANI) or ETST = 2 (test code followed by ANI) in the trunk group option Q word (Fig. 3). Test codes can only be used if item ECN $\neq$ 4 or 5. The test code must be 3 digits distinct from the digits expected for a 911 (regardless of whether item ECD = 1, 2, or 3). For example, if ECD = 1, test codes cannot be 1XX; if ECD = 2, test codes cannot be 11X; and if ECD = 3, the test code cannot be 911. The tandem table associated with a dedicated E911 trunk group (see Fig. 2) translates the test code digits to a data type four (DTYP = 4) entry.

(b) If item ETST = 0, no 3-digit test codes are used for that trunk group and item ECD = 4 (ANI only). The ANI contains the encoded test code. With this method, the ANI and the ESCO are used to obtain the ESN (as for a 911 call) which leads to a test line rather than a PSAP. When this method is used, item TNDTBL = 0 in word 2 of the TGN auxiliary block (Fig. 2). Typically, this method is used for an incoming trunk group from a No. 1 X-Bar or panel local office.

Note: Test calls from step-by-step local offices can be either type. If digits plus ANI are received for test calls, the test code digits are dial pulse digits for test calls as for regular calls.

C. Incoming 911 Calls Via Message Network Trunks

3.06 The message network may be used to route 911 calls from local offices to the E911 tandem office. For example, this arrangement provides for local offices not equipped for ANI which are soon to be taken out of service. Any message network trunk group can be arranged to handle 911 calls. The manual seizure type trunk group (ECD = 5) can provide what is sometimes referred to as "hot line" service for routing 911 calls to the E911 tandem office where no digits and no ANI will be received.

3.07 Two methods are possible for obtaining the ESCO for 911 calls via message network trunks. The ESCO is obtained from either the supplementary TGN translator option Q word (Fig. 3) or from the 3/6-digit translator. If the trunk group option Q word exists for a particular trunk group and item ESCO $\neq$ 0, then that ESCO number assigned for the trunk group is used for routing. Otherwise, if the trunk group option Q word does not exist, or exists and an ESCO is not specified (ESCO = 0), then the ESCO obtained from the 3/6-digit translator is used. In the latter case, the digits for 911 calls are translated via the 3-digit translator as call type 22 (4FESCO). Refer to Fig. 4. If the 3/6-digit translator yields an ESCO and the call is via a message network trunk group with an assigned ESCO, the assigned ESCO for the trunk group is used in lieu of the ESCO obtained from the 3/6-digit translator.

3.08 Several cases are possible with the trunk group option Q word for translation and routing 911 calls incoming via nondedicated E911 trunks.

(a) If the trunk group has AIOD, either the AIOD billing TN or else the trunk group billing TN and the ESCO, or just the ESCO, can be used to obtain the ESN assigned. If the trunk group has CAMA ANI, either the billing TN (received as ANI or used because of ANI failure) and the ESCO, or just the ESCO, can be used to obtain the ESN assigned.

(b) If the trunk has a screening LEN (indicated by a word type 5 in word 2 of the TGN translator), the billing TN associated with the screening LEN and the ESCO are used to select ESN.

(c) Otherwise, without ANI or a screening LEN, the 911 call will be routed to the default ESN assigned in the ESCO translator.

Note: For 911 calls routed to a default ESN, if ANI display is provided for the terminating PSAP, the E911 tandem office will generate and send a special ANI code in the form 911-aaaa (where aaaa equals the ESCO number). This provides an indication of the approximate originating location.

D. E911 Tandem Office Local 911 Calls

3.09 The 3-digit translator is used to obtain the call type and ESCO item for 911 calls originated from lines served by the E911 tandem office. The 3-digit translator is also used for 911 calls from cus-

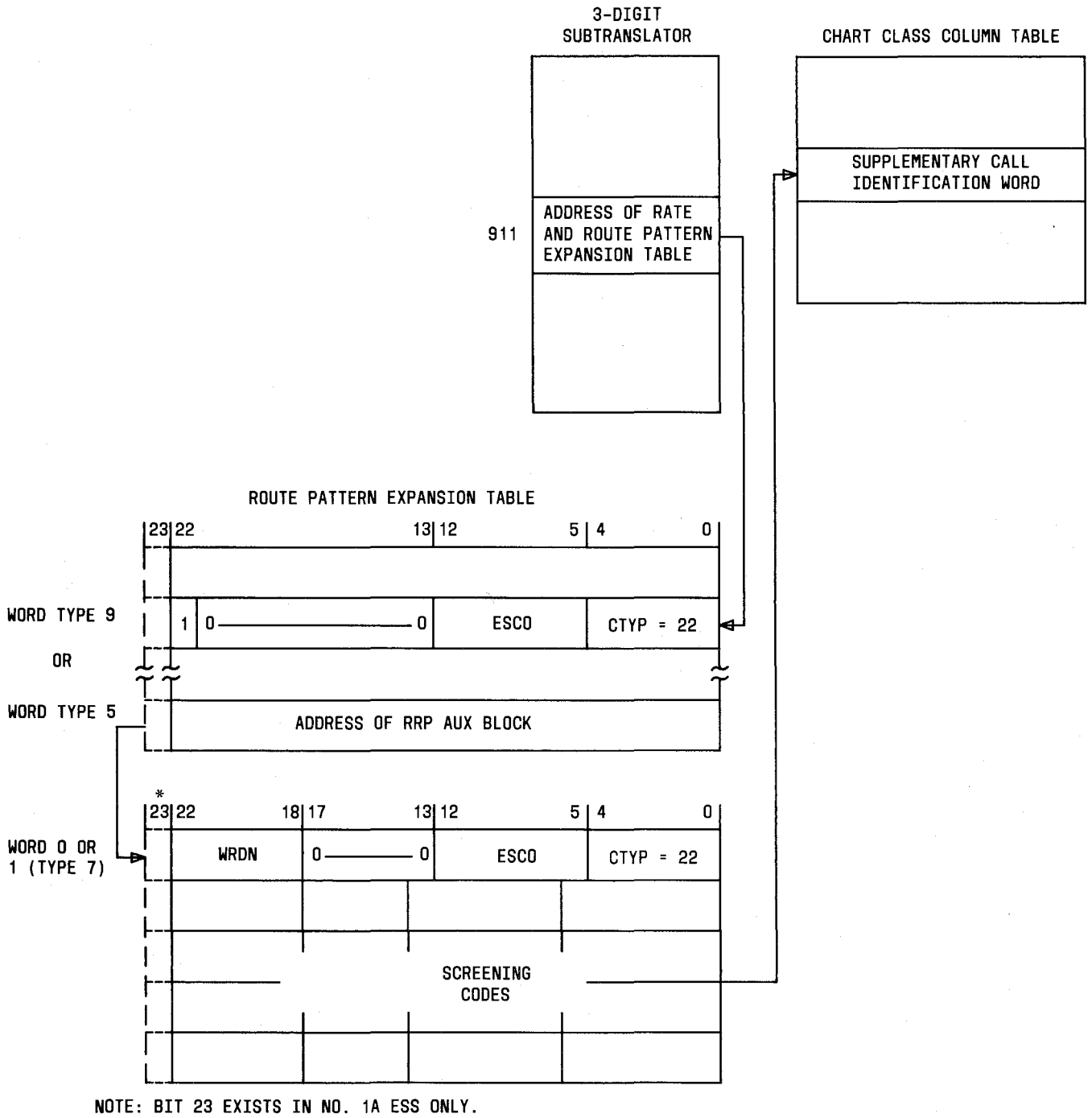


Fig. 4—E911 Tandem Office 3-Digit Translation for 911

tomer tie trunks and message network trunks which require 3-digit translation. For such calls, the 3-digit translator contains or points to RRP data. As shown in Fig. 4 call type = 22 (4FESCO) is associated with 911 calls. For the rate center used for the E911 tandem office local customers, the associated RRP, primary translation word (PTW), or RRP auxiliary block also contains the ESCO number (ESCO $\neq$ 0) assigned for that E911 tandem office rate center. Chart column screening can be used to intercept 911 calls from lines which are not in the E911 service area. A 911 call from such a line may be routed to an announcement, overflow tone, or intercept.

> ***Note:*** If the E911 tandem office serves as a local office with two or more NPAs, the 3/6-digit translator must yield a different ESCO for each NPA.

3.10 The TN of the calling line used for selective routing is the TN which would be used as the billing TN. To reiterate this arrangement, the billing TN is the special billing TN or AIOD TN if available; otherwise, it is the calling TN or, for multiline groups with multiline hunt type not equal to three (MLHTYP $\neq$ 3), the pilot TN. Exceptional cases are rural party or QZ billed lines (ie, STB = 1 in LENCL 3) which have no defined billing TNs. With E911, a 911 call originated from a line without an identified or defined TN is routed to the ESCO default ESN with an appropriate ANI information digit and digit sequence to indicate the originating office (if the PSAP has ANI display).

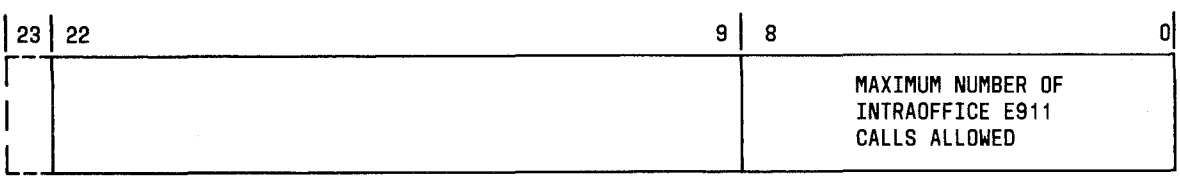
E. Intraoffice E911 Call Limit for the E911 Tandem Office

3.11 Bits 0 through 8 in the second word of the office options table contain the maximum number of simultaneous intraoffice E911 calls allowed for the E911 tandem office. See Fig. 5. The intraoffice E911 call limit is referred to generally as the E911 "choke" mechansim. It is desirable to limit the number of 911 calls that can be handled from any office to prevent 911 facilities from being tied up due to a large influx of 911 calls originating from any one office. This limit is normally inherent in the number of trunks in the dedicated incoming 911 trunk group(s) from another local office(s). The E911 choke mechanism allows a similar call limiting capability within the E911 tandem office for local 911 calls. This method prevents having to use loop-around trunks in the E911 tandem office to accomplish the same objective. The maximum number of intraoffice calls allowed is determined in the same manner as if loop-around trunks had to be engineered. Peg and overflow counts are available for intraoffice 911 calls.

F. ESCO Translator

3.12 To provide selective routing, the ESCO is translated to an NPD. The NPD and ANI TN of the calling station are translated to obtain the primary ESN associated with the calling station. The ESN identifies the primary PSAP associated with the calling station.

3.13 The ESCO translator (Fig. 6) is pointed to by word 23 of the master head table annex. The ESCO translator provides a primary translation word (PTW) for each assigned ESCO (255 maximum). An ESCO PTW contains a default ESN, an NPD, an emergency peripheral data storage processor (EPDSP) item, and an EN01 item. When selective routing translations are resident in the E911 tandem office, item EN01 = 1. When selective routing translations are resident in a PDSP, item EPDSP = 1. The default ESN is used if both the EPDSP and EN01 items are zero indicating no selective routing, if there is an ANI failure, if the TN-to-ESN translation does



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

Fig. 5—E911 Intraoffice Choke Mechanism (Office Option Table Word 2)

not yield a valid ESN, or when the ANI information is not a TN (eg, rural party lines). The default ESN is also used if item EPDSP = 1 but the PDSP does not return proper ESN data to the E911 tandem office. The NPD assigned is used to index into the TN-to-ESN translations. If the EPDSP item is set, then TN-to-ESN translations are accomplished in the PDSP; otherwise, they are resident in the E911 tandem office. Item EN01, when set, indicates selective routing translations are stored in the E911 tandem office.

3.14 The NPD item contains two bits for NPD data. An E911 service area may sometimes serve multiple NPAs. The NPD item is used to indicate the NPA from which an E911 call originated. A PSAP with ANI display always receives eight digits for display. The first digit sent to the PSAP indicates the NPD obtained from item NPD in the ESCO translator as shown in Fig. 6. If the first digit sent to a PSAP is 0, 1, 2, or 3 (corresponding to NPD 0, 1, 2, and 3), the ANI display is not flashed. If the first digit is 4, 5, 6, or 7 (corresponding to NPD 0, 1, 2, and 3), the ANI display is flashed.

> ***Note:*** If a local office does not send ANI or does not require selective routing, the ESCO PTW for that office can have item EPDSP = 0 and item EN01 = 0. In this case, the ESCO PTW will provide the NPD and the default ESN used for default routing. Otherwise, selective routing is done based on the NPD and ANI TN to obtain the primary ESN.

G. NPD and ANI TN-to-ESN Selective Routing Translations

No. 1 ESS

3.15 If a PDSP is used, NPD and TN-to-ESN translations for selective routing are resident in the PDSP. The selective routing translations in the PDSP are structured similar to those in the E911 tandem office. Selective routing translations and data base generation in a PDSP are discussed in item A(21) in Part 7. The following paragraphs discuss selective routing translations resident in the E911 tandem office only. The NPD translator (Fig. 7) which provides for selective routing includes the following:

- DN-to-ESN head table
- DN-to-ESN subtranslator (office code subtranslator)
- DN number group list (number group subtranslator)
- DN index list.

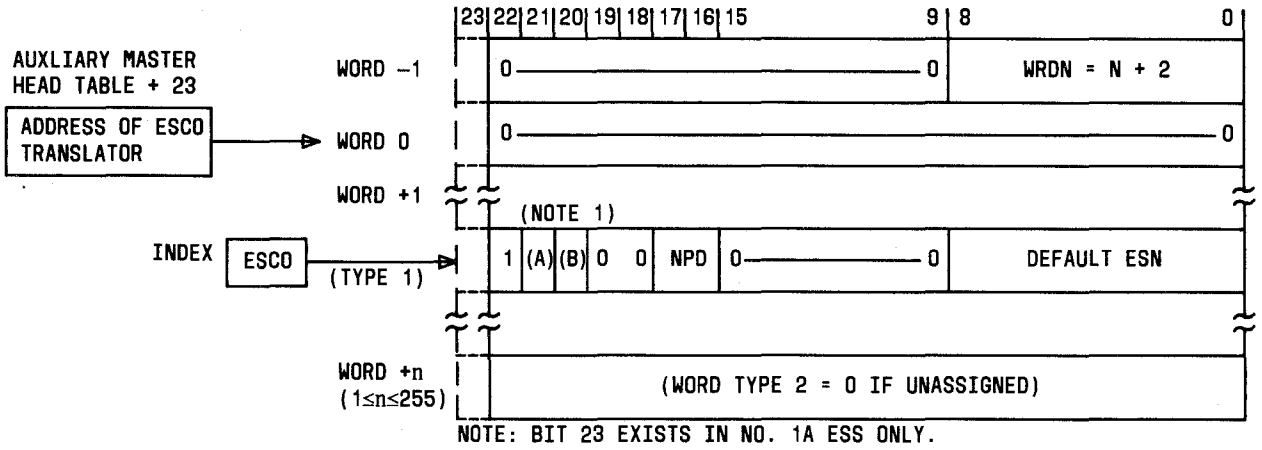
> ***Note:*** In the E911 ESS data structures, the ANI TN is used as DN; therefore, the data structure layouts reflect the term "DN" in lieu of "ANI TN."

3.16 Generally, the ESN can be obtained from either of several levels of translations, depending on the level required to accomplish selective routing. For example, if an entire office code is served by only one set of agencies, the ESN may be obtained from the office code subtranslator. Other levels from which the ESN may be obtained are the number group subtranslator and the DN index list. If an entire thousands group is served by the same PSAP, the primary ESN may be obtained from the number group subtranslator. If the thousands group is served by more than one PSAP, the ESNs are obtained on a per DN basis from the DN index list.

3.17 The NPD obtained from the ESCO translator indexes the DN-to-ESN head table, which contains the address of the office code subtranslator. The office code of the ANI TN indexes the proper office code PTW, which either yields the ESN, or contains a pointer to the number group subtranslator, or contains an unassigned entry. When a number group subtranslator is used, the fourth digit of the ANI TN is used to index the appropriate number group translation word which either yields the ESN or contains the address of the DN index list.

3.18 The DN index list is similar to the abbreviated 3/6-digit translator. The last three digits of the ANI TN select an abbreviated ESN (AESN) which then expands to a full ESN as shown in Fig. 7. Up to eight ESNs may be assigned per number group in a No. 1 ESS. Therefore, an AESN is a 3-bit binary representation, which points to the full ESN. The DN index list contains a valid AESN for every DN index regardless of whether or not the DN is assigned to a customer. Furthermore, by convention, AESN = 0 (the primary ESN which is assigned the majority of the DNs in the list) should be used for unassigned lines. The primary ESN contained in word 0 is pointed to by AESN = 0, which should be the most frequently used AESN for assigned lines. This does not mean that AESN = 0 is an error type of default ESN. It is merely preassigned to DNs that would otherwise not be assigned an ESN.

> ***Note:*** The digit "0", which normally has a value = 10, is converted to value = 0 for indexing the DN index list.



NOTES:

1. (A) EQUALS EPDSP ITEM.
   (B) EQUALS ENO1 ITEM.
2. FCLD DATA IS CONTAINED IN THE ESN TRANSLATOR.

WORD −1 WRDN – NUMBER OF WORDS IN THE TRANSLATOR WHERE 1≤N≤255.

WORD 0 – WORD 0 IS ALWAYS BUILT AS ALL ZEROS.

WORD 1 THROUGH WORD n EPDSP – EMERGENCY PERIPHERAL DATA STORAGE PROCESSOR ITEM IS SET (=1) IF A PDSP IS USED FOR TN-TO-ESN TRANSLATIONS.

(TYPE 1) ENO1 – WHEN SET, ENO1 INDICATES FURTHER TRANSLATIONS ARE STORED IN THE NO. 1 ESS.

DEFAULT ESN – DEFAULT ESN ASSOCIATED WITH THE ESCO.

NPD – NUMBERING PLAN DIGIT ASSOCIATED WITH THE ESCO. THE FIRST DIGIT SENT TO A PSAP INDICATES NPD AND FCLD DATA AS FOLLOWS.

FIRST DIGIT SENT TO PSAP	NPD	(NOTE 2) FCLD
0	0	0
1	1	0
2	2	0
3	3	0
4	0	1
5	1	1
6	2	1
7	3	1
8 (FOR MAINTENANCE TEST CALLS)		

WORD n (TYPE 2) – TYPE 2 IS BUILT AS ALL ZEROS FOR FOR ALL UNASSIGNED ESCOs.

Fig. 6—ESCO Translator

No. 1A ESS

3.19 In the 1AE5 generic program, up to eight ESNs may be assigned per number group. The NPD and ANI TN-to-ESN selective routing translations in a No. 1A ESS (with a 1AE5 generic program) are identical to those in a No. 1 ESS except left half memory does not exist in a No. 1A ESS. See Fig. 7. Therefore, a left half DN index list does not exist in a No. 1A ESS.

