OPERATION WITH ENGINEERING

AND ADMINISTRATIVE DATA ACQUISITION SYSTEM FEATURE

FEATURE DOCUMENT

1"ESS*" SWITCH

CONTENTS	PAGE

INTRODUCTION

1. GENERAL INFORMATION

SCOPE

1.01 This practice describes the Operation With Engineering and Administrative Data Acquisition System (EADAS) feature for the 1ESS switch.

REASON FOR REISSUE

1.02 Revision arrows are used to emphasize significant changes. This practice is reissued for the following reasons:

(a) To delete references to inactive generic programs

(b) To provide coverage through the 1E8 generic program

(c) To make minor corrections.

FEATURE AVAILABILITY

1.03 The EADAS feature is available with all active generic programs. The EADAS feature is optionally loaded via the EADAS interface and network management (EADAS) feature group. With 1E7 and earlier generic programs, when the EADAS feature group is loaded, the network management code blocking on toll translators (NMTC) feature group must also be loaded. ♦The NMTC feature group is not used with 1E8 and later generic programs.♦

1.04 The Synchronization With EADAS feature is available with the 1E7 and later generic programs and is included in the EDAS feature group.

2. DEFINITION/BACKGROUND

DEFINITION

2.01 The *Operation With Engineering and Administrative Data Acquisition System (EADAS)* feature provides an interface between a 1ESS switch and a near real-time data collection and surveillance system.

BACKGROUND

2.02 The EADAS feature consists of a centrally located data collection computer (CCU) which:

(1) Collects and summarizes peg count and usage data

(2) Performs arithmetic calculations on the summarized data

(3) Reports calculation results which exceed predefined limits to remotely located dial administrators

(4) Records the summarized data on magnetic tape for downstream processing

(5) Forwards certain selected data every 5 minutes and discrete status data every 30 seconds to the network management EADAS (NMEA).

The ESS switch interface with the EADAS is a high-speed interface operating in half duplex and transmitting at a 1200-baud rate.

2.03 With EADAS, only a small portion of the traffic data is presented to the traffic TTY channels. The remainder of the traffic data is sent, upon request, to EADAS for analysis. However, EADAS performs limited data analysis; primarily, it transmits data for downstream processing and performs exception reporting. The content of data analysis performed by EADAS is a function of the calculation set specified by the network administration. See Table A for directing traffic second overload data when operating in conjunction with EADAS.

◆TABLE A◆

DESTINATIONS OF TRAFFIC SCHEDULE OUTPUTS

SCHEDULE	DESTINATION		
	WITHOUT EADAS	WITH EADAS	WITH NETWORK MANAGEMENT
Hourly (H)	Print at ESS switch	To EADAS only	To EADAS only
Continuous (C)	Print at ESS switch	To EADAS only	To EADAS only
Fixed quarter hour (TC15)	Print at ESS switch	Print at ESS switch + to EADAS in H and C	Print at ESS switch + to EADAS in H and C
Selected quarter hour (DA15)	Print at ESS switch	Print at ESS switch + to EADAS in H and C	Print at ESS switch + to EADAS in H and C
Daily traffic counts (TDR01)	Print at ESS switch	To EADAS only	To EADAS only
Weekly (W)	Print at ESS switch	To EADAS only	To EADAS only
Special studies schedule (S1, S2, S3)	Print at ESS switch	Print at ESS switch	Print at ESS switch
TC24A*, TC24C†, TC24Z‡	Print at ESS switch	To EADAS only	To EADAS only
HILO quarter hour (HL15)	Print at ESS switch	Print at ESS switch	Print at ESS switch
Connected trunks per group (CT/G)	Print at ESS switch	Print at ESS switch	Print at ESS switch
NM10 — Count of traffic handled by office during the last clock quarter hour	—	—	To EADAS only
NM11 — Count of calls being code blocked	—	—	To EADAS only
NM12 — Count of active preprogram trunk group controls	—	—	To EADAS only
NM24 — Count of active flexible trunk group controls	—	—	To EADAS only

See footnotes at end of table

♦TABLE A♦ (Contd)

DESTINATIONS OF TRAFFIC SCHEDULE OUTPUTS

* TC24A is an output message appearing on the traffic TTY. It is the 24-hour cumulative total of 25 specific traffic counts.