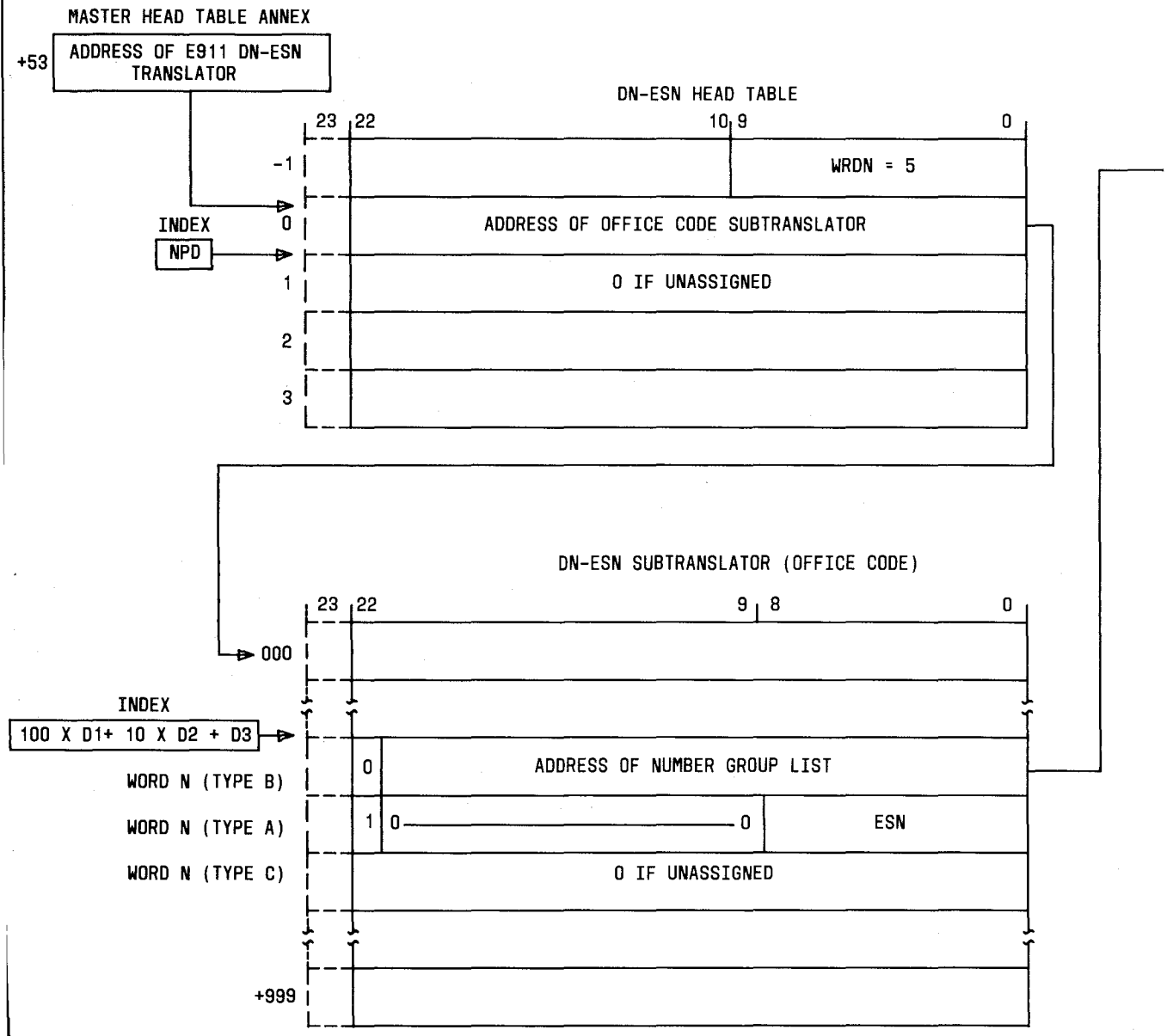
3.20 In the 1AE6 and later generic programs, up to 511 ESNs may be assigned per number group. Each number group can have a different ESN limit (ie, either 8, 16, 32, 64, 125, 256, or 511) which depends on the number of ESNs needed per number group. The NPD and TN-to-ESN translations are the same except item ESNLM (ESN limit) has been added in word 0 of the DN index list and the size of the DN index list varies according to the number of ESNs required per number group. Figure 16 shows the NPD and TN-to-ESN translator for a No. 1A ESS with a 1AE6 or later generic program. Figure 8 depicts the translator with an ESN limit of 32.

H. ESN Translator

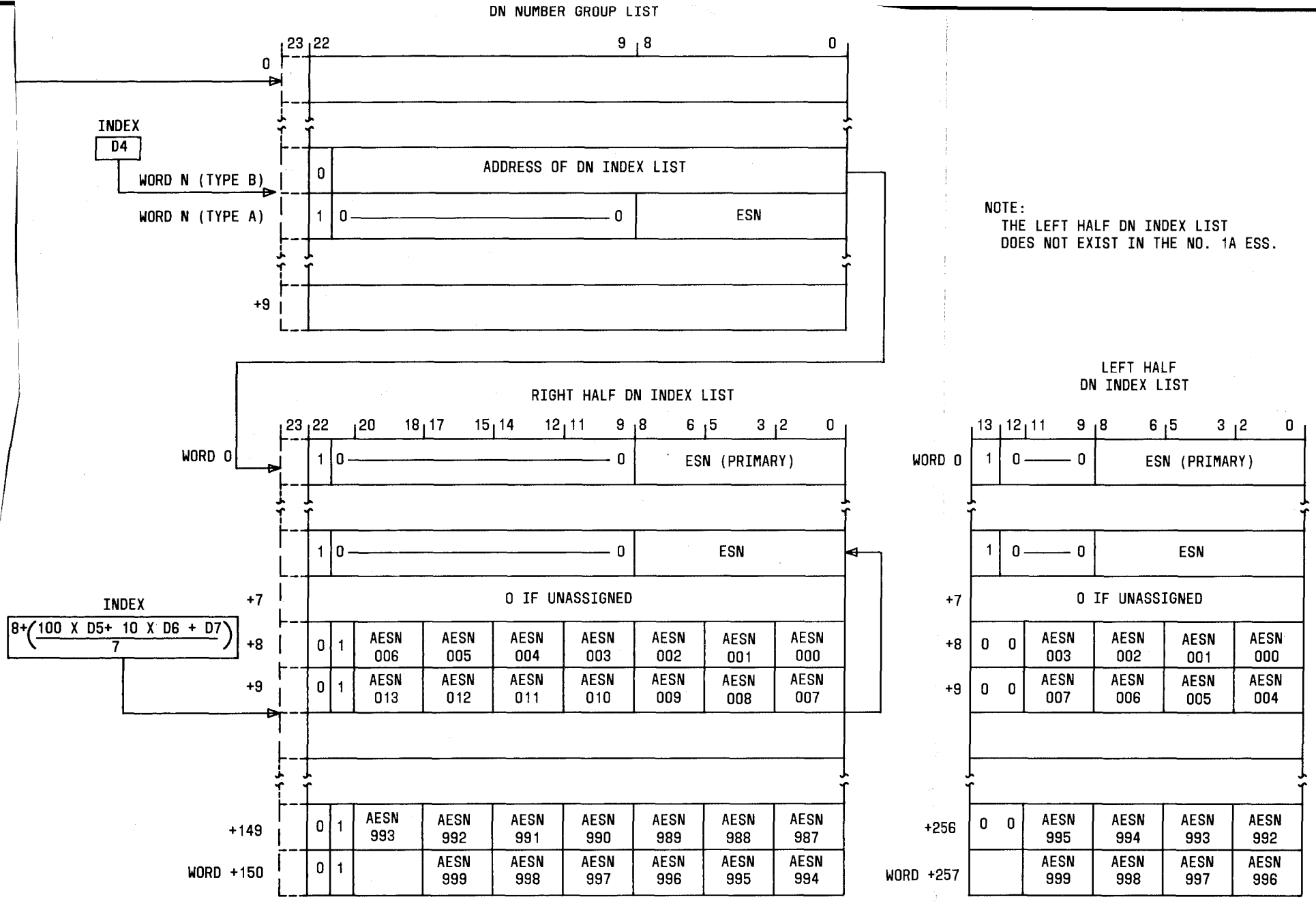
3.21 The ESN obtained from the selective routing translations must be translated to a PSAP DN via the ESN translator shown in Fig. 9. A single entry PTW (type 3) in the ESN head table is used when selective transfer does not apply for a particular ESN. When selective transfer service is provided, the PSAP primary DN and a list of secondary PSAP DNs (six maximum per primary ESN) are contained in the ESN auxiliary block. With selective transfer, the primary PSAP is the initial answering point. The primary PSAP or subsequent answering points (secondary PSAPs if equipped for selective transfer) can generate a selective transfer access code and an emergency transfer digit (ETD), which indexes the selective transfer list.

3.22 Any assigned DN is considered valid in the ESN translator; however, standard usage DNs are considered as those DNs associated with a nonringing PSAP, ringing PSAP, maintenance testing, and remote call forwarding to another PSAP.

3.23 If a PSAP is provided ANI display, the first digits sent to PSAP indicates both the NPD (from the ESCO translator) and whether or not the ANI display would be flashed to alert the attendant for special 911 call situations. For example, a PSAP arranged for flashing ANI display may be assigned as the primary ESN for all foreign exchange (FX) lines that terminate outside the E911 service area. If item FCLD is set (FCLD = 1) in the ESN translator, the first digit sent to the primary PSAP to indicate the NPS also indicates that the ANI display should be flashed. The first digit sent to a PSAP to indicate the ND and FCLD (flash calling line display data) contains the following information.



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


DN NUMBER GROUP LIST
23 22 9 8 0
0
INDEX
D4
WORD N (TYPE B)
WORD N (TYPE A)
0 ADDRESS OF DN INDEX LIST
1 0 0 ESN
+9
RIGHT HALF DN INDEX LIST
23 22 20 18 17 15 14 12 11 9 8 6 5 3 2 0
WORD 0
1 0 0 ESN (PRIMARY)
1 0 0 ESN
+7 0 IF UNASSIGNED
INDEX
8+(100 X D5+ 10 X D6 + D7 / 7)
+8 0 1 AESN 006 AESN 005 AESN 004 AESN 003 AESN 002 AESN 001 AESN 000
+9 0 1 AESN 013 AESN 012 AESN 011 AESN 010 AESN 009 AESN 008 AESN 007
+149 0 1 AESN 993 AESN 992 AESN 991 AESN 990 AESN 989 AESN 988 AESN 987
WORD +150 0 1 AESN 999 AESN 998 AESN 997 AESN 996 AESN 995 AESN 994
NOTE:
THE LEFT HALF DN INDEX LIST
DOES NOT EXIST IN THE NO. 1A ESS.
LEFT HALF
DN INDEX LIST
13 12 11 9 8 6 5 3 2 0
WORD 0
1 0 0 ESN (PRIMARY)
1 0 0 ESN
+7 0 IF UNASSIGNED
+8 0 0 AESN 003 AESN 002 AESN 001 AESN 000
+9 0 0 AESN 007 AESN 006 AESN 005 AESN 004
+256 0 0 AESN 995 AESN 994 AESN 993 AESN 992
WORD +257 AESN 999 AESN 998 AESN 997 AESN 996

DN-ESN HEAD TABLE WORDS

WORD -1 WRDN - LENGTH OF HEAD TABLE (FIXED AT 5).

WORD 0 - ADDRESS OF OFFICE CODE SUBTRANSLATOR WORD 0 IS BUILT FOR NPD = 0.

WORDS 1,2, & 3 - WORDS 1, 2, & 3 ARE BUILT AS NEEDED FOR NPDS 1, 2, & 3. OTHERWISE, ALL ZEROS ARE ENTERED FOR UNASSIGNED NPDS.

DN-ESN SUBTRANSLATOR (OFFICE CODE)

WORD N (TYPE A) ESN - EMERGENCY SERVICE NUMBER (WHEN TYPE A IS USED, BIT 22 = 1)

WORD N (TYPE B) - CONTAINS THE NUMBER GROUP LIST ADDRESS WHEN FURTHER TRANSLATIONS ARE NECESSARY TO OBTAIN THE ESN.

WORD N (TYPE C) - BUILT AS ALL ZEROS FOR UNASSIGNED OFFICE CODES

DN NUMBER GROUP LIST

WORD N (TYPE A) ESN - EMERGENCY SERVICE NUMBER (WHEN TYPE A IS USED, BIT 22 = 1)

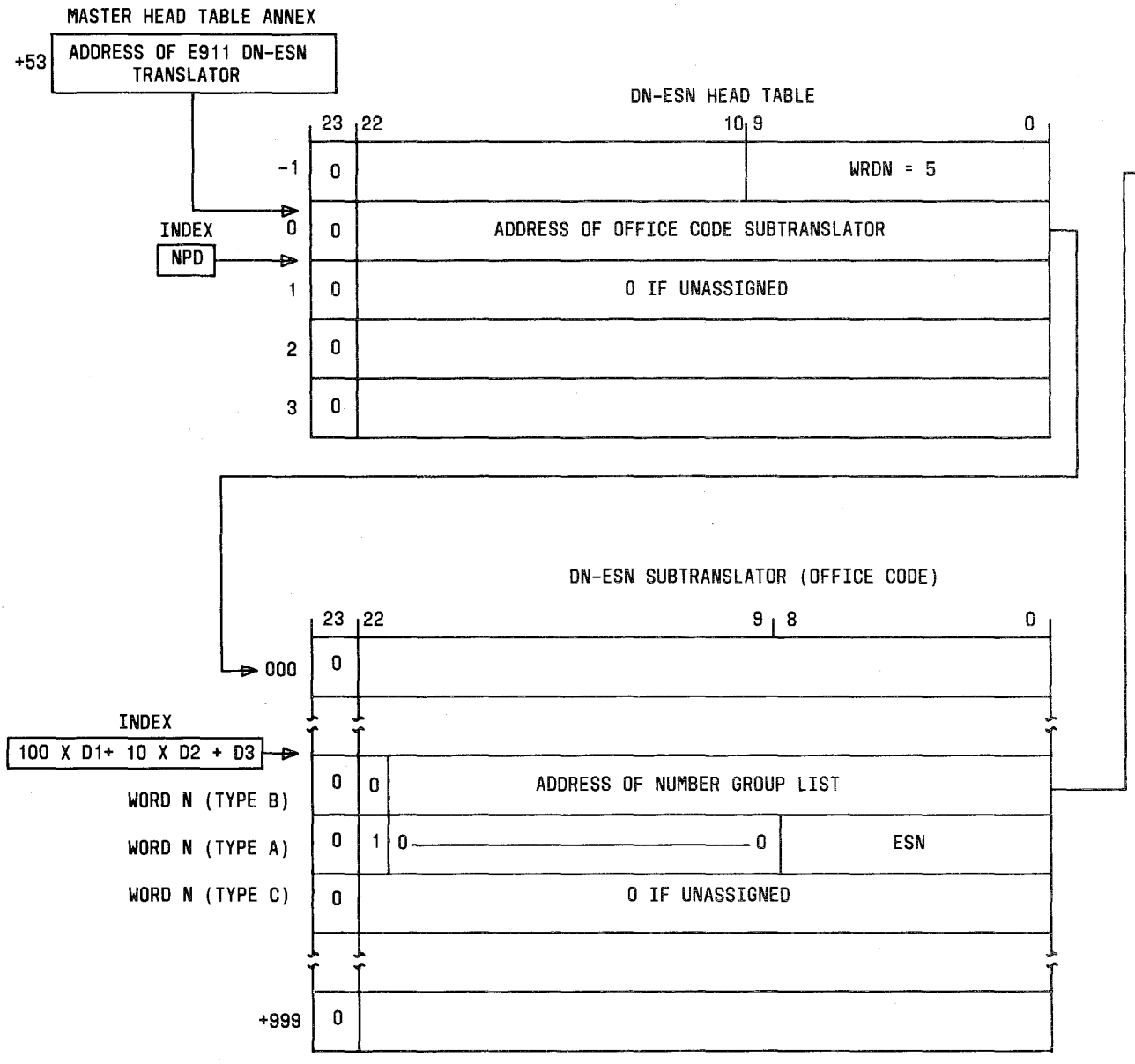
WORD N (TYPE B) - CONTAINS THE TN INDEX LIST ADDRESS WHEN FURTHER TRANSLATIONS ARE NECESSARY TO OBTAIN THE ESN.

DN INDEX LIST

WORDS 0 TO 7 - THESE WORDS MAY CONTAIN UP TO EIGHT ESNS ASSOCIATED WITH A PARTICULAR NUMBER GROUP. WORD 0 SHOULD CONTAIN THE PRIMARY ESN, WHICH IS THAT ESN USED FOR THE MAJORITY OF THE CUSTOMER ASSIGNED TNS IN THAT NUMBER GROUP. BIT 22 = 1 WHEN AN ESN IS ASSIGNED IN WORDS 0 TO 7. WHEN AN ESN IS NOT ASSIGNED IN A PARTICULAR WORD, BIT 22 = 0 IN THAT WORD.

WORDS 8 TO 150 (RIGHT HALF) OR 8 TO 257 (LEFT HALF) - AN ABBREVIATED ESN (AESN) IS ASSIGNED FOR EVERY TN IN THE THOUSANDS GROUP. THESE 3-DIGIT AESNS CORRESPOND TO THE ESNS ASSIGNED IN WORDS 0 THROUGH 7. UNASSIGNED TNS SHOULD CONTAIN THE AESN CORRESPONDING TO THE PRIMARY ESN CONTAINED IN WORD 0. THE TN INDEX LIST IS INDEXED USING THE FIFTH, SIXTH, AND SEVENTH DIGITS OF THE ANI IDENTIFIED CALLING TN.

Fig. 7—NPD Translator for 1E5 (No. 1 ESS) and 1AE5 (No. 1A ESS) and Earlier Generic Programs


MASTER HEAD TABLE ANNEX
+53
ADDRESS OF E911 DN-ESN TRANSLATOR
DN-ESN HEAD TABLE
23
22
10
9
0
-1
0
WRDN = 5
INDEX
NPD
0
ADDRESS OF OFFICE CODE SUBTRANSLATOR
1
0 IF UNASSIGNED
2
3
DN-ESN SUBTRANSLATOR (OFFICE CODE)
23
22
9
8
0
000
INDEX
100 X D1+ 10 X D2 + D3
WORD N (TYPE B)
ADDRESS OF NUMBER GROUP LIST
WORD N (TYPE A)
ESN
WORD N (TYPE C)
0 IF UNASSIGNED
+999

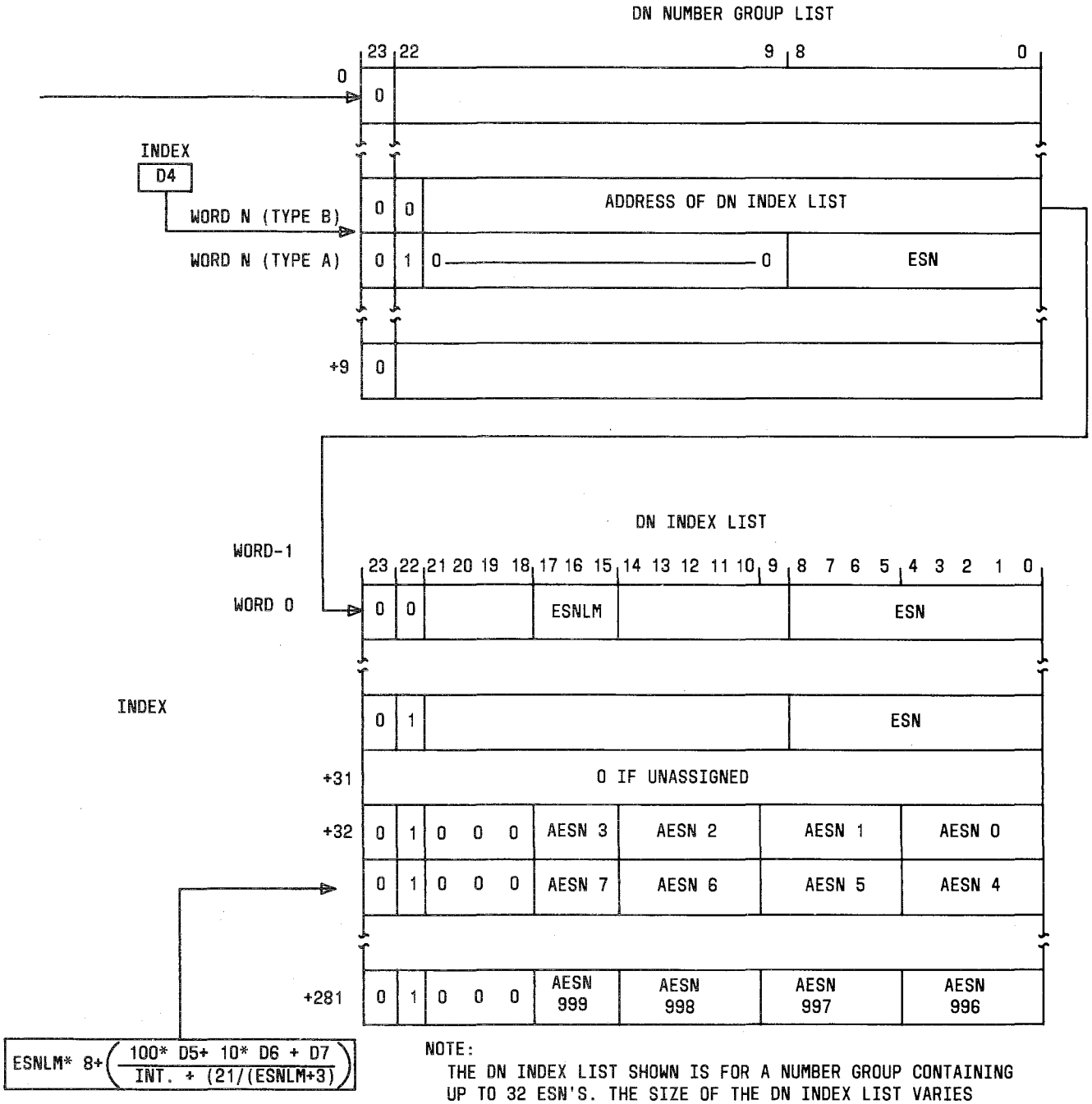
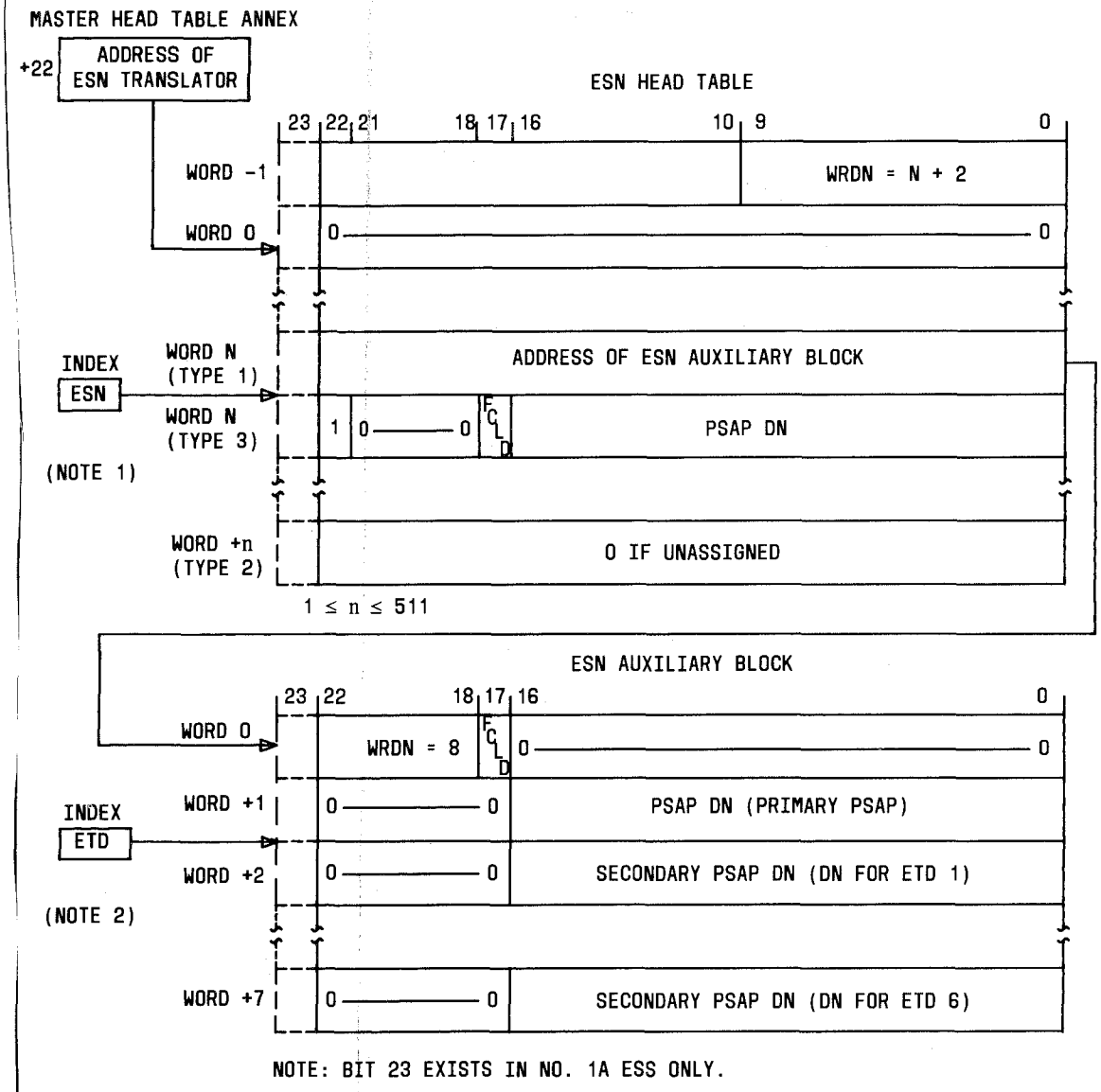


Fig. 8—No. 1A ESS NPD Translator for 1AE6 and Later Generic Programs



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

NOTES:
1. THE TYPE 3 WORD IS BUILT WHEN SELECTIVE TRANSFER DOES NOT APPLY.
2. FOR THOSE WORDS (2 THROUGH 7) THAT DO NOT DEFINE AN ETD VALUE, THE CORRESPONDING WORD SHOULD CONTAIN ALL ZERO ENTRIES.

ESN HEAD TABLE WORDS

WORD -1	WRDN	- NUMBER OF WORDS IN THE HEAD TABLE. THE VALUE OF N SHOULD BE EQUAL TO OR LESS THAN 511.
WORD 0		- ALWAYS BUILT AS ALL ZEROS
WORD N (TYPE 1)		- ADDRESS OF AN AUXILIARY BLOCK FOR THE ESN WHEN SELECTIVE TRANSFER IS PROVIDED.
WORD N (TYPE 2)		- THE TYPE 2 WORD IS BUILT FOR ALL UNASSIGNED ESN NUMBERS THAT ARE LESS THAN THE HIGHEST ASSIGNED ESN NUMBER.
WORD N (TYPE 3) (NOTE 1)	FCLD	- FLASH CALLING LINE DISPLAY (FCLD = 1 IF THE PSAP IS ARRANGED FOR FCLD; OTHERWISE FCLD = 0.)
	DN	- DIRECTORY NUMBER OF PSAP

ESN AUXILIARY BLOCK WORDS

WORD 0	WRDN	- THE NUMBER OF WORDS IN THE AUXILIARY BLOCK IS ALWAYS EIGHT.
	FCLD	- FLASH CALLING LINE DISPLAY
WORD 1	DN	- DIRECTORY NUMBER OF PRIMARY PSAP
WORDS 2-7	DN	- DIRECTORY NUMBERS CORRESPONDING TO EMERGENCY TRANSFER DIGITS (ETD) 1 THROUGH 6 AS ASSIGNED FOR SELECTIVE TRANSFER SERVICES TO ONE OR MORE SECONDARY PSAPs. (NOTE 2)

FIRST DIGIT	NPD	FCLD
0	0	0
1	1	0
2	2	0
3	3	0
4	0	1
5	1	1
6	2	1
7	3	1
8 (Not used)		
9 (Not used)		

Note: If a call requiring special attention is subsequently transferred to a secondary PSAP equipped with ANI display, the same ANI information including the first digits is sent to the secondary PSAP.

I. PSAP DN Translations

3.24 The PSAP DN obtained from the ESN translator is translated via DN translations. The DN subtranslator (word type 7) contains the address of the 911 DN auxiliary block. Refer to Fig. 10 for data contained in the 911 DN auxiliary block. Any DN may be assigned as a valid PSAP DN. The four standard types of DN assignments recommended are as follows:

(a) DN with a terminating major class of 3 and a program index of 3 for a nonringing PSAP. This type may be used when providing expanded 911 service. Each PSAP should have only one such DN.

(b) DN with a terminating major class of 28 and a program index of 3 for a ringing PSAP. Generally, ringing PSAPs are associated with B911 service; however, the E911 tandem office can also route calls to a ringing PSAP.

(c) DN with a terminating major class of 3 and a program index of 1 for incoming maintenance test calls over dedicated E911 incoming trunks arranged for ANI operation. Refer to paragraph 3.05.

(d) DN with remote call forwarding major class that routes to another PSAP (eg, a small town fire-house) served by another office. This DN should not be part of a centrex group.

3.25 The RI in word 0 (Fig. 10) is the RI assigned for the outgoing dedicated 911 trunk group to the particular PSAP. The terminating major class data indicates either a PSAP without ringing (TMAJ = 3) or a PSAP with ringing (TMAJ = 28). The program index equals three (PIND = 3) for 911 service.

3.26 With TMAJ = 3 and PIND = 3, the DN auxiliary block may optionally contain the CFBL word (word 2). If CFBL is specified, the special line format may also be specified with a make-busy MSN and the busy sense (BS) option indicator (ie, no MTDNs allowed). The CFBL and make-busy MSN options may be arranged to provide the following call forwarding services.

(a) Night service and/or power failure call forwarding—Forwards calls to the CFBL DN only if the MSN is made busy due to either night service or a PSAP power failure. For this option, the items specified are CFBL and CFILB = 1, and the MSN is specified in word 3.

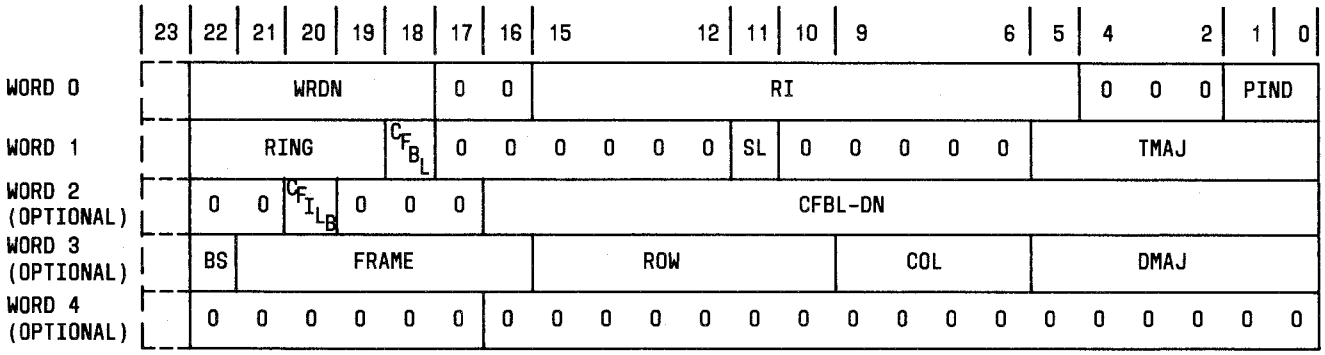
(b) Traffic busy forwarding only—Forwards calls to the CFBL DN only if the PSAP is traffic busy. For this option, the items specified are CFBL and CFILB = 0 (and no MSN specified in word 3).

(c) Night service/power failure and traffic busy forwarding—Forwards calls to the CFBL DN if either the MSN is made busy (night service/power failure) or the PSAP is traffic busy. The same CFBL DN is used for either condition. For this option, the items specified are CFBL and CFILB = 0, and the MSN is specified in word 3.

Note: Call forwarding for E911 PSAPs will accommodate the usual five levels of forwarding. No detailed or usage sensitive billing is available. Also, if a PSAP is transferring a 911 call to another PSAP and the forwarding mechanism routes the call back to the transferring PSAP, the E911 tandem office provides overflow tone.

J. Route Index (RI) Expansion

3.27 The RI obtained from the 911 DN auxiliary block must be expanded to obtain trunk group data. Regular RI expansion is done via a 2-word RI expansion table indexed using the RI assigned for the PSAP DN. Refer to Fig. 11. In word 0, the next RI equals stop and the TGN is assigned. Item TROK (transfer okay) equals one (TROK = 1), if central office transfer is provided; otherwise, TROK = 0. DEL



NOTES:
1. BIT 23 EXISTS IN NO. 1A ESS ONLY.
2. WORDS 3 AND 4 ARE BUILT AS A PAIR (WORD 4 = ALL ZEROS) WHEN BUSY SENSE IS USED.

WORD 0 WRDN = WORD NUMBER (2, 3, OR 5)
RI = ROUTE INDEX ASSIGNED FOR AN E911 OUTGOING PSAP TRUNK GROUP
PIND = PROGRAM INDEX EQUALS 3 FOR 911 SERVICE

WORD 1 RING = RINGING CODE ASSIGNED FOR A 911 TRUNK GROUP
CFBL = CALL FORWARD BUSY LINE (EQUALS 1 IF CFBL OPTION IS PROVIDED)
SL = SPECIAL LINE
TMAJ = TERMINATING MAJOR CLASS EQUALS 28 FOR RINGING PSAP OR 3 FOR NON-RINGING PSAP

WORD 2 (OPTIONAL WORD BUILT WHEN CFBL IS SPECIFIED IN WORD 1)
CFILB = CALL FORWARD INHIBIT LINE BUSY
CFBL-DN = CALL FORWARD BUSY LINE DIRECTORY NUMBER

WORD 3 (NOTE 2) BS = BUSY SENSE (EQUALS 1 IF REVERSE MAKE BUSY IS SPECIFIED) MAKE BUSY MSN OPTIONS MAY BE USED FOR NIGHT SERVICE AND/OR TRAFFIC BUSY FORWARDING.
FRAME = MASTER SCANNER FRAME
ROW = MASTER SCANNER ROW
COLUMN = MASTER SCANNER COLUMN
DMAJ = DISPLACED MAJOR CLASS. IF WORD 3 IS BUILT, TMAJ DATA FROM WORD 1 IS PLACED IN THIS FIELD AND THE TMAJ ITEM IN WORD 1 IS SET TO 2

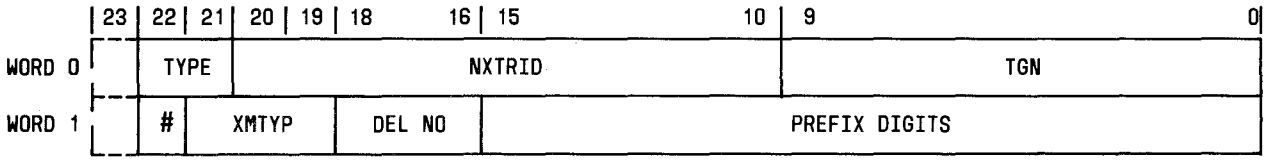
Fig. 10—911 DN Auxiliary Block Data for E911 PSAP

NO (digits deleted), and prefix digits equal zero. If the RI expansion is for a PSAP without ANI display, item XMTYP (transmitter type) equals zero. If the RI expansion is for a PSAP with ANI display, item XMTYP equals one.

K. Dedicated E911 PSAP Trunk Translations

3.28 Regular TGN and TCC translations are required for dedicated E911 outgoing trunks to PSAPs. Standard trunk translations are used. Figure 12 shows the TCC expansion data. For detailed translation requirements and data structures for these trunk circuits, refer to items D(1) through D(3) in Part 7.

3.29 When a PSAP is provided central office transfer service, the trunk group must be a centrex tie trunk group with a screening LEN. Word 1 in the TGN auxiliary block is marked as trunk group type six (TGTYP = 6) and the screening LEN is marked in word 2. The screening LEN auxiliary block is marked for attendant major class and release link operation. Otherwise, if the PSAP is not provided



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

= TROK

WORD 0 TYPE – TYPE = 10 FOR E911
NXTRID – NEXT ROUTE INDEX = STOP FOR E911
TGN – TRUNK GROUP NUMBER

WORD 1 TROK – TRANSFER OKAY = 1 FOR E911
XMTYP – TRANSMITTER TYPE = 000 (MANUAL SEIZURE) FOR PSAP WITHOUT CALLING LINE DISPLAY. XMTYP = 001 (MULTI-FREQUENCY) FOR PSAP WITH CALLING LINE DISPLAY
DEL NO – DIGITS DELETED = 000 FOR E911
PREFIX DIGITS – NOT USED (=0) FOR E911

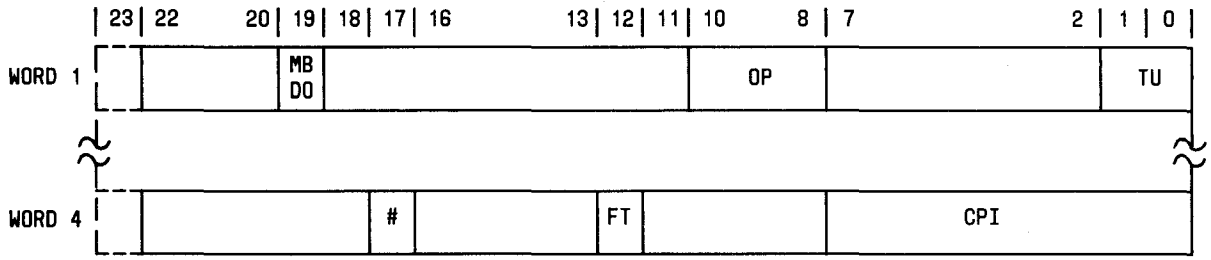
Fig. 11—RI Expansion Data for E911 Service

central office transfer service, the trunk group can be marked as TGTYP = 1 (1-way outgoing) in the TGN auxiliary block.

L. Centrex Data for PSAPs

3.30 Central office transfer service requires centrex translations for the E911 PSAPs with transfer service. Centrex translations are required to implement call transfer service for those E911 trunk groups to E911 PSAPs requiring call transfer. Trunk dial transfer (TDT) is provided for those E911 PSAP trunk groups. Excluding any special dialing plan considerations, all PSAPs in the E911 service area can belong to the same centrex groups. For a detailed description of the centrex common block items and data structure, refer to items D(1) through D(3) in Part 7. The LDN contained in word 0 may be the DN for a particular PSAP or may be some other DN assigned for the customer group. The PSAP trunks are assigned screening LENs, which may be provided selective, fixed, or manual dial transfer. Since these E911 trunks are in a centrex trunk group and "9+" dialing is not desirable for PSAP attendants, "assume dial 9" service is used. Because of this, the initial digits 0 through 9 all translate to data type 4. Thus the only initial digits usable for other features and/or dialing patterns are *(digit 11) and #(digit 12). The digit 11 (*) is used as the initial digit of assigned centrex extension numbers for secondary PSAPs. Furthermore, if the PSAP DNs are nondialable, the speed calling codes of the PSAPs must translate to the centrex extension number. Otherwise, if they translate to a regular DN, the call will not complete since the DNs are nondialable.