† TC24C is an output message printed in response to input message TC-GENP. The following information is collected:
  (1) Coin zone calls by initial charge condition.
  (2) The number of orignating calls according to chart column class of service.
  (3) The number of times a particular line is found busy. Fifty counts will follow the heading TC24C and will be either category 1, 2, or 3 or the combination of 1 or 2 or 3.

‡ TC24Z is an output message printed in response to input message TC-GENP. Up to a maximum of 32 counts will follow the heading TC24Z indicating whether routine to count coin attempts by initial charge condition has been activated.

2.04 The ESS switches equipped to send network management data to EADAS do so only via the request from EADAS. These requests come once every 30 seconds in the case of status and event discrete indicators, and once every 5 minutes in the case of network management traffic data. Discrete indicators are relayed directly through EADAS to the NMEA for immediate observation by network managers. They are maintained in call store associated with the NMEA interface feature and are updated every 2 seconds by the 1ESS switch. Therefore, when EADAS polls for discrete indicators, the network managers receive a near real-time indication from the ESS switch vital signs (receiver delays, queue overflows, trunk group control counts, dynamic overload control functions, etc).

2.05 The 5-minute traffic data can also be supplied in a near real-time environment. The 5-minute data consists of peg counts of calls affected by code blocks, preprogrammed trunk group controls, flexible trunk group controls, and counts from the hourly (H) and continuous (C) traffic schedules selected for 5-minute collection.

2.06 With 1E7 and later generic programs, the Synchronization With EADAS feature provides added intelligence to the EADAS interface in the 1ESS switch. This added intelligence is designed to prevent clock synchronization problems by giving the EADAS a larger polling window and more control over the interface. The ESS switch can now detect when synchronization is being lost. An output message is printed at the network management, traffic 1, traffic 2, and local maintenance TTY channels.

DESCRIPTION

3. USER PERSPECTIVE

CUSTOMER

3.01 Not applicable.

TELEPHONE COMPANY

3.02 The traffic data collected is obtained from 1ESS switches over a dedicated high-speed data link. This data link is a 4-wire facility which transmits and receives at a 1200-baud rate. Although the data link can transmit and receive at a high data rate, the transmission between a 1ESS switch and the EADAS is not continuous. Data can be transmitted and received at either end but not simultaneously. Although the data link is full duplex, it operates as if it were half duplex.

3.03 The H and C traffic counts are collected in accumulating registers in the ESS switch by call processing, maintenance, and administrative programs. The collected traffic data is then transferred to holding registers according to a specific schedule. This schedule is a fixed part of traffic program routines. Daily and weekly traffic counts are also collected in accumulating registers concurrently with the H and C data.

3.04 The collected (H, C, daily, and weekly) traffic data is transmitted to the EADAS from an ESS switch only upon request. An ESS switch never sends unrequested data to the EADAS. The EADAS data requested from the ESS switch is transmitted over the data link as logical collections of 8-bit characters called polls. Each character in the poll is transmitted back to the EADAS as an error check and as a signal to send the next character. The retransmission of each character by the ESS switch to the EADAS is called echoing.

3.05 There are three types of polls:

(a) Traffic polls

(b) Interface polls

(c) Network management polls.

The first character of the traffic poll identifies the poll. The second character contains the requested block number. The third character is an all zeros character affirming the echoed second character, if the echoed second character is correct. If the format of the poll received by the ESS switch is incorrect, an all ones character is sent in lieu of an echo of the all zeros character indicating to EADAS that the request is to be started over. However, if any of the echoed characters received at EADAS are incorrect (that is, the character received does not match the character sent), EADAS will transmit an all ones character to the ESS switch. The ESS switch then echoes back to EADAS indicating that it will reinitialize for receipt of another poll.