3.31 When selective and/or dial transfer services are provided, the call transfer individual (CTI) and call transfer unlimited (CTU) item must be marked (CTI = 1, CTU = 1) in word 1 of the centrex



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

ITEM OGT-ESB

WORD 1 TU = TRUNK USAGE
OP = OUTPULSING
MBDO = MAKE-BUSY DISTANT OFFICE

WORD 4 CPI = CIRCUIT PROGRAM INDEX
FT = FLASH TIMING
OGT-ESB = OUTGOING TRUNK TO EMERGENCY SERVICE BUREAU (OGT TO PSAP)

Fig. 12—TCC Expansion Data for Dedicated E911 Outgoing Trunks to PSAPs

common block. Another use of CTI is available. Call transfer outside (CTO) already allowed the controlling party to add a direct outward dialed (DOD) call to either a direct inward dialed (DID) or DOD call. The added option (valid only if CTO = 1) allows the controlling party to abandon after adding a DOD call to a DID call without disconnecting both parties. When this option is provided, item CTDD (call transfer DID or DOD) in word 20 is set (CTDD = 1).

3.32 The selective transfer service uses the data type 5, subtype 5, sub-subtype 3 (DTYP5, STYP5, SSTYP3) for the access code in the centrex digit interpreter table. The selective transfer access code (in the form of *1X) includes the ETD (emergency transfer digit = X) which is translated via the ESN auxiliary block (Fig. 9). The form *1X is used where X = 1≤ ETD ≤ 6.

3.33 The 2-digit speed calling feature uses the DTYP5, STYP2, SSTYP0 as the access code. Speed calling codes *2X, *3X, and/or *4X may be used for manual dial transfer using the speed calling feature. Fixed transfer uses the speed calling code *2X only.

3.34 The secondary PSAP DNs can be part of the centrex extension range either as DTYP2 or DTYP6 entries. Speed calling entries for secondary PSAPs must have the PSAP centrex extensions listed, not the PSAP DNs. For example, if *23 is the speed calling code assigned for the PSAP DN 727-6601, then the 5-digit centrex extension entry is *6601. If a secondary PSAP has ANI display, the original ANI will be sent to the secondary PSAP for transferred 911 calls.

M. Parameters/Call Store

3.35 The E911 feature requires parameters to provide call store memory for:

- E911 call registers
- Traffic and error counts for 911 calls
- Peripheral processor request data. (This call store memory is required only when a PDSP is used to store the TN-to-ESN data for a No. 1 ESS E911 tandem office.)

For detailed parameter and call store information, refer to items D(4) through D(6) in Part 7.

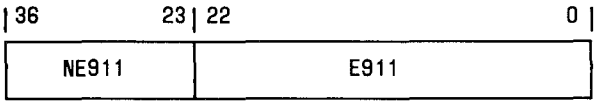
N. E911 Call Registers

3.36 E911 call registers are specified by parameter word I4E911. Refer to Fig. 13. Parameter word I4E911 is located in the I4REGS table at I4REGS+17. I4REGS is a table of pointers to variable call store

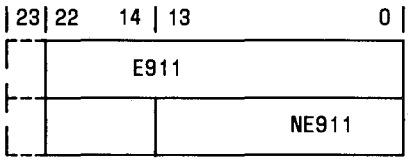
giving the start address of each register type and the number of registers. Set card NE911 defines the number of E911 call registers specified by parameter I4E911. If NE911 equals zero, I4E911 data equals zero. Otherwise, the I4E911 data is as follows:

14 = NE911, 23 = E911

where NE911 is the number of call registers and E911 is the call store address of a call store block of size 9* NE911. NE911 = 1 plus the number of outgoing trunks to E911 PSAPs.



A. NO. 1 ESS I4E911 DATA (PROGRAM STORE)



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

B. NO. 1A ESS I4E911 DATA (UNDUPLICATED CALL STORE)

ITEM	DESCRIPTION
NE911	= NUMBER OF 9-WORD E911 CALL REGISTERS
E911	= CALL STORE ADDRESS OF E911 CALL REGISTER MEMORY BLOCK

Fig. 13—Parameter Word 14E911

3.37 E911 registers are used to complete all 911 calls to an E911 PSAP. An E911 register is used for the duration of a 911 call. The register contains state, queue, link, scan, path memory, ANI, and other related information for a 911 call. See Fig. 14 for the E911 call register data layout.

O. E911 Traffic and Error Data Block

3.38 A block of variable call store memory is required to record traffic and error counts for E911 service. When feature package 9FE911 is loaded, parameter word E9TFCT (Fig. 15) contains the call store address of the third word (word 0) of a 24-word call store table. The E911 feature package set card is 9FE911. If 9FE911 equals zero, E9TFCT equals zero. If 9FE911 equals one, E9TFCT data is as follows:

14 = 0, 23 = csadr + 2

where csadr is the address of a 24-word call store block.

3.39 The variable call store block for E911 traffic is used to control the printing of the EN01 (E911 error) output message and to collect the counts that are printed as EN02 (E911 error counts) and EN03 (E911 traffic counts) output messages. Refer to Fig. 16. The odd-numbered words are counts pertaining to the TGN being monitored. Then even-numbered words are total office counts minus the counts pertaining to the TGN being monitored. Therefore, for E911 traffic, the total traffic count for the office is the total of the odd plus even word counts in the register. Refer also to item A(2) in Part 7.

P. No. 1 ESS Memory for PDSP

3.40 When a PDSP is used to provide TN-to-ESN data for a No. 1 ESS E911 tandem office, the processor interface unit (PIU) feature is required. The PIU serves as a data buffer for the directional communications (request and data) between the No. 1 ESS and the PDSP. The PIU is coupled to the No. 1 ESS call store bus. For a description of the PIU interface feature, refer to item A(22) in Part 7.

3.41 When a PDSP is used, feature package 9FPIU is loaded in the generic program. Parameters are required for the PIU interface. Two parameter words required for the PIU interface, but not unique to E911 service, are P2PPMSG and P2PPMC.

(a) Parameter word P2PPMSG (Fig. 17) is used to build peripheral processor message blocks in variable call store to receive incoming messages (data) from the PIU. Set card PPMB specifies the number of message blocks to be built. Parameter word P2PPMSG contains the number of message blocks (PPMB), block size (BLKSZ = 7), and the call store address of the first message block.

(b) Parameter word P2PPMC (Fig. 18) is used to build a block of call store (referred to as a box block), which provides for peripheral processor message block control data. Data in the box block controls the use of the peripheral processor message blocks pointed to by P2PPMSG. Control data

	23	22	21	20 17	16	15	14	13 12	11 9	8	7 4	3 1	0
WORD 0	0	Y4P MAD	Y4RI = 21			Y4 TOA	Y4 LI	Y4PMFI		Y4 TO	Y4PT		Y4 QI
WORD 1	0	Y4QUE											
WORD 2	0	Y4 MR	Y4 RW	Y4 CI	Y4LINK								
WORD 3	0	Y4SCAN											
WORD 4	0	Y4PMA0											
WORD 5	0	Y4PMA1											
WORD 6	0	Y4 TS		E9 TGN		E9DN							
WORD 7	0	E9 CH OKE	E9A REG	E9ESN					E9 DS1	E9 DS2		E9 DS3	
WORD 8	0			E9DS8		E9DS4			E9DS5	E9DS6		E9DS7	

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

WORD DESCRIPTIONS FOR THE E911 REGISTER

WORD 0 (STATE WORD)
Y4PMAD - PATH MEMORY ANNEX DISPLACED (EQUALS ONE IF PATH MEMORY IS DISPLACED)
Y4RI - REGISTER IDENTIFIER (INDEX FOR TABLE CONTAINING PROGRAM TAG TABLE WORD)
Y4TOA - TIME OUT ACTIVITY (USED BY PIDENT SARG)
Y4LI - LINK INDICATOR
Y4PMFI - PATH MEMORY FORMAT INDICATOR
Y4TO - TIME OUT INDICATOR (USED BY PIDENT SARG)
Y4PT - PROGRAM TAG
Y4QI - QUEUE INDICATOR

WORD 1 (QUEUE WORD)
Y4QUE - LINK TO NEXT REGISTER WHEN QUEUEING

WORD 2 (LINK WORD)
Y4MR - MASTER REGISTER INDICATOR
Y4RW - REQUEST WAITING
Y4CI - CONDITIONAL INHIBIT BIT
Y4LINK - LINK WORD (CONTAINS ADDRESS OF REGISTER LINKED TO RIGHT IF Y4LI = 1)

WORD 3 (SCAN WORD)
Y4SCAN - SCAN WORD

WORD 4 (PATH MEMORY ANNEX ZERO WORD)
Y4PMA0 - PATH MEMORY ANNEX ZERO

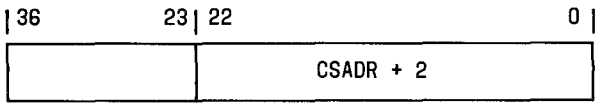
WORD 5 (PATH MEMORY ANNEX ONE WORD)
Y4PAM1 - PATH MEMORY ANNEX ONE

WORD 6
Y4TS - TRUNK STATE BIT
E9TGN - TGN BEING MONITORED FOR PROBLEMS
E9DN - THE DIRECTORY NUMBER ASSOCIATED WITH THIS PSAP

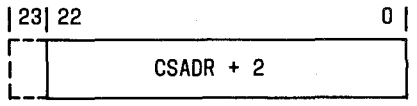
WORD 7
E9CHOKE - LOCAL CHOKE IS ACTIVE ON THIS CALL
E9AREG - THERE IS ANOTHER E911 REG. ON THE CALL
E9ESN - THE EMERGENCY SERVICE NUMBER ASSOCIATED WITH THIS CALL
E9DS1 -
E9DS2 - } DIGIT SLOTS ONE, TWO, AND THREE FOR ANI INFORMATION TO BE SENT TO THE PSAP
E9DS3 -

WORD 8
E9DS8 -
E9DS4 -
E9DS5 - } DIGIT SLOTS FOUR THROUGH EIGHT FOR ANI INFORMATION TO BE SENT TO THE PSAP
E9DS6 -
E9DS7 -

Fig. 14—E911 Call Register



A. NO. 1 ESS E9TFCT DATA (PROGRAM STORE)



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

B. NO. 1A ESS E9TFCT DATA (UNDUPLICATED CALL STORE)

ITEM CSADR + 2 IS THE CALL STORE ADDRESS OF THE THIRD WORD OF A 24-WORD CALL STORE TABLE FOR E911 TRAFFIC AND ERROR COUNTS.

Fig. 15—Parameter Word E9TFCT

in the box block is used to identify message confirmations received after a message is sent to the PIU and for retaining requests for message blocks when none are idle. The P2PPMC control data controls the transfer of data from the PDSP (via the PIU) to the appropriate No. 1 ESS application program(s). Parameter word P2PPMC, specified by set card PPMC, contains the number of words (length = 15) in the call store box block (control block) and the call store address.

3.42 Parameter word P2PPRB (Fig. 19) is provided when feature packages 9FPIU and 9FE911 are loaded in the generic program. P2PPRB builds a block of variable call store used to buffer No. 1 ESS processor requests for data from the PDSP. Set card PPRB specifies the number of simultaneous requests allowed for E911 data from the PDSP. If a PDSP is not used for E911 service, item PPRB equals zero. When a PDSP is used for E911 service, item PPRB equals ten (PPRB = 10). Item csadr is the address of the call store block of size 4*PPRB+2.

3.43 The call store message buffer formats for No. 1 ESS requests to and replies from the PDSP (via the PIU) for E911 TN-to-ESN data and ESN verification data are shown in Fig. 20. For detailed information concerning the PDSP and PIU, refer to items A(6), A(9), and A(13) through A(22) in Part 7 of this document.

4. FUNCTIONAL DESCRIPTION

E911 OPERATION

4.01 The E911 tandem office completes 911 calls received from local offices and 911 calls originated by local customers served by the E911 tandem office. As with any other call, the call processing includes the originating phase, the terminating phase, and the disconnect phase. In addition, when selective routing is provided, selective routing may be considered as a separate phase.

4.02 The originating phase includes digit reception and translations required to determine the call type, rate and route pattern, and initial routing information. Selective routing provides the primary PSAP DN associated with the calling station's ANI TN. The terminating phase includes the final routing and connection based on the ESN, DN, RI, and trunk translations to complete the call to a particular PSAP via a dedicated E911 outgoing trunk group. The disconnect phase includes supervision of the established connection. Disconnect actions depend on whether the 911 call is a local or tandem call and whether the calling party or the PSAP attendant disconnects first. In this description of feature operation, PSAP call transfer and maintenance test calls are discussed after the descriptions of the originating, selective routing, terminating, and disconnect phases for an E911 call.

A. Call Origination

E911 Tandem Office Trunk Originated 911 Call

4.03 The E911 tandem office is capable of processing incoming 911 traffic from step-to-step (SXS), panel, crossbar, and ESS local offices. The incoming 911 traffic from local offices may be received via either dedicated E911 trunks equipped for ANI operation or regular message network trunks.

(a) If 911 calls from a local office are to be selectively routed and/or are routed to a PSAP with ANI display, the incoming 911 calls from that local office must be over dedicated E911 trunks arranged for ANI transmission. This is necessary because the ANI information provides the ANI TN used for both selective routing and for the ANI display. If the ANI does not provide a TN or if there is an ANI failure, the 911 call can be routed to a default ESN based on the incoming trunk group.

If the ESCO translator indicates that selective routing does not apply, the default ESN is used to route the call. Paragraphs 3.02 through 3.05 describe the translations for a 911 call via an E911 dedicated trunk group.

(b) If all 911 calls from a local office are to be routed to the same ESN and ANI display is not provided, the incoming 911 calls from that local office can be received via regular message network trunks since ANI information is not required. This is not a recommended arrangement, however, since it does not provide the service protection for 911 calls that is provided by using dedicated trunks for the E911 network. The 911 calls that are received over message network trunks are typically routed (on a per incoming trunk group basis) to the default ESN obtained from the ESCO translator. Exceptions to this are message network trunks which have either AIOD or CAMA ANI operation and tie trunks with screening LENs. This more detailed routing occurs only if selective routing translations are provided for the ESCO assigned for a particular trunk group. With CAMA ANI, the ANI TN and the ESCO are used to obtain the correct PSAP ESN. With AIOD, either the AIOD billing TN or else the trunk group billing TN and the ESCO, or just the ESCO, can be used to obtain the ESN. For customer tie trunks, the billing TN associated with the screening LEN is used to obtain the PSAP ESN. In general, for 911 calls received via message network trunks, the ESCO from 3/6-digit translations is used unless the TGN has the supplementary TGN Q option word with item ESCO $\neq$ 0, in which case the ESCO in the Q option word is used.

4.04 Several different signaling combinations are possible, depending on the type of incoming trunk and the type of local office routing 911 calls to the E911 tandem office. TGN and TCC translations are discussed in paragraphs 3.02 through 3.08. The dedicated E911 incoming trunks may be immediate dial dial pulse (DP) trunks for bylink operation or MF trunks for nonbylink operation. The dedicated E911 outgoing trunks from local offices are the same as would be used for outgoing CAMA trunks. The format of the ANI, which a local office sends to an E911 tandem office, is the same format as used for an outgoing call to a TSPS. Primed start pulses, as allowed by these formats, are accepted as start pulses by an E911 tandem office; however, an E911 tandem office does not require primed start pulses. Sometimes a local office is equipped with excess TSPS type outgoing trunks, which could be reassigned for use as dedicated E911 outgoing trunks.

(a) E911 dedicated trunks from non-SXS offices are incoming MF type trunks equipped for MF ANI operation. On these type trunks, a 911 call is recognized when any of the following digit combinations are received.

- KP—911—ST + ANI (typical from No. 5 X-Bar)
- KP—11—ST + ANI (preferred from ESS because 10X test codes can be used for testing)
- KP—1—ST + ANI (possible from ESS)
- Direct seizure + ANI (typical from panel or No. 1 X-Bar, CAMA or LAMA)

(b) E911 dedicated trunks from SXS offices are always bylink incoming trunks equipped for MF ANI operation. On these type trunks, a 911 call is recognized when any of the following digit combinations are received.

- 911 + ANI (possible from senderized SXS)
- 11 + ANI
- 1 + ANI
- Direct seizure + ANI (bylink trunks are not required in this case).

Note: For any given trunk group, only one digit combination is allowed.

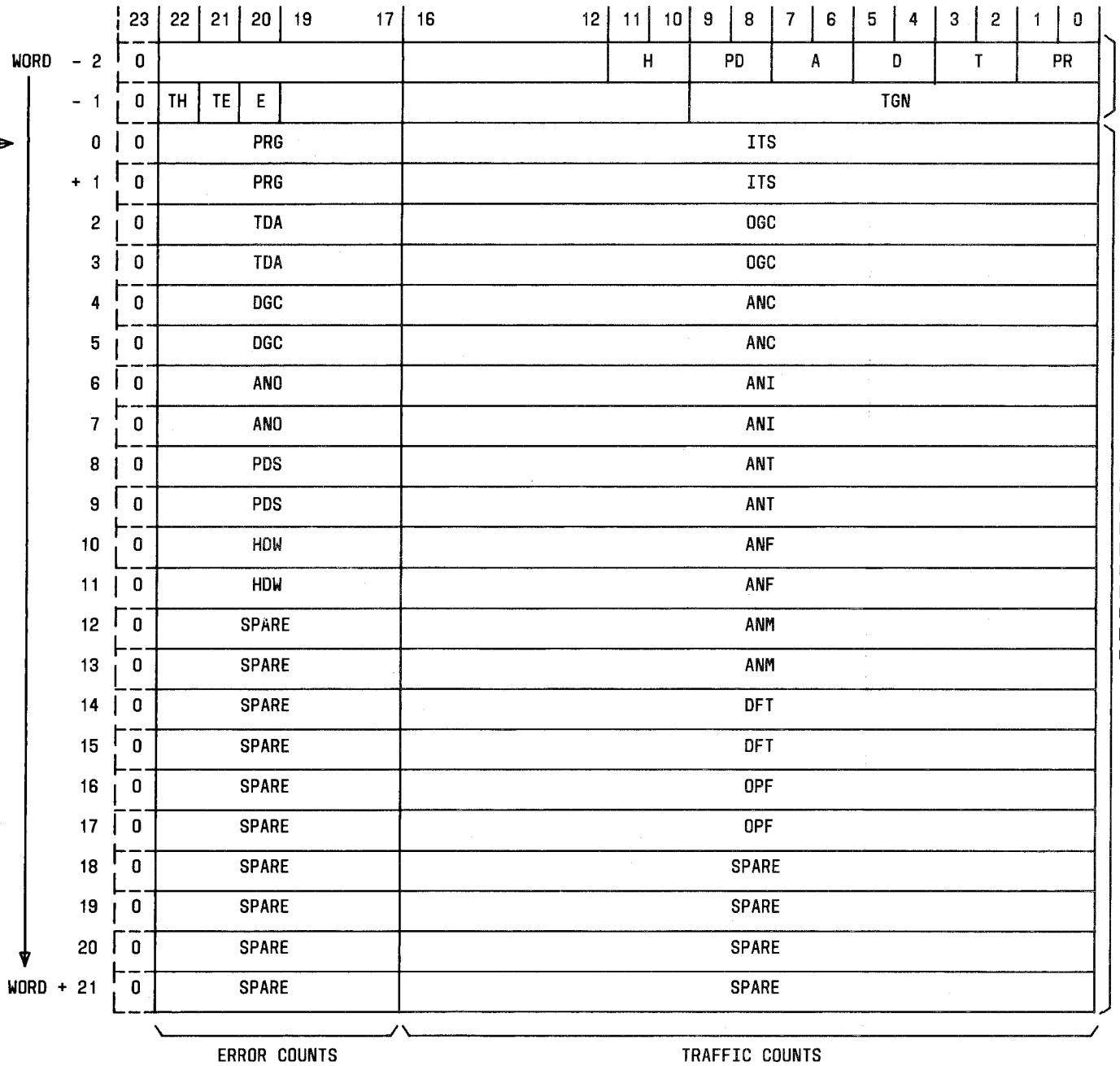
(c) 911 calls originating via nondedicated message network trunks are detected as normal seizures with 911 or 11 being received to indicate a 911 call as discussed in paragraph 3.06. The digits "11" can only be received via those tandem trunks for which one "X11" code can be associated. Manual seizure trunks are direct trunks to the E911 tandem office requiring no digits and no ANI to be sent.

4.05 The originating phase is described according to the type of trunk and type of inpulsing signal received. The possible digit sequences received over dedicated E911 trunks are:

- MF digits + MF ANI (only from non-SXS offices)

PARAMETER E9TFCT

CALL STORE ADDRESS



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

WORD -2 - THIS WORD DETERMINES WHAT ACTIONS TO TAKE
IF AN E911 ERROR OCCURS.

PR - PROGRAM ERROR (ITEM PRG)
T - TRANSLATION ERROR (ITEM TDA)
D - DIGIT COLLECTION ERROR (ITEM DGC)
A - ANI OUTPULSING ERROR (ITEM ANO)
PD - PERIPHERAL DATA STORAGE PROCESSOR ERROR (ITEM PDS)
H - HARDWARE ERROR (ITEM HDW)

ACTION TAKEN IF VALUE EQUALS:
0 = DON'T PRINT AN ENO1 OUTPUT MESSAGE IF AN ERROR OCCURS.
1 = PRINT AN ENO1 OUTPUT MESSAGE IF AN ERROR OCCURS AND DUMP ONE CALL REGISTER.
2 = PRINT AN ENO1 OUTPUT MESSAGE IF AN ERROR OCCURS AND DUMP UP TO TWO CALL REGISTERS.
3 = PRINT AN ENO1 OUTPUT MESSAGE, BUT DON'T DUMP ANY REGISTERS.

WORD -1

TH - ITEM TGN-HERE MEANS THAT A PARTICULAR E911 TRUNK GROUP IS BEING MONITORED
TE - ITEM TGN-ENO1 MEANS THAT IF TH=1 AND TE=1, THE ENO1 OUTPUT MESSAGE SHOULD BE PRINTED IF AN ERROR OCCURS ON THE TRUNK GROUP BEING MONITORED.
E - ITEM ENO3-HRLY, IF EQUAL TO ONE, INDICATES THAT ENO3 OUTPUT MESSAGE SHOULD BE PRINTED HOURLY. IF EQUAL TO ZERO, THEN ENO3 OUTPUT MESSAGE SHOULD BE PRINTED DAILY.
TGN - TRUNK GROUP NUMBER BEING MONITORED WHEN ITEM TH EQUALS ONE.

WORDS 0 THROUGH 17 - THESE WORDS STORE THE ERROR AND TRAFFIC COUNTS FOR OUTPUT MESSAGES ENO1, ENO2, AND ENO3.

ERROR COUNT ITEMS
PRG - PROGRAM ERROR COUNT
TDA - TRANSLATION ERROR COUNT
DGC - DIGIT COLLECTION ERROR COUNT
ANO - ANI OUTPULSING ERROR COUNT
PDS - PERIPHERAL DATA STORAGE PROCESSOR ERROR COUNT
HDW - HARDWARE ERROR COUNT

TRAFFIC COUNT ITEMS
ITS - DEDICATED E911 INCOMING TRUNK SEIZURES
OGC - NUMBER OF ORIGINATING E911 CALLS
ANC - VALID DIGIT RECEIVED
ANI - ANI INFORMATION DIGIT INDICATES ANI FAILURE
ANT - ANI TIME OUT OCCURRED WHILE COLLECTING ANI
ANF - ANI DID NOT AGREE WITH ANI FORMAT
ANM - ANI INFORMATION DIGIT INDICATES MULTIPARTY OR QZ BILLING
DFT - NUMBER OF E911 CALLS ROUTED TO DEFAULT ESBS DUE TO SYSTEM PROBLEMS
OPF - NUMBER OF FAILURES TO OUTPULSE ANI TO ESBS

Fig. 16—E911 Traffic and Error Call Store Data Block

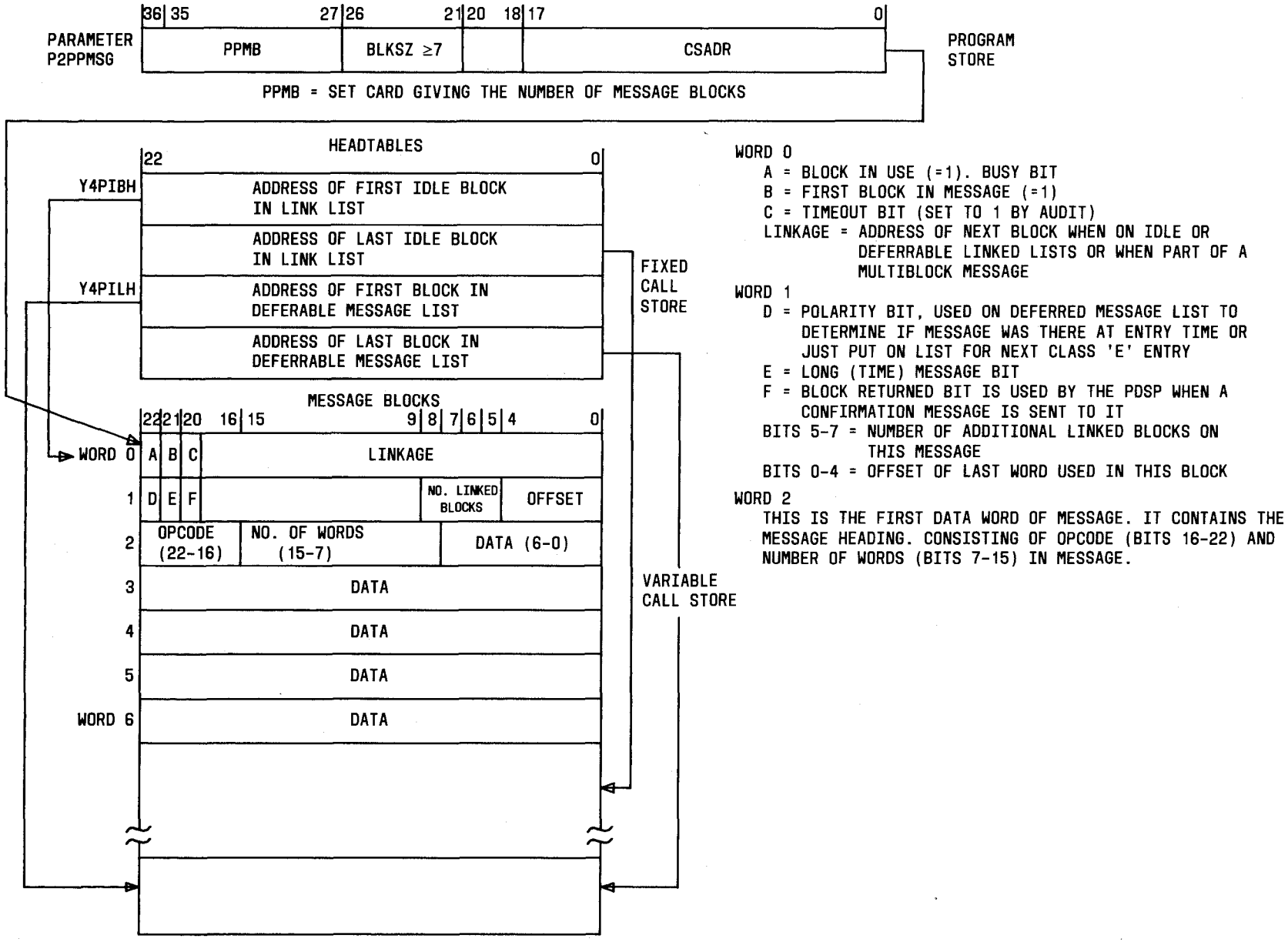


Fig. 17—Parameter Word P2PPMSG and Associated Call Store Message Blocks

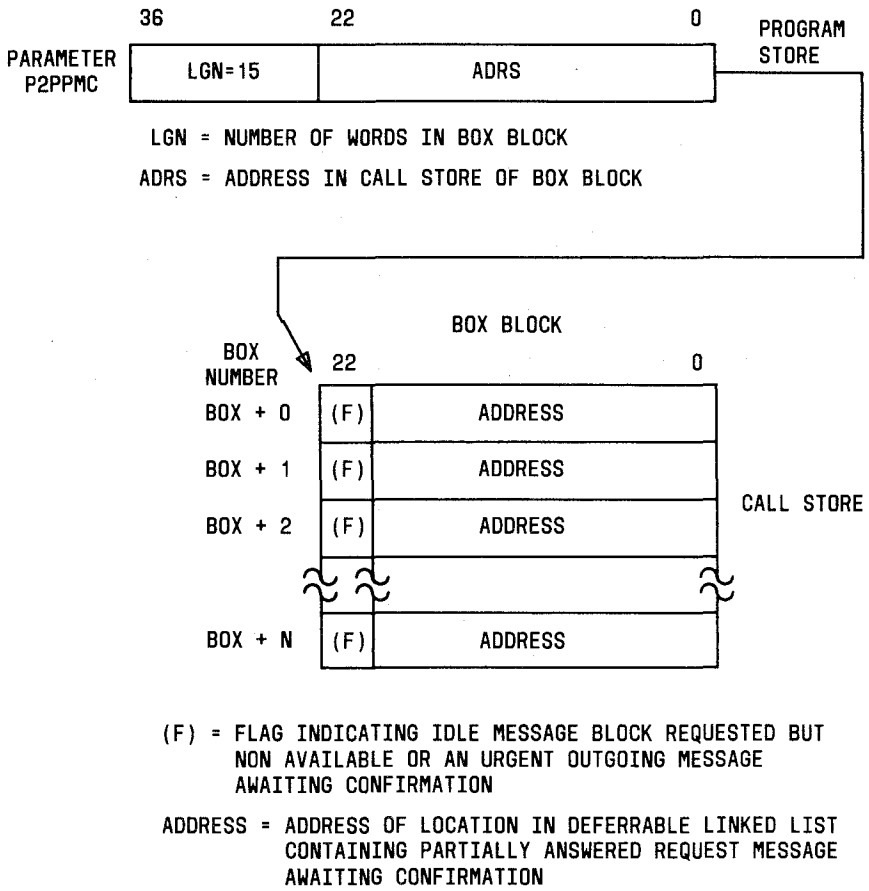


Fig. 18—Peripheral Processor Message Block Control Parameter P2PPMC and Associated Pointers

- DP immediate dial digits + MF ANI (only from SXS offices)
- Direct seizure + MF ANI (from either SXS or non-SXS offices).

4.06 ***MF Digits Followed by MF ANI***—The E911 tandem office detects the seizure on a dedicated 911 incoming trunk and bids for an idle MF receiver. If the local office times out before the E911 tandem office can seize and connect an idle MF receiver, the local office will return reorder tone to the calling party and will send an on-hook signal (indicating trunk release) to the E911 tandem office. Otherwise, if an idle MF receiver is connected prior to local office time-out, the normal sequence of events occurs as discussed below. Actions due to failure modes are described where appropriate.

(1) After seizure, the E911 tandem office attaches an MF receiver, sends the start pulsing signal (wink signal) to the local office, and begins standard PSPD timing for receipt of the digits. If PSPD time-out occurs, the incoming 911 trunk is put on the high and wet list. Otherwise, the digits are received before the PSPD time-out.

(2) After the digits are received, the E911 tandem office transmits the ANI start pulsing signal (steady off-hook) and begins 8- to 9-second timing for receipt of the complete ANI information. If time-out occurs prior to receiving complete ANI information, the E911 tandem office completes the call as an ANI failure. An ANI failure causes the call to be routed to the default ESN associated with the ESCO assigned for the incoming trunk group. Refer to paragraphs 3.03 and 3.13. Otherwise, the complete ANI information is received prior to time out.

(3) After receiving the ANI information, the E911 tandem office processes and routes the call

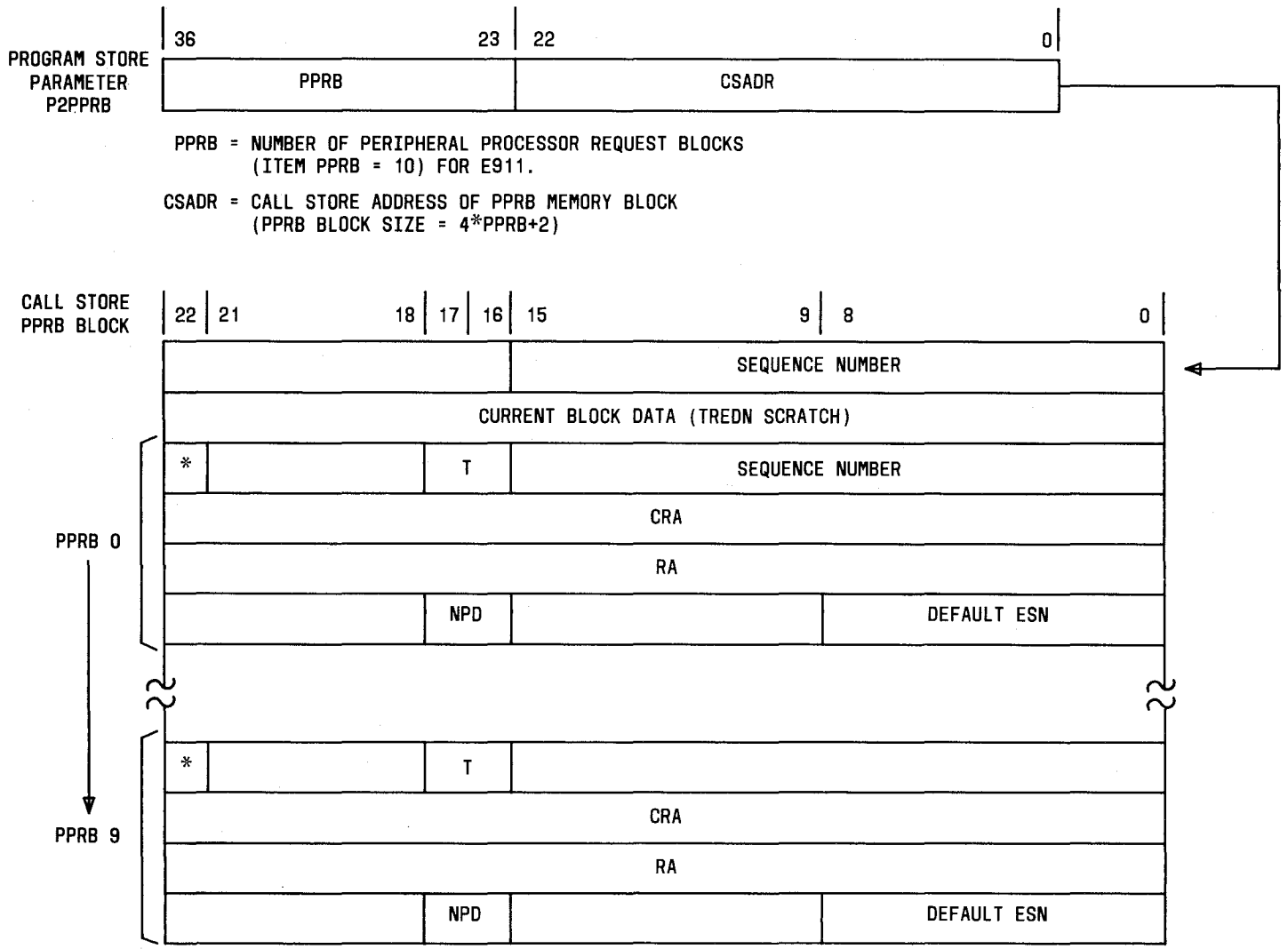


Fig. 19—Parameter Word P2PPRB and Call Store PPRB Memory Block

according to the ESCO, the NPD and ANI TN obtained from translations. Refer to paragraphs 3.02 through 3.04. Selective routing, the terminating phase, and the disconnect phase are discussed in subsequent paragraphs. After call completion, the call is supervised for disconnect and for a PSAP transfer request (if transfer service is provided).

4.07 ***Dial Pulse Immediate Dial Digits Followed by MF ANI***—The E911 tandem office detects the seizure on the incoming bylink trunk and sets up for immediate digit collection and begins PSPD timing for permanent signal or early dial. If time-out occurs due to a permanent signal or early dial is detected, the incoming 911 trunk is connected to reorder tone, and if disconnect is not received, the incoming trunk is eventually put on the high and wet list. Otherwise, after reception of the dial pulse digits (ie, 1 or 11), the E911 tandem office attempts to connect an MF receiver.

(1) If an MF receiver is not available, the E911 tandem office sends the steady off-hook ANI start dial signal directly to the E911 incoming trunk so that the local office will transmit ANI and cut through the calling customer. Of course the ANI digits do not register at the E911 tandem office since no MF receiver is connected. Approxi-

mately 1 to 2 seconds after sending the off-hook signal, the E911 tandem office default routes the call to the default ESN based on the ESCO of the incoming trunk group.

(2) Otherwise, after the dial pulse digits are received and an MF receiver is connected, the call proceeds as described in paragraph 4.06, subparagraphs (2) and (3).

4.08 ***Direct Seizure Followed by MF ANI***—After the trunk is seized, the E911 tandem office immediately sends a steady off-hook signal and begins 8- to 9-second timing for receipt of the complete ANI information. The call proceeds as described in paragraph 4.06, subparagraphs (2) and (3).

4.09 ***Direct Seizure Without ANI***—After the trunk is seized by the local office, the E911 tandem office returns off-hook to the local office and immediately default routes the call to the default ESN based on the ESCO of the incoming trunk group.

4.10 ***911 Calls Incoming Via Message Networks Trunks***—This type of 911 call is received as any other tandem call. After the local office determines a calling party has dialed 911, the local office attempts to seize a message trunk to the E911 tandem office. If no trunks are available, the local office returns reorder tone to the calling party. Otherwise, a message trunk is seized and the digits 911 or 11 are outpulsed to the E911 tandem office. The digits are translated as a call type 22 (911 call) and the call is typically routed to either the ESN associated with the ESCO obtained from 3/6-digit translations, or to the default ESN based on the ESCO of the incoming trunk group. Refer to paragraphs 3.06 through 3.08.

E911 Tandem Office Line Originated 911 Call

4.11 An E911 tandem office line originated 911 call is translated via 3-digit translations as a call type 22 (4FESCO). Route pattern expansion yields the ESCO number associated with the E911 tandem office. Refer to paragraphs 3.09 and 3.10 and Fig. 4.

4.12 The ESCO number is translated via the ESCO translator (Fig. 6) to obtain the NPD, default ESN, and to determine whether or not selective routing applies. If the ESCO translator indicates that selective routing does not apply (ie, selective routing data for that ESCO does not exist in either the No. 1/1A ESS or a PDSP), the default ESN is considered to be the primary ESN and is used for routing the call. If selective routing applies for an ESCO, the selective routing translations are stored in either the E911 tandem office or in a PDSP (for No. 1 ESS only) as indicated by items EN01 and EPDSP in the ESCO translator (Fig. 6). If selective routing applies for an ESCO, the NPD and the calling station's ANI TN are used to index selective routing translations to obtain the primary ESN associated with the calling line.

4.13 During the initial 911 call processing, if the maximum number of 911 intraoffice calls already exist (based on the E911 intraoffice choke mechanism, paragraph 3.11), overflow tone is returned to the originating line. In cases where a billing TN does not exist (such as for multiparty or QZ billing lines), or an ANI failure occurs, the call is routed to the default ESN obtained from the ESCO translator. Otherwise, the call is selectively routed using the NPD obtained from the ESCO translator and the ANI TN of the originating line.