3.06 Interface polls request data concerned with the interface between EADAS and the ESS switch. The data consists of verification of trunk groups, traffic schedules, and the ESS switch clock time. In addition, interface polls are used to reset discrete indicators [see reference A(3) in Part 18], notify the ESS switch if EADAS is temporarily down, and request the last block of data transmitted to be repeated. (See Table B.) Interface poll requests are composed of four characters, each of which is echoed back to EADAS by the ESS switch. The first character identifies the type of poll request. The second and third characters contain data that varies with different types of requests. The fourth character is an all zeros check character.

3.07 Network management poll requests are composed of 4 to 64 characters, each of which is echoed back to EADAS by the ESS switch. For details concerning network management polls, see reference A(3) in Part 18.

3.08 Once a poll request has been accepted by the ESS switch and properly echoed back to EADAS, the requested data block is sent. Between requests for data blocks, the ESS switch continues to update information according to a fixed parameter defined schedule. Thorough coordination between the ESS switch, the EADAS center and dial administrator is required to provide awareness of the collection schedule so the data is properly interpreted.

3.09 The ESS switch can operate in three modes with respect to EADAS: EADAS, non-EADAS, and NMEA. Operation in the EADAS mode allows the EADAS center to access the traffic data. In the non-EADAS mode, all scheduled traffic information, plus exception counts, are printed on the traffic TTYs per the traffic map. For operation in the NMEA mode, see reference A(3) in Part 18.

3.10 The Synchronization With EADAS feature (1E7 and later generic programs) provides added intelligence to the EADAS interface in the ESS switch. This added intelligence is designed to minimize clock synchronization problems by giving the ESS switch the ability to recognize polls which arrive before the data is collected (early poll). Upon receipt of an early poll, the ESS switch waits until the new data has been collected before responding to the poll. An output message (EAD01-CLK) is printed at the network management, traffic 1, traffic 2, and local maintenance TTY channels to indicate that a poll has been received early (ESS switch clock is greater than 20 seconds slow). The EAD01-CLK output message carries a minor alarm and the message is not printed more than twice in a 12-hour period. This avoids printing the message every 5 minutes if the clocks cannot be synchronized immediately.

3.11 The ESS switches, which serve as host to one or more Remote Switching Systems (RSSs), send RSS daily traffic data to the EADAS. When the EADAS polls the ESS switch for RSS daily traffic data, the ESS switch sends counts for all equipped RSSs. If selected line concentrator counts are being collected on one of the RSSs, these counts follow the daily counts for the last equipped RSS. If there are no equipped RSSs in the office, the ESS switch sends

TABLE B

INTERFACE POLLS

GENERAL FORMAT OF
THE INTERFACE POLL

7	6	5	4	3	2	1	0
1	1		IDENTIFIER				
	MISCELLANEOUS						
	INFORMATION						
0	0	0	0	0	0	0	0

TYPE OF POLL	NUMBER IDENTIFIER	CONTINUATION CLASS	ADDITIONAL DATA CAN BE REQUESTED VIA CONTINUATION POLL	CAN BE INTERLEAVED WITH	MISCELLANEOUS INFORMATION
EADAS temporary down	1	NA	NA	NA	In the second character, NNN appears in the low order bits. NNN is the number of hours to inhibit automatic switching of the mode at the ESS switch to the non-EADAS mode $(0<NNN\leq5)$.
Verify H&C 5-minute items (NM)*	2	2	Yes	All except a continued class 2	
Class 2 continuation request for various verify messages	3	2	NA	NA	In the second character, bit position 1 is set to 1 to indicate a class 2 continuation request
Repeat last block	4	NA	NA	NA	
Reset event discretes (NM)*	5	NA	NA	NA	
Send discretes block then reset status discretes to off (NM)*	6	NA	NA	NA	
Verify all trunk groups (NM)*	7	2	Yes	All except a continued class 2	