B. Selective Routing

4.14 Selective routing translations are resident in either the E911 tandem office or in a PDSP used in conjunction with a No. 1 ESS tandem office. Item EPDSP in the ESCO translator indicates that selective routing translations are resident in a PDSP (EPDSP = 1) or not in a PDSP (EPDSP = 0). Item EN01 in the ESCO translator indicates that selective routing translations are resident in the E911 tandem office (EN01 = 1) or not in the E911 tandem office (EN01 = 0). If both EPDSP = 0 and EN01 = 0, selective routing is not provided for that ESCO, in which case the default ESN is used.

4.15 If a PDSP is used, an ESN data request is sent to the PDSP via the PIU interface. Refer to paragraphs 3.40 through 3.43. The ESS request for PDSP ESN data includes the NPD and ANI TN of the calling station. The PDSP reply data contains the correct ESN for the NPD and ANI TN. Refer to Fig. 20 for the message buffer formats for ESS request and PDSP reply data. The selective routing translations in the PDSP are structured similar to and provide the same function as those resident in the E911 tandem office. If the PDSP fails or if an invalid ESN is returned, the call is routed using the default ESN which was initially obtained from the ESCO translator and stored in the PPRB memory block (Fig. 19). Otherwise, if the selective routing translations are

NO. 1 ESS REQUEST DATA FOR PDSP DATA

22 18	17	16	15 12	11 9	8	7 4	3 0
SUBTYPE = 1			SEQUENCE NUMBER				
				D1		D2	D3
			D4	D5		D6	D7
	NPD			WORD COUNT = 4			

NPD = NUMBER PLAN DIGIT

D1 THROUGH D7 = TELEPHONE NUMBER OF STATION (ANI IDENTIFICATION)
DIALING 911

A. ESN DATA REQUEST FORMAT (MESSAGE TYPE 4, SUBTYPE 1)

22 18	17	16	15 9	8 0
SUBTYPE = 2				ESN (START)
	*			ESN (END)
				WORD COUNT = 3

* STATUS: 01 = UNASSIGNED
10 = ASSIGNED
00 = NEW ADDITION } RECENT CHANGE
11 = NEW REMOVAL } TYPE STATUS

NOTE - AN ERROR CONDITION EXISTS WHEN:
ESN (START) = ESN (END) = 0
OR
STATUS (*) = 11

C. ESN VERIFICATION REQUEST FORMAT (MESSAGE TYPE 4, SUBTYPE 2)

PDSP REPLY DATA FOR NO. 1 ESS REQUEST

22 — 17	16	15 — 9	8	7	6 — 0
TYPE = 4		WORD COUNT = 3			SUBTYPE = 1
		SEQUENCE NUMBER			
	*				ESN

* DATA FOUND BIT: IF DATA FOUND EQUALS 1 (SET)
IF DATA NOT FOUND EQUALS 0 (RESET)

B. ESN DATA REPLY FORMAT (MESSAGE TYPE 4, SUBTYPE 1)

22 — 16	15 — 9	8	7	6 — 0
TYPE = 4	WORD COUNT = 3			SUBTYPE = 2
				ESN (START)
				ESN (END)

D. ESN VERIFICATION REPLY FORMAT
(MESSAGE TYPE 4, SUBTYPE 2)

Fig. 20—Message Buffer Data Request and Reply Formats

resident in the E911 tandem office, the call is routed using the ESCO translator data and the selective routing translations described in paragraphs 3.15 through 3.20.

4.16 The NPD obtained from the ESCO translator and the ANI TN of the calling station are used to index the NPD translator which may provide selective routing translation data on a per office code, per number group, or per TN basis. Refer to paragraphs 3.15 through 3.20 and Fig. 7 and 8. The NPD translator yields the ESN for the 911 call.

C. Call Termination

4.17 The call termination phase includes ESN, PSAP DN, RI, and trunk group translations. Either the default ESN obtained from the ESCO translator or the ESN obtained from the NPD translator is translated via the ESN translator (paragraphs 3.21 through 3.23 and Fig. 9) to obtain the PSAP DN assigned for the ESN. The PSAP DN obtained is translated via the 911 DN auxiliary block (paragraphs 3.24 through 3.26 and Fig. 10) to obtain program index, terminating major class, RI, and call forwarding data. Typically, an E911 call will route to a DN for nonringing E911 PSAP with PIND = 3 and TMAJ = 3. If a nonringing E911 PSAP is indicated, an E911 call register (paragraphs 3.36 and 3.37 and Fig. 14) is initialized and linked for the call.

> ***Note:*** The PSAP DN can be any valid DN. With the E911 feature, the E911 tandem office may also route 911 calls to ringing PSAPs. Ringing PSAPs are typically associated with basic 911 (B911) service. For a 911 call to a ringing PSAP, if all 911 lines to that PSAP are busy, busy tone is returned to the calling party. Otherwise, ringing is provided and the call connection is established upon receipt of answer. Alternate routing is not available for ringing PSAPs.

4.18 The RI obtained from the 911 DN auxiliary block is expanded via RI expansion (paragraph 3.27) to obtain the TGN assigned for the particular PSAP. Regular TGN and TCC translations are used to find an idle 911 trunk to the PSAP. The E911 tandem office hunts for and attempts to seize an idle 911 trunk to the PSAP. One of several conditions can be encountered.

(a) If no idle trunk in the trunk group can be found, and the optional call forwarding service (traffic busy alternate routing) is not provided, the calling station receives reorder tone.

(b) If no idle trunk can be found due to either a traffic busy condition, night service, and/or a power failure condition, and alternate routing is provided for traffic busy, night and service and/or power failure, the call is alternate routed to the CFBL-DN contained in the 911 DN auxiliary block (Fig. 10). The CFBL-DN must be translated and the connection phase must be repeated for the CFBL-DN. The CFBL-DN may be associated with another E911 PSAP, a B911 PSAP, or any other facility which may be assigned a DN; however, the CFBL-DN typically is associated with another E911 PSAP. As for any alternate routing, up to five attempts may be made for alternate routing. If the alternate routing results in the call being routed to an entity other than an E911 PSAP, the E911 feature no longer has any impact on the call.

(c) Otherwise, if a 911 trunk to the PSAP is available, the trunk is seized either on a manual seizure basis or the trunk is seized which requires an MF transmitter. The trunk seizure and connection phase depends on whether or not the PSAP has the ANI display, which requires MF outpulsing.

Connection to an E911 PSAP Without ANI Display

4.19 For an E911 PSAP without the ANI display option, an idle 911 trunk to the PSAP is seized on a manual seizure basis and the call is automatically cut through to the PSAP. The network connections are established as for any other line or trunk-to-trunk connection. When the trunk seizure is detected by the PSAP customer premises equipment, the PSAP customer premises equipment signals the attendant(s) and returns audible ringing to the originating line via the path established. The E911 tandem office supervises the calling line for abandon and the 911 trunk for answer. When the 911 call is answered at the PSAP, the talking connection is established at the PSAP and the off-hook answer signal is returned to the E911 tandem office. After the answer signal is received, the E911 tandem office supervises the call for disconnect and for a call transfer request if call transfer service is provided.

Connection to an E911 PSAP With ANI Display

4.20 MF outpulsing is required to send ANI information to an E911 PSAP having the ANI dis-

play option. An idle 911 trunk to the PSAP is seized and an attempt is made to seize and connect an idle MF transmitter to the outgoing 911 trunk. If an MF transmitter is not available, the call is routed to reorder tone. Otherwise, when an MF transmitter is available, it is seized and connected to an E911 outgoing trunk to the PSAP. Standard start dial timing is done for receipt of the ANI start signal (approximately 250 ± 50 millisecond wink signal) from the PSAP customer premises equipment. There are several failure modes that can occur after the E911 tandem office seizes a dedicated E911 outgoing trunk and connects an MF transmitter.

4.21 The normal sequence of events after 911 trunk seizure is described below. Failure modes are discussed as they are applicable to a particular sequence.

(1) The E911 tandem office sends an off-hook signal to the PSAP indicating 911 trunk seizure.

(2) The E911 tandem office times, for a period of 16 to 20 seconds, for receipt of the ANI start pulsing wink signal from the PSAP. The normal call sequence continues if the PSAP returns the start pulsing wink signal. If the start pulsing wink signal is not received within 16 to 20 seconds, the E911 tandem office puts the trunk on the trunk maintenance list and makes one retry on a different E911 trunk to the PSAP. In this case trunk hunting and the connection phase begins again.

(3) When the PSAP recognizes the E911 trunk seizure, it will typically return an ANI start pulsing wink signal (250 ± 50 millisecond wink signal) to the E911 tandem office in less than 4 seconds. After sending the start pulsing wink signal, if the MF pulses are not received in 4 seconds or garbled pulses are received, the PSAP completes the call as if an ANI failure occurred. That is, the PSAP customer premises equipment immediately signals the attendant(s) and returns audible ringing tone to the calling station via the E911 network. In this case, when the attendant answers, all zeros are displayed on the ANI display. Otherwise, receipt of the start pulsing wink signal typically causes the E911 tandem office to start MF outpulsing.

(a) The MF outpulsing consists of a stream of MF tone pulses 55 to 65 ms duration separated by silent intervals of 55 to 65 ms. The NPD plus ANI TN digits are preceded by a KP digit of 115 to 125 ms duration and succeeded by an ST digit of 55 to 65 ms duration. The E911 tandem office begins MF outpulsing the ANI information to the PSAP in the form KP-A-NXX-XXXX-ST where NXX-XXXX is typically the ANI TN of the calling station and item A is the encoded information digit, indicating the NPD and flash calling line display data as discussed in paragraph 3.23. The encoded information digit is used as the E911 PSAP as follows:

DIGIT	USE
0 =	dummy digit (not displayed, ANI TN displayed steady)
1 =	digit 1 plus ANI TN displayed steady
2 =	digit 2 plus ANI TN displayed steady
3 =	digit 3 plus ANI TN displayed steady
4 =	dummy digit (not displayed, but ANI TN flashed)
5 =	digit 1 plus ANI TN displayed flashing
6 =	digit 2 plus ANI TN displayed flashing
7 =	digit 3 plus ANI TN displayed flashing
8 =	for maintenance test call (not displayed)

(b) If valid ANI is not available at the E911 tandem office, a fictitious NXX-XXXX ANI is sent as follows:

0-911-0TTT—This format is sent due to ANI failures, multiparty or QZ billing lines, and possibly a 911 call received via a message trunk. The digits TTT indicate the ESCO number associated with the originating office.

0-911-0000—This format is sent when an anonymous call is made to a PSAP. An anonymous call is a 7-digit call (non-911) to the DN of a PSAP.

Note: The information digit is not displayed if a valid ANI is not available. Also, if an ANI

failure occurs between the E911 tandem office and the PSAP, the digits displayed are 000-0000.

(4) When the PSAP receives the complete MF outpulsed ANI information, the PSAP signals the attendant(s) and returns audible ringing to the calling party. When the call is answered, the PSAP disconnects audible ringing, connects the call to the answering attendant position, causes the appropriate information to be displayed on the adjunct selector console display, and returns an off-hook signal to the E911 tandem office indicating answer.

(5) After answer is detected, the E911 tandem office supervises the call for disconnect and for a PSAP transfer request (if transfer service is provided).

D. Call Disconnect

Disconnect for Tandem E911 Calls From Local Offices

4.22 For an established E911 tandem call, disconnect supervision is maintained at the E911 tandem office for the incoming and outgoing E911 trunks. Disconnect actions depend on whether disconnect is received from the PSAP or from the local office first.

4.23 When the PSAP attendant disconnects first, the PSAP sends an on-hook (disconnect) signal to the E911 tandem office. The on-hook signal duration must be greater than the flash timing period (1.2 seconds) to be interpreted as a disconnect signal. The E911 tandem office passes the on-hook to the local office and begins 4- to 5-second timing for an on-hook signal returned from the local office. Either the local office returns on-hook within the 4- to 5-second period or time-out occurs. When either on-hook is received or when time-out occurs, the E911 tandem office disconnects the tandem E911 call connection, sends on-hook to the PSAP, idles the E911 trunk to the PSAP, and releases the E911 call register. If time-out occurred prior to receiving on-hook from the local office, the incoming dedicated 911 trunk is put on the high and wet list.

> ***Note:*** The 4- to 5-second timing for on-hook is also done for message network trunks from local offices carrying 911 calls.

4.24 The following is an example of how disconnect should occur when the PSAP attendant disconnects first.

(1) When the PSAP attendant disconnects, the PSAP equipment sends an on-hook to the E911 tandem office.

(2) The E911 tandem office begins 1.2-second flash timing, which times out in this case, thus signaling a disconnect.

(3) The E911 tandem office sends an on-hook signal to the local office and begins 4- to 5-second timing for receiving an on-hook from the local office. This 4- to 5-second timing is unique for E911 calls to a PSAP and, in fact, is the forced disconnect service for the E911 feature.

(4) If the 911 call is from a local office which meets the local switching system requirements for disconnect actions on ANI outgoing trunks, then when the local offices receives disconnect from the E911 tandem office, it immediately disconnects the call and returns on-hook to the E911 tandem office. Thus, the E911 tandem office normally receives on-hook from the local office prior to time out, disconnects the call, and sends on-hook to the PSAP.

(5) If the on-hook signal is not received from the local office within the 4- or 5-second timing interval, the E911 tandem office disconnects the call, returns on-hook to the PSAP, and puts the dedicated E911 incoming trunk on the high and wet list.

4.25 When the calling party disconnects first, the local office sends an on-hook signal to the E911 tandem office and releases the outgoing trunk if it is a message network trunk. If the outgoing call was via a dedicated E911 trunk, the trunk is released after an on-hook signal is received from the E911 tandem office. When the E911 tandem office receives the on-hook signal, the tandem connection is released and an on-hook signal is sent to the local office. The incoming dedicated E911 trunk is released and idled. If the outgoing dedicated E911 trunk to the PSAP is a loop type trunk, the trunk is released and idled. If the outgoing dedicated E911 trunk to the PSAP is an E&M type trunk, the trunk to the PSAP is left busy and supervised until disconnect is received. When disconnect is received from the PSAP, the E911 trunk is idled and the E911 call register is released.

Disconnect for E911 Calls From E911 Tandem Office Customers

4.26 When the PSAP attendant disconnects first, the PSAP sends an on-hook signal (discon-

nect) to the E911 tandem office. The on-hook signal duration must be greater than 1.2 seconds (time greater than for a flash signal) to be interpreted as a disconnect signal. The E911 tandem office processes the disconnect, returns an on-hook signal to the PSAP, immediately releases and idles the E911 trunk to the PSAP, and restore verifies the line so that the line will receive dial tone if still off-hook. Regular PSPD timing and treatment are provided for the calling line.

4.27 When the calling customer disconnects first, the E911 tandem office disconnects the connection and sends an on-hook signal indicating disconnect to the PSAP. The PSAP does not recognize an on-hook signal with a duration of less than 250 ms to be a disconnect. If the outgoing dedicated E911 trunk to the PSAP is marked as an operator trunk, the E911 tandem office supervises the E911 trunk for an on-hook signal from the PSAP. Upon receipt of the on-hook signal, the E911 tandem office releases and idles the E911 trunk and releases the E911 call register.

E. E911 PSAP Central Office Transfer

4.28 For central office call transfer capability, a dedicated E911 outgoing trunk to a PSAP must be in a centrex tie trunk group having the trunk dial transfer (TDT) feature. For information regarding the TDT feature, refer to item A(23) in Part 7. The dedicated E911 outgoing trunk must be marked for flash timing in the TCC expansion table (Fig. 12). Refer to Item A(2) of Part 7. The PSAP equipment can be arranged to automatically generate and send selective transfer codes with the form of *1X and/or the prefixed 2-digit transfer codes with the form *2X. The PSAP equipment cannot be arranged to automatically generate and send prefixed 2-digit speed calling codes with the form *3X or *4X. However, these speed calling codes can be used and are simply manually dialed.

4.29 A request for transfer is recognized when a flash signal (500 ± 50 ms on-hook signal) is received from the PSAP. For E911 service, there are three types of transfers: selective, fixed, and manual.

(a) With selective transfer the list of secondary PSAP DNs (identified in the ESN translator, Fig. 9) is used to selectively transfer an E911 call according to the ETD (emergency transfer digit) received. Selective transfer has the form of *1X, where X = 1, 2, 3, 4, 5, or 6. The *1 yields DTYP5, STYP5, SSTYP3. The call program then collects one more digit, the "X" digit of *1X, where X equals the ETD. In this way, the secondary PSAP DN to be used is dependent on the initial selective routing to the primary PSAP associated with the particular calling station. Selective transfer is always based on the primary ESN obtained for a particular call regardless of the number of times a call is transferred from one E911 PSAP to another E911 PSAP. The primary ESN is stored in the E911 call register (Fig. 14) as long as the call is connected to an E911 PSAP.

(b) With fixed transfer the prefixed 2-digit speed calling code has the form of *2X. The 2-digit speed calling code yields DTYP5, STYP2, SSTYP0 unless the associated PSAP DNs are part of a centrex extension range. The PSAP DNs can be part of a centrex extension range either as DTYP2 or DTYP6 entries. If the DNs assigned to PSAPs are nondialable DNs, the number obtained from the speed calling list must be the centrex extension of the desired PSAP. Refer to paragraphs 3.33 and 3.34.

(c) With manual dial transfer, the attendant either manually dials the DN or the speed calling code (if speed calling is provided) for the desired destination. Manually dialed speed calling codes for an E911 PSAP have the form *2X, *3X, or *4X. The same data types used for fixed transfer are used for manually dialed speed calling codes.

Note: Code *2X may be used for either fixed or manual dial transfer.

4.30 If the routing DN leads to a secondary E911 PSAP with ANI display, the 8-digit ANI code that was sent to the answering (primary) PSAP is also sent to the add-on (secondary) PSAP. If the secondary PSAP has alternate routing (for night service and/or traffic busy) and the alternating routing loops back to the PSAP that is requesting the transfer, the transfer is blocked and the PSAP attendant receives overflow tone (120 ipm) to indicate the transfer is not allowed. Otherwise once the transfer is complete, all parties are connected via a 3-port conference circuit at the E911 tandem office until either of the parties disconnects from the call. While all three parties are connected, the primary PSAP can cause the added party (secondary PSAP) to be disconnected (forced off) by sending an on-hook flash

signal to the E911 tandem office. The E911 tandem office will reestablish the call as a 2-party call between the calling party and the primary PSAP.

> ***Note:*** If a selective transfer request is made and the request is not valid, interrupted high tone (120 ipm) is returned to the PSAP attendant requesting the transfer. An invalid request occurs upon receipt of a selective transfer code (*1X) when there is no DN in the ETD slot for ETD X in the ESN auxiliary block.

E911 Call Transfer Sequence

4.31 When the PSAP attendant initiates selective or fixed transfer, the PSAP automatically generates and sends an on-hook flash signal (approximately 500 milliseconds duration) to the E911 tandem office. Otherwise, for a manual dial transfer, the PSAP attendant causes a timed on-hook flash to be generated and sent to the E911 tandem office. In either case, when the flash signal is detected, the E911 tandem office attempts to seize a 3-port conference circuit and a TOUCH-TONE® receiver. One of three events can occur.

(a) If a 3-port conference circuit is not available, the flash signal is ignored.

(b) If a TOUCH-TONE receiver is not available within 3 to 4 seconds of receiving the flash signal, the flash is ignored. If a receiver is not immediately available, an attempt is made to queue for a receiver during the 3- to 4-second interval; however, it may not be possible to queue due to a queue overload.

(c) Otherwise, a 3-port conference circuit and receiver are seized. The calling party, receiver, and 911 trunk are connected (with the calling party split) and dial tone is returned to the PSAP.

4.32 For manual dial transfer, after receiving dial tone, the PSAP attendant manually dials the DN or speed calling code (*2X, *3X, or *4X) for the desired destination. The speed calling code *2X may be used for either fixed or manual dial transfer. For selective or fixed call transfer, the PSAP equipment generates and sends the transfer code (*1X or *2X) to the E911 tandem office. The transfer code is sent no sooner than 500 milliseconds after receiving dial tone. The transfer code contains standard TOUCH-TONE digits of minimum duration (50 milliseconds on, 50 milliseconds off). Regular PSPD timing (16 to 24 seconds) is done for receipt of the transfer digits unless the E911 tandem office is in an overload condition, in which case permanent signal timing is 10 to 15 seconds and partial dial timing is 5 to 10 seconds. After the transfer digits have been received, the calling party is unsplit and the talking connection between the calling party and the PSAP attendant is restored.

4.33 The E911 tandem office collects and interprets the digits dialed (for manual transfer) or the speed calling code (for selective, fixed, or manual transfer) and attempts to add on the destination.

(a) If a manual dial transfer, standard 3/6-digit and DN translations are performed to route the call. If speed calling is used for manual dial transfer, standard centrex translations yield the DN.

(b) If a selective transfer, the selective transfer code (*1X) yields the ETD (X=ETD=1, 2, 3, 4, 5, or 6) which is used as an index to the ESN auxiliary block (Fig. 17) to obtain the secondary PSAP DN. For selective transfer, the secondary PSAP DN is translated via the 911 DN auxiliary block (Fig. 10) and an attempt is made to complete the transfer call (add-on connection) using the RI, TCC, and TGN translations as is done to complete any 911 call to an E911 PSAP DN. Refer to paragraphs 4.18 through 4.21. Note that a secondary PSAP DN, just as the primary PSAP DN, does not have to translate to an E911 PSAP DN. A PSAP may be assigned any valid DN.

(c) If a fixed transfer, the prefixed speed calling code (*2X) typically is the code representing the centrex extension of an E911 PSAP. Secondary PSAP DNs can be part of the centrex extension range either as DTYP2 or DTYP6 entries. Refer to paragraph 3.34. Standard centrex translations yield the DN associated with the particular speed calling code. The DN may lead to another E911 PSAP or some other facility. Standard DN translations are used to route the transfer call and add on the predesignated destination.

4.34 If the transfer attempt fails, the E911 tandem office restores the 911 call connection to the original 2-party call configuration. If the destination (E911 PSAP) is traffic busy and has the optional CFBL service, an attempt is made to route the trans-

fer call to the CFBL DN obtained from the 911 DN auxiliary block. Otherwise, if the destination is busy and does not have CFBL service, if there is no answer, or if the destination is no longer desired, the PSAP attendant controlling the 911 call can release the destination using the 10A1-50 selector console. This causes the PSAP equipment to generate and send a timed on-hook flash signal to the E911 tandem office, which interprets the flash signal as a request to disconnect the added destination. The E911 tandem office releases the destination and 3-port conference circuit and restores the initial 2-party 911 call connection.

4.35 Otherwise, after the destination answers, the 3-way talking connection is established at the E911 tandem office via the 3-port conference circuit and the 3-way call is supervised for disconnect by either party and for a request from the controlling PSAP attendant to release the added party. If the added destination is an E911 PSAP, then:

(a) If the added PSAP disconnects, the initial 2-party 911 connection is restored and the PSAP attendant can initiate another transfer request.

(b) If the controlling PSAP disconnects, a 2-party connection is established between the calling party and the added PSAP. If the added PSAP also has transfer service, the added PSAP can also initiate a transfer for the 911 call.

Disconnect Supervision for 3-Party Connection

4.36 ***Controlling PSAP Disconnects First***— Upon receipt of an on-hook signal from the controlling PSAP, the E911 tandem office begins flash timing (approximately 1.2 seconds). One of two events can occur.

(a) If the controlling PSAP returns off-hook before flash timing ends, then the signal is actually a flash signal indicating a request to release the added party. The E911 tandem office releases the added party and the 3-port conference circuit and restores the 911 call to a 2-party connection between the calling party and the controlling PSAP. Supervision is maintained for disconnect and for another transfer request.

(b) If the controlling PSAP remains on-hook (beyond the flash timing period), the on-hook signal is a disconnect signal. The 3-port conference circuit and 911 trunk to the controlling PSAP are released and idled and a 2-party connection is made between the calling party and the added PSAP. The call is supervised for disconnect and a transfer request (if transfer is provided) is done for any established 911 call. After the 2-party connection between the calling party and the secondary PSAP is established, the secondary PSAP can also transfer the 911 call to another E911 PSAP or some other DN.

(1) Selective transfer to other secondary PSAPs associated with the primary ESN for the calling station continues to work because the primary ESN initially obtained for the call is saved in the E911 call register (Fig. 14).

(2) A fixed transfer from the controlling secondary PSAP to another E911 PSAP or some other DN depends on the fixed transfer assignments for the controlling PSAP.

(3) For any type of transfer which terminates to another E911 PSAP with ANI display, the original ANI information (retained in the E911 call register) is sent to that PSAP destination for the transfer call. No matter how many transfers occur and no matter in what order PSAP attendants disconnect, as long as transfer is from one E911 PSAP to another E911 PSAP, the original ANI will be passed to the added E911 PSAPs having ANI display.

4.37 ***Added Party Disconnects First***—Upon detection of an on-hook (disconnect) signal from the added party, the E911 tandem office begins 10- to 11-second timing. If the added party is an E911 PSAP, then after 10- to 11-second timing is done, the connection to the added party is disconnected. If an off-hook signal is received before the end of timing, the 3-party connection is held. If the added party is other than an E911 PSAP, upon receipt of an on-hook signal, the E911 tandem office begins 10- to 11-second timing. One of four events can occur.

(a) If the added party returns off-hook before time-out occurs, timing is terminated and the added party remains on the 3-party connection.

(b) If the controlling PSAP sends a timed on-hook flash before time-out occurs, timing is terminated and the connection to the added party and

the 3-port conference circuit are released and idled. The call is reestablished as a 2-party call between the calling party and the controlling PSAP.

(c) If time-out occurs, the connection for the added party and the 3-port conference circuit is released and idled. The call is reestablished as a 2-party call between the calling party and the controlling PSAP.

(d) If either the calling party or the controlling PSAP disconnects before time-out occurs, the disconnecting party is immediately released. Timing continues until either time-out occurs (all connections are released and idled), or the added party goes off-hook. In this case the call is established as a 2-party call between the remaining party and the added party.

4.38 ***Calling Party Disconnects First***—Upon detection of calling party disconnect, the calling party connection is released; however, the 3-port conference circuit is not released. The controlling PSAP remains connected via the 3-port conference circuit to the added party until either the added party disconnects, the controlling PSAP releases the added party, or the controlling PSAP disconnects.

5. PROGRAM DESCRIPTIONS

MAJOR PIDENTS INVOLVED

5.01 This section describes the functional purpose of the major PIDENTs involved with the E911 feature. Refer to Table A. The three exclusive E911 related PIDENTs are ESCA, ESDR, and ESMG. The remaining PIDENTs contain small code segments (usually designated "ME") that are called upon for their specific function.

A. Exclusive E911 PIDENTs

ESCA

5.02 The purpose of PIDENT ESCA is to perform E911 call administration and translation interfaces. This PIDENT contains selective routing digit analysis routines and interfaces with the new translation routines implemented in PIDENT TRBL. Among the many functions this PIDENT performs is code for reporting E911 register status and routing to default ESB.

ESDR

5.03 The primary purpose of PIDENT ESDR is to act as a logical buffer between the existing system call set-up and digit reception and analysis routines, plus the new digit analysis routines implemented in PIDENT TRBL. PIDENT ESDR has the specific responsibility of interfacing with PIDENTs AIOD, CAMA, CXIC, CXOR, DCNL, DCNT, ICAL, ISXS, MFTL, and ORDL to:

(a) Set up digit reception

(b) Receive and perform preliminary analysis on the ANI digits

(c) Place the call in standard network configurations for further call processing after digit analysis

(d) Interface with the selective routing digit analysis routines in PIDENT ESCA in order to obtain the proper routing information.

5.04 PIDENT ESDR is broken up into 12 program units as follows:

(1) Set up for digit reception on dedicated E911 incoming trunk

(2) Mechanics of digit reception call setup

(3) Call selective routing digit analysis for incoming calls

(4) Test code analysis

(5) Dialed 911 received on a nondedicated incoming trunk

(6) Special case: Seizure only DE911 incoming trunk call setup

(7) ESB DN directly dialed from a trunk

(8) ORDL interface

(9) Call selective routing digit analysis for originating calls

(10) Process anonymous or ESB standard transfer call

(11) Process ESB selective transfer call

(12) ESB CTX tie trunk 2-digit abbreviated dialing.

5.05 Program unit (1) has the function of marking E911 dedicated calls by setting the E911 bit. It does E911 office-wide or particular TGN incoming peg counts, and supplementary TGN translations. It also sets up for digit reception on bylink "digits + ANI" DE911 incoming trunks and on nonbylink DE911 incoming trunks.

5.06 Program unit (2) has the function of sending start dial signals and setting up an incoming trunk and receiver for digit reception.

5.07 Program unit (2) has the function of performing sufficient digit analysis to realize that all digits have been received. It does this for (bylink or MF) + ANI digits dialed on DE911 incoming trunks.

5.08 Program unit (3) has the function of calling the selective routing digit analysis routine to obtain information on how to route the call. This routine calls translation routines to obtain the routing data. This program unit provides connection to expanded ESBs (EESB) when an EESB DN has been directly dialed anonymously either as a DN or as a CTX extension. PIDENT ESCA prepares the ANI information which is outpulsed to the EESB.

5.09 Program unit (4) has the function of comparing the initial digits on a digits + ANI ICT with emergency code digits (ECDs). It checks to see if a test code or an illogical digit sequence is being dialed. A transfer to PIDENT ICAL is made if a test code is dialed.

5.10 Program unit (5) has the function of formulating digits which will serve as ANI digits. In some cases meaningful digits can be constructed. In more difficult cases the digits 0-911-ESCO are constructed, where ESCO is the ESCO obtained from translations. This ANI is ultimately outpulsed to the EESB.

5.11 Program unit (6) has the function of getting the incoming trunk in the right state (hold offhook) and then transfers to a routine to form an ANI of the form 911-ESCO for selective routing purposes.

5.12 Program unit (7) has the function of creating an anonymous ANI (0-911-0000) because an ESB POTS DN or CTX extension has been directly dialed. This could be caused by one ESB dialing another ESB or, in the DN case, one ESB dialing another ESB or an incoming anonymous call.

5.13 Program unit (8) has the function of handling 911 dialed by calls which are analyzed by the line digit analysis routines in PIDENT ORDL. These include POTS line 911, CTX line 9 + 911, ADDON line 911, ADDON CTX extension, tie trunk, or console 9 + 911. These calls have the essential property of originating in the E911 tandem office as local calls. From a service standpoint, these calls get the same treatment as the majority of 911 calls which originate in other offices. Thus, ANI is identified exactly as though the calls were to a TSPS so that the ANI used for the selective routing function is identical to that used if the line were in another office. Another essential feature of this equality of service is embodied in the "local office choke." Normally 911 calls from other offices comes into an E911 tandem office via a small dedicated incoming trunk group. This trunk group can also be viewed as a "choke" network because its typically small size greatly restricts the number of simultaneous 911 calls from a given local office. However no such choke naturally exists for calls which originate in the E911 tandem office. Thus, without doing something to prevent it, these calls would get preferential treatment. The local office choke is implemented to correct this disparity. It is nothing more than an office translation item in the office options section of translations. This translation gives a number equivalent to the "trunk group" size of the dedicated incoming "trunk group." This number originates in the ESS when acting as a local office and terminates when acting as an E911 tandem office. On calls that are subject to the choke, a routine in PIDENT ESCA bumps an appropriate counter and disallows the call if the current count is too high. One of the inputs to this routine is the E9INHCK (inhibit choke) bit which tells the routine that this call is not subject to choking. This is true for most calls from incoming trunks except for tie trunks or AIOD calls, which really are local office calls. The routine noted in PIDENT ESCA also administers the E9INHCK bit. A routine in PIDENT MFTL is used also to identify ANI on-line to TSPS trunk calls.

5.14 Program unit (9) has the function of calling the selective routing digit analysis routine. That routine in turn calls translation routines to obtain the routing data. This program unit has the same functions as program unit (3) described in paragraph 5.08.

5.15 Program unit (10) has the function of providing a buffer between the various conditions

noted below and calling a routine in PIDENT ESCA which indicates if the call is anonymous or an ESB transfer. The conditions to be monitored are:

(a) A DN extension dialed directly which translates to be an EESB termination.

(b) A DN extension dialed directly via 2-digit speed calling which translates to be an EESB termination.

(c) A CTX extension dialed directly which translates to be an EESB termination.

(d) A CTX extension via 2-digit speed calling which translates to be an EESB termination.

Therefore TMAJ = 4FTRKG (trunk group, no ringing) with "program index" = 3. The call is either an anonymous call (particularly unlikely in the CTX extension case) or an ESB standard transfer call.

5.16 Program unit (11) has the function of handling selective transfers. An ESB tie trunk in a transfer situation dials a selective transfer code (data type 5, subtype 5, sub-subtype 3). This final data is recognized at level two of the CTX digit interpreter table. The actual digit stream generated by the ESB is *1X. Thus the X must still be collected. When the remaining digit comes in, a transfer is made to the selective transfer analysis routine.

5.17 Program unit (12) has the function of allowing the 2-way trunks to ESBs to use their 2-digit speed calling lists for originating call capabilities. It is initially entered from PIDENT CXIC from a DTYP 5 (special services) STYP 2 (group speed calling) entry from the call to the CTX prefix and extension translation. The only type of speed calling allowed is the prefixed variety (*KY, where K = 2, 3, or 4). Furthermore, an ESB CTX tie trunk may not use the customer changeable speed calling feature to change the speed calling list. It is possible to have a line or lines in the ESB CTX with access to the same group list which can change the list. The only entries which are allowed from the speed calling translation are standard 7- or 10-digit (dial 9 type) calls or CTX extensions.

5.18 There is another program unit included in PIDENT ESDR which contains routines used for call tracing. It is not considered to be major in this document.

ESMG

5.19 PIDENT ESMG contains the code that records error and traffic counts and requests to print various error and other output messages. Following are the common output messages seen.

EN01 Output Message

5.20 The EN01 message is an E911 error message containing pertinent data available at the time the error occurred. Following the EN01 message may be TW02 messages, which are dumps of associated registers. The EN01 message contains a variable number of printed lines. Only the first line is printed if there are no registers associated with the error. If there are registers but no trunk network numbers (TNNs) associated with the error, the first three lines are printed. Four lines are printed if there are any TNNs.

5.21 The first line in the form:

EN01 E911 ERR (aaaa) bbb

where aaaa = the error number and bbb = the error category.

The error category and error number can be used to obtain additional information about the particular error. The error category and error number define a particular E911 error. A description of the particular error is contained at the end of PIDENT ESMG. The abbreviations for the error categories are also used in the input message EMCALL-PRT to control the printing of the EN01 output message and the EN02 E911 ERROR SUMMARY output message. The printing of the EN01 message is automatically turned on for program and translation error categories once a day at approximately 2:30 a.m. A summary of the EN01 errors by error category is printed hourly on the half hour by the EN02 output message.

5.22 Probable causes for a particular category are as follows where bbb equals:

(a) ***PRG***—An E911 call has reached an invalid program point. The E911 error description in PIDENT ESMG defines the specific invalid point. This type of error can be caused by faulty program logic, nonsensical data, or translation errors.

(b) ***TDA***—Translation data is in error.

(c) ***DGC***—Digit collection errors are probably caused by bad hardware: incoming trunk or

MF digit receivers in the E911 tandem office, the outgoing trunk, or MF transmitters in the originating office.

(d) ***ANO***—ANI outpulsing errors are probably caused by hardware problems: outgoing trunk or MF transmitter in the E911 tandem office, or equipment problems at the PSAP.

(e) ***PDS***—Peripheral data storage errors are caused by either software or hardware problems associated with the peripheral data storage processor.

(f) **HDW**—Trunk circuits and/or network connections within the E911 tandem office are at fault. Hardware error messages have probably been printed giving further information about the error.

EN02 Output Message

5.23 The EN02 message is an E911 error summary of the errors that have occurred in the past hour. The EN02 output format is in the form:

```
EN02 E911 ERROR SUMMARY
aa/aa/aa bbb cc:cc:cc
TOTAL TGN ddd
eee fff gg
. .
. .
. .
```

The second line printed indicates the month, day, year, the day of week, and the time of day that the EN02 message is loaded into the TTY buffer, not the time of printing. The third line indicates the E911 incoming or outgoing trunk group number (TGN) for which errors are be counted. The fourth and subsequent lines specify the error category, the total count per particular category, and the TGN error count for a particular error category.

5.24 The format of the error data is as follows:

eee = The error category:

= PRG—Program

= TDA—Translation

= DGC—Digit collection

= ANO—ANI outpulsing

= PDS—Peripheral data storage

= HDW—Hardware

fff = The total error count for the particular error category. The count contains the errors which have occurred during the past hour. The maximum count is 63 if no TGN is specified, and 126 if one is specified. If the count reaches maximum, it will stay there and not recycle to zero.

gg = The TGN error count for the particular error category. The count contains the errors which have occurred during the period of time a TGN was specified. At most, this period of time will be the past hour. The TGN counts are zeroed when the EN02 message is printed hourly, when the TGN is changed, and when counting TGN errors is stopped. An EN02 message is printed before the counts are zeroed. The maximum count is 63; if the count reaches the maximum, it will stay there and not recycle to zero.

Note: If there are no errors for a particular category, that line is not printed.

5.25 This message is printed every hour on the half hour if errors have occurred in the previous hour. This message can also be printed upon demand by using input message EMCALL-PRT. A total count is given for each error category. If requested (through input message EMCALL-PRT), a TGN count can be given for each error category. The TGN count is a count of errors associated with a particular E911 incoming or outgoing trunk group. The second line of the EN02 message gives the date and the time that the message is loaded into the TTY buffer. Individual E911 errors are represented by the EN01 message. Printing of the EN01 message is controlled by input message EMCALL-PRT-.

EN03 Output Message

5.26 The EN03 message is an E911 traffic summary message. This is a summary of the E911 traffic over the past hour or over the past day. The EN03 message is printed either every hour on the half hour or once per day at approximately 2:30 a.m., depending on what has been specified by input message EMCALL-PRT. This message can also be printed

upon demand by using input message EMCALL-PRT. This is a separate set of counts and is not related to the TC24A, TC24B, and TC24C traffic messages. The EN03 message is not printed if there has been no E911 traffic since the last scheduled printout. A total count is given for each traffic category. If requested (through input message EMCALL-PRT), a TGN count can be given for each traffic category. The TGN count is a count of traffic on a particular E911 incoming or outgoing trunk group.

5.27 The EN03 format is as follows:

```
EN03 E911 TRAFFIC SUMMARY
aa/aa/aa bbb cc:cc:cc
TOTAL TGN ddd
eee ffffff ggggggg
. .
. .
. .
```

The second line printed indicates the month, day, year, the day of week, and the time of day that the EN03 message is loaded into the TTY buffer, not the time of printing. The third line indicates the E911 incoming trunk group for which 911 traffic is being counted. The fourth and subsequent lines specify the traffic category, the total traffic count per particular category, and the TGN traffic count for a particular traffic category.

5.28 The format of the traffic data is as follows:

eee = The traffic category:

= ITS—Dedicated E911 incoming trunk seizures

= OGC—Number of originating E911 calls

= ANC—Valid ANI digits received

= ANI—ANI information digit indicates ANI failure

= ANT—ANI time-out occurred while collecting ANI

= ANF—ANI did not agree with ANI format

= ANM—ANI information digit indicates multiparty or QZ billing

= OTS—Seizures of trunks to PSAPs

= DFT—Number of calls routed to default PSAPs due to system problems

= OPF—Failures to outpulse ANI to PSAPs.

ffffff = The total traffic count for the particular traffic category. The count contains the traffic which has occurred during the past hour or day, as specified by input message EMCALL-PRT. The maximum count is 131,071 if one TGN is specified, and 262,142 if one is specified. If the count reaches maximum, it will recycle to zero. This is not expected to happen; if it does, changing from daily counts to hourly counts will help.

ggggggg = The TGN traffic count for the particular traffic category. The count contains the traffic which has occurred during the period of time in which a TGN was specified. At most, this period of time will be the past hour or day. The TGN counts are zeroed when the EN03 message is printed hourly or daily, when the TGN is changed, and when counting TGN traffic is stopped. An EN03 message is printed before the counts are zeroed. The maximum count is 131,071; if the count reaches maximum, it will recycle to zero. This is not expected to happen; if it does, changing from daily counts to hourly counts will help.

Note: If there is no traffic for a particular category, that line does not print.

5.29 The EN03 traffic counts give three types of information: the type of E911 traffic, an indication of the stages of progress achieved by E911 calls, and an indication of traffic overload and errors. Particular traffic counts or combinations of traffic counts may point out that something is wrong and needs to be corrected. More information can be obtained by taking traffic counts on different E911 incoming trunk groups. Also, the EN02 E911 error summary message and the EN01 immediate error

message can be correlated with the EN03 message to possibly provide answers to the problems.

EMCALL-PRT Input Message

5.30 The EMCALL-PRT message affects PIDENT ESMG by controlling the following:

(a) The printing of the EN01 immediate error message and the associated TW02 messages.

(b) TGN counts (E911 incoming and outgoing trunk groups) that are printed in the EN02 E911 ERROR SUMMARY message and the EN03 E911 TRAFFIC SUMMARY message.

(c) The printing of the EN02 and EN03 summary messages upon demand.

(d) The printing of the EN03 E911 TRAFFIC SUMMARY message either daily or hourly.

5.31 The input message format is EMCALL-PRT aaa bbb. There are four groups of valid input parameters for the fields aaa bbb. Within a group, any parameter aaa can be used with any parameter bbb. By using a slash (/) at the end of the input message instead of a period (.), more than one set of aaa and bbb parameters can be easily specified. More than one TTY request may be requested to accomplish what is desired. There are not restrictions as to the order in which TTY requests are made.

(a) The group 1 parameters are:

aaa = ON0—Turn on printing of the EN01 message.

= ON1—Turn on printing of the EN01 message and one TW02 message. This TW02 will be a dump of the register most closely related to the error.

= ON3—Turn on printing of the EN01 message and up to three TW02 messages. The registers that can be dumped are originating registers, incoming registers, incoming SXS registers, E911 call registers, and outpulsing registers.

= OFF—Turn off printing of EN01 and TW02 messages.

bbb = PRG—Do the above for error category (program).

= TDA—Do the above for error category (translation).

= DGC—Do the above for error category (digit collection).

= ANO—Do the above for error category (ANI outpulsing).

= PDS—Do the above for error category (peripheral data).

= HDW—Do the above for error category (hardware).

= ALL—Do the above for all error categories.

(b) The group 2 parameters are:

aaa = SUM—Apply the specified TGN only to the E911 summary messages—EN02 and EN03. Error and traffic counts will be taken for the specified E911 incoming or outgoing trunk group.

= ALL—Apply the specified TGN to the E911 immediate error message EN01, in addition to the E911 summary messages explained directly above. Printing of EN01 messages will be restricted to only those that are associated with the specified TGN.

= ()—The parentheses represent any 3-digit E911 incoming or outgoing trunk group number. This specifies a TGN; it will be used according to bbb parameters SUM or ALL. Only the last TGN specified can be in effect at any given time. If a TGN is already in effect and another one is specified, EN02 and EN03 messages are printed and then the TGN counts are zeroed to initialize for the new TGN.

= 000—Remove the influence of the TGN, stop taking TGN error and traffic counts, and stop restricting the printing of EN01 messages to those associated with a particular TGN. EN02 and EN03 messages are printed and then the TGN counts are zeroed.

(c) The group 3 parameters are:

aaa bbb = SUM NOW—Print immediately the EN02 E911 ERROR SUMMARY message and the EN03 E911 TRAFFIC SUMMARY message. Current counts are printed which cover a period of time starting at the last hourly or daily printout. Then TGN counts may cover a period of time (starting from when the particular TGN was input via EMCALL-PRT-TGN) if a TGN was specified after the last scheduled printout. The counts are not zeroed.

(d) The group 4 parameters are:

aaa = TRF—Traffic information is to follow.

bbb = HLY—Print the EN03 E911 TRAFFIC SUMMARY message every hour on the half hour. This message is not printed if all traffic counts were zero for the past hour.

= DLY—Print the EN03 E911 TRAFFIC SUMMARY message once a day at 2:30 a.m. This message is not printed if all traffic counts were zero for the past day.

5.32 The possible system output responses to the EMCALL-PRT input message are:

- OK—The request is done.
- PF—The requested printout is forthcoming.
- NO—The request cannot be done because the requested printouts did not fit into the TTY buffer; or the requested printouts are not necessary because all the data is zero.
- NG—The input parameters are invalid.
- NA—This response should not be received; it means there is a program error in the EMCALL-PRT-code.
- NP—The request cannot be done because the E911 feature is not loaded in the generic program.

5.33 Examples of the uses of the EMCALL-PRT message are provided below:

(a) Assume an initial state for EN01 printing is all error categories printing, category "program" with up to three register dumps, and the other categories with no register dumps:

EMCALL-PRT-ON0 ALL/
ON3 PRG

(b) Assume that trouble develops in an ANI trunk group supplying E911 traffic to the office and the result is a large number of EN01 messages of category DGC. After using the messages to determine the problems, it may be desirable to turn off the printing of these messages temporarily until the problem is fixed:

EMCALL-PRT-OFF DGC.

Then, to restore printing.

EMCALL-PRT-ON0 DGC.

(c) Assume that several trunk groups develop trouble at one time. Large numbers of EN01 messages for each trunk group may make it hard to see patterns of errors for a particular office. Restricting the printing of the EN01 messages to those associated with a particular E911 incoming trunk group will allow one E911 incoming trunk group at a time to be inspected:

EMCALL-PRT-TGN xxx/
TGN ALL

where xxx = a 3-digit E911 incoming trunk group number.

To change to another E911 TGN:

EMCALL-PRT-TGN yyy.

(d) Each office from which E911 traffic originates can be checked to see whether performance standards are being met by looking at hourly printouts of the EN02 E911 ERROR SUMMARY and EN03 E911 TRAFFIC SUMMARY messages. The TGN counts of these messages provide the capability to gather data on an individual office. For this application, the TGNs that are specified should only affect the summary messages and not

restrict the printing of the EN01 messages. This can be accomplished with the following:

EMCALL-PRT-TGN xxx/
TGN SUM/
TRF HLY.

(e) To check the present error and traffic counts without waiting for the scheduled printout of the summary messages, the following message is typed:

EMCALL-PRT-SUM NOW.

To stop taking TGN counts, the following message is typed:

EMCALL-PRT-TGN 000.

B. Non-Exclusive E911 PIDENTs

5.34 The following paragraphs describe the code segments within the remaining major PIDENTs for E911 that are not exclusively related to E911.

5.35 PIDENT DCNT involves dialing connections and contains an option block of code that checks for E911 service. If E911 service is needed, a transfer is made to code segment ME where a check is made for use of a dedicated E911 ICT. A second occurrence of the option block and segment ME is used to check for a tandem or dedicated E911 trunk.

5.36 PIDENT ICAL (previously mentioned) involves digit analysis and contains several option blocks and ME segments. Some of the functions performed are storage of all normal digits, both prior to and after ANI; collection of MF digits prior to ANI on E911 dedicated ICT; allowing the use of coin type circuits; examining exact tone combinations; and ANI reception.

5.37 PIDENT MFTL involves control of multifrequency transmission and contains code segment MF.

5.38 PIDENT TRBL contains translation routines for basic line and directory numbers. Code segment JL is used and includes a directory number major class vector table and the following routines:

(1) TRESN1—Given an ESN and perhaps an emergency transfer digit (ETD), this routine returns an ESB DN and a flash calling—line—display bit.

(2) TRESN2—Utility routine used by TREDN3 and possibly others.

(3) TREDN1—Given a DN, an ESCO number and (when the PDSP is used) a client register address (CRA), this routine returns the default and assigned ESN and associated error/condition bits.

(4) TREDN2—This routine decrements the timers in the PDSP request blocks and notifies the client when a request block has timed out.

(5) TREDN3—This routine unloads an E911 PDSP message and, depending on the message type, either passes values to a client routine waiting on a PDSP request or checks the validity of an ESN or range of ESNs and responds to the PDSP.

(6) TRBUFR—This routine unloads an E911 PDSP request block. If the block number is out of range, then the request is ignored.

(7) TREDNC—Given a CRA this routine searches the PDSP request block list. If a request block with a matching CRA is located, then the routine sets the cancel bit in the request block.

5.39 PIDENT TUBL contains two routines in code segment JL that process verification messages. Routine TRUM79 processes a verification message for ESN data. Given an ESN the primary service emergency bureau DN and (when present) the possible speed transfer DNs are printed. Routine TRUM78 processes a verification message for ESCO data. Given an ESCO and a range of DNs, this routine prints the ESN assignment for each DN in the range.

5.40 PIDENT TVMN contains the main control program for translation data verification messages. Code segment JL and an option block perform checks for calling DN and ESCO to ESN, which uses the TR09 input error message and checks for ESN to ESB DN.

MINOR PIDENTS INVOLVED

5.41 PIDENT YAHA contains seizure and release routines and L-, J-, and T-bit administration. Two ME code segments separately perform seizure and release of E911 registers. A check is also made to see if the E911 local choke is active.

5.42 The remaining PIDENTs that are involved with E911 are listed in Table A. These PIDENTs contain segments of code that when called upon perform E911 related functions. This section will not describe these minor PIDENTs.

6. ABBREVIATIONS AND ACRONYMS

ADDON	Add on
AESN	Abbreviated ESN
AIOD	Automatic Identified Outward Dialing
ALI	Automatic Location Identification
ANI	Automatic Number Identification
B911	Basic 911
CAMA	Centralized Automatic Message Accounting
CFBL	Call Forward Busy Line
CRA	Client Register Address
CTX	Centrex
DE911 ICT	Dedicated E911 Incoming Trunk
DMS	Data Management System
DN	Directory Number
DP	Dial Pulse
ECD	Emergency Call/Code Digit
EESB	Expanded ESB
EPDSP	Emergency Peripheral Data Storage Processor
ESB	Emergency Service Bureau
ESCO	Emergency Service Central Office
ESN	Emergency Service Number
ESS	Electronic Switching System
ESZ	Emergency Service Zone
ETD	Emergency Transfer Digit
E911	Enhanced/Expanded 911
LEN	Line Equipment Number
MF	Multifrequency
NPA	Numbering Plan Area
NPD	Numbering Plan Digit
PIDENT	Program Identification
PIU	Processor Interface Unit
POTS	Plain Old Telephone Service
PSAP	Public Safety Answering Point
PTW	Primary Translation Word
RI	Route Index
RRP	Rate and Route Pattern
SXS	Step-by-Step
TDT	Trunk Dial Transfer
TGN	Trunk Group Number
TN	Telephone Number

7. REFERENCES

A. Bell System Practices

(1) Section 231-090-287—Feature Document Universal Emergency Service Number 911 Feature—Basic 911 Service—2-Wire No. 1 and No. 1A Electronic Switching Systems

(2) Section 231-090-288—Feature Document—Universal Emergency Service Number 911—Enhanced 911 Service—2-Wire No. 1 and No. 1A Electronic Switching Systems

(3) Task Oriented Practice 533-400-001—E911 System Answering Point—Installation, Test, and Trouble Locating Procedures

(4) Section 533-400-101—E911 System Answering Point—System Description Customer Premises System

(5) Section 533-400-301—E911 System Answering Point Preinstallation and Planning Information Customer Premises System

(6) Section 254-300-100—3A Processor Description—Common Systems

(7) Section 254-300-110—3A Central Control (3A CC) Description—Common Systems

(8) Section 254-300-120—3A Central Control (3A CC) Theory of Operation—Common Systems

(9) Section 254-300-130—I/O Interfaces—Common Systems

(10) Section 254-130-150—Main Store and Supplementary Store—Description and Theory of Operation—Common Systems

(11) Section 254-300-170—Tape Data Controller Description and Theory of Operation—Common Systems

(12) Section 254-300-200—Programmed Magnetic Tape System Description and Theory of Operation—Common Systems

(13) Section 231-144-005—Processor Interface Frame Description for Peripheral Data Storage Processor (PDSP)—2-Wire No. 1 Electronic Switching System

(14) Section 231-144-101—Peripheral Data Storage Processor (PDSP) Initialization Description— 2-Wire No. 1 Electronic Switching System

(15) Section 231-144-103—Processor Interface Unit Software—2-Wire No. 1 Electronic Switching System

(16) Section 231-144-301—System Initialization and Recovery Procedures—Peripheral Data Storage Processor (PDSP)—2-Wire No. 1 Electronic Switching System

(17) Section 231-144-303—Data Base Reallocation Procedures—Peripheral Data Storage Processor (PDSP)—2-Wire No. 1 Electronic Switching System

(18) Section 231-144-304—Updating Generic Program—Peripheral Data Storage Processor (PDSP)—2-Wire No. 1 Electronic Switching System

(19) Section 231-144-305—Tape Data Facility Operating Procedures—Peripheral Data Storage Processor (PDSP)—2-Wire No. 1 Electronic Switching System

(20) Section 231-144-306—System Growth Procedures—Peripheral Data Storage Processor (PDSP)—2-Wire No. 1 Electronic Switching System

(21) Section 231-144-360—Recent Change Procedures and Data Base Generation for E911—Peripheral Data Storage Processor (PDSP) and Data Base Description—2-Wire No. 1 Electronic Switching System

(22) Section 231-190-136—Feature Document—Interface With the Peripheral Data Storage Processor Feature—2-Wire No. 1 Electronic Switching System

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

(24) Section 231-118-323—Trunk Translation Recent Change Procedures For TG, TGBVT, TRK, and CFTRK, and TGMEM (CTX-6 Through 1E5 Generic Programs)—2-Wire No. 1 Electronic Switching System With HILO 4-Wire Feature

(25) Section 231-318-303—Trunk Translation Recent Change Procedures For TG, TGBVT, TRK, CFTRK, and TGMEM (Through 1AE5 Generic Program)—2-Wire and HILO 4-Wire No. 1A Electronic Switching System

(26) Section 231-118-342—Recent Change Procedures For Expanded 911 (E911) Service, 1E5 Generic Program—2-Wire No. 1 Electronic Switching System

(27) 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

(28) Section 231-118-325—RC Procedures For PSWD, GENT, PSBLK, SUBTRAN (CTX-6

Through 1E5 Generic Programs)—2-Wire No. 1 Electronic Switching System With HILO 4-Wire Feature

(29) 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

(30) Section 231-318-305—RC Procedures for PSWD, PSBLK, SUBTRAN, and GENT (Through 1AE5 Generic Program)—2-Wire and HILO 4-Wire No. 1A Electronic Switching System

(31) Section 231-118-321—General Recent Change Information (CTX-6 Through 1E5 Generic Programs)—2-Wire No. 1 Electronic Switching System

(32) Section 231-318-301—General Recent Change Information and Rollback Procedures—2-Wire No. 1A Electronic Switching System

(33) Section 231-318-308—RC Procedures for DALNK, DAMBI, DAMSK, DATER, ESCO, ESN, and TNESN (Through 1AE5 Generic Program)—2-Wire No. 1A Electronic Switching System

(34) 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

(35) Section 231-318-302—Line Recent Change Procedures for LINE TWOPTY, MPTY, SCLIST, MLHG, ACT, and CFV (Through 1AE5 Generic Program)—2-Wire No. 1A Electronic Switching System

(36) Section 231-118-331—Centrex/CO ESSX-1 Recent Change 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

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

(38) Section 231-120-301—Traffic Measurements—2-Wire No. 1 Electronic Switching System

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(40) Section 231-061-210—Service Circuits— Network Design—2-Wire No. 1 Electronic Switching System

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(42) Section 476-270-001—2B ACD Business Services Traffic Engineering Automatic Call Distributing System

(43) Section 255-500-100—Data Management System (DMS) and Automatic Location Identification (ALI) System Used With Emergency 911 (E911)—Description

(44) Section 255-500-101—Data Management System (DMS) and Automatic Location Identification (ALI) System Used With Enhanced 911 (E911), DMS/ALI Computer Operating Procedures

(45) Section 255-500-102—Data Management System (DMS) and Automatic Location Identification (ALI) System Used With Enhanced 911 (E911), DMS Operating Procedures

(46) Section 255-500-103—Data Management System (DMS) and Automatic Location Identification (ALI) System Used With Enhanced 911 (E911), ALI Operating Procedures

(47) Section 255-500-104—Data Management System (DMS) and Automatic Location Identification (ALI) System Used With Enhanced 911 (E911), DMS/ALI Acceptance Tests

(48) Section 231-048-303—Trunk Translation 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 System

(49) Section 231-048-304—Rate and Route Translation Recent Change 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

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

(51) Section 231-048-307—Traffic Measurement Recent Change Formats for DIGTRN, TRFSLB, TRFLCU, TRFHC, TNCTX, CTRF, and NUTS (1E6 and 1AE6 Generic Programs)—2-Wire No. 1 and No. 1A Electronic Switching Systems

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

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

B. General Letters

(1) GL 73-04-203—Office of Telecommunications (OTP) National Policy for Emergency Telephone Number 911

(2) GL 73-05-121—Rate Considerations Involved in Providing Basic 911 Service

(3) GL 73-09-013—No. 1 ESS—Development of New Features For Universal Emergency Service Number 911

(4) GL 73-10-060—911 Emergency Service Recommended Rate Treatment of the 911 Emergency Service Trunk

(5) GL 74-04-149—No. 1 ESS—Development of New Features For Universal Emergency Service Number 911

(6) GL 74-12-121—911 Emergency Service— Additional Information on 911 CO Equipment Including No. 2 ESS and Crossbar Tandem

(7) GL 75-05-039—8A Key Telephone System For Basic 911 Service

(8) GL 76-03-292—Marketing of 911 Emergency Service

(9) GL 76-09-034—Rate & Tariff Guidelines for the 8A Key Telephone System For Use With Basic 911 Service

(10) GL 77-07-045—Operating Instruction Manual for 8A Key Attendant's Position

(11) GL 77-09-023—Illustrative Tariff For Universal Emergency Number Service (Basic 911)

(12) GL 77-09-171—Expanded 911 Emergency Service—System Description

(13) SL 79-10-344—Enhanced 911 (E911) Service—Tariff and Pricing Guidelines

(14) GL 77-11-200—Detailed Information on Conversion of Traffic Facilities Practices and Dial Facilities Practices to the Bell System Practices Series

(15) GL 78-03-243—No. 1/1A ESS—Traffic Counts on 3-Ports

(16) GL 78-09-279—Expanded Universal Emergency Number 911 (E911) System—Description and Ordering Guide

C. TTY Input and Output Manuals

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

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

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

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

D. Other Documentation

(1) Translation Guide TG-1A

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

(3) Translation Output Configuration 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

(7) Trunk and Service Circuit Engineering Specification J1A063A-1, No. 1 Electronic Switching System

(8) Parameter Guide PG-1A—No. 1A Electronic Switching System