*NM — Network management polls for EADAS/Network Management

INTERFACE POLLS

```
        7  6  5  4  3  2  1  0
```

1	1		IDENTIFIER	
GENERAL FORMAT OF	MISCELLANEOUS			
THE INTERFACE POLL	INFORMATION			
0	0	0	0	0	0	0	0

TYPE OF POLL	NUMBER IDENTIFIER	CONTINUATION CLASS	ADDITIONAL DATA CAN BE REQUESTED VIA CONTINUATION POLL	CAN BE INTERLEAVED WITH	MISCELLANEOUS INFORMATION
Verify one trunk group (NM)*	8	NA	No	NA	The second character bit positions 0—7 and the third character bits 0—3 contain the trunk group in binary.
Verify H schedule all data	9	2	Yes	All except a continued class 2	
Set all discretes on (NM)*	10	NA	NA	NA	
Verify time	11	NA	No	NA	
Verify C schedule all data	12	2	Yes	All except a continued class 2	
Send W schedule traffic map	13	NA	No	NA	
Reinitialize internal flags in the ESS switch EDAS program	14	NA	No	NA	

*NM — Network management polls for network management control — EADAS (NMEA)

an all ones character signifying a rejection of the poll. See reference A(8) in Part 18 for further details of the RSS daily traffic data.

4. SYSTEM OPERATION

HARDWARE

4.01 The hardware interface interconnecting the 1ESS switch and EADAS consists of a modified transmit/receive (T/R) unit, SD-1A147 (Issue 5AC or later), with options ZE and ZI. A supervisory master scanner number scan point (SC13) is provided with option ZE. Option ZI provides an EADAS clock option via an A1128 circuit pack (SG26). This circuit pack generates 1200-baud clock pulses from a crystal oscillator. The T/R unit is mounted on the miscellaneous trunk frame J1A033C.

4.02 The data link consists of a 4-wire dedicated path with a 202T data set attached to each end. Under normal operation, 8-bit data characters are passed to a 202T data set which converts the data to a transmittable form. The data is transmitted to EADAS where a data set converts the data back to 8-bit characters and sends it to a channel interface circuit.

4.03 The EADAS feature employs a minicomputer system which stores and analyzes traffic data.

The minicomputer's associated hardware consists of core memory, bulk storage device (disc), magnetic tape unit, local TTY, and input/output interface circuits. For details on EADAS hardware, see reference A(2) in Part 18.

OFFICE DATA STRUCTURES

A. Translations

4.04 The EADAS feature uses a data link consisting of a modified T/R unit. This unit requires the normal unit type (UTYP) translations (UTYP 10) for T/R units, but is fixed as member number 23. (See Fig. 1.) The auxiliary block is laid out identically with other T/R units except the quantity of bipolar central pulse distributor points changes to two (channel select [CSEL] is added) and a supervisory master scanner number scan point (SC13) is added.

B. Parameters/Call Store

4.05 The EADAS feature requires two parameter words (N2EADAS and N2EADAC). These two parameter words point to call store blocks referred to as the input/output scratch area and the control scratch area, respectively. When set card EDAS = 1, parameter word N2EADAS contains the address of the EADAS input and output buffers used by the EADAS program. (See Fig. 2.) In a central control

	22 18	17	16	15	14	13 0
WORD 0	WRDN=5	QUANT=2				CPDN
WORD 1	QUANT=0	SDF				
WORD 2	QUANT=12	*		MSN (SUPERVISORY)		
WORD 3	QUANT=1	0	0	MSN (FAST)		
WORD 4	QUANT=2	0	0	0	0	CPDN

    * TTCRAFT

LEGEND:
        CPDN - Central pulse distributor number
         MSN - Master scanner number
         SDF - Signal distributor frame
    TTCRAFT - Trunk test craft group

Fig. 1—Unit Type 10 Auxiliary Block

(CC) switch, parameter word N2EADAS points to a 273-word call store block EADASB. In a signal processor (SP) switch, N2EADAS points to a 257-word call store block SPEDPR.

4.06 Parameter word N2EADAS points to a call store block which contains various control items for the EADAS (Fig. 3). This block of call store, the EADAS control block (EADAC), is 14 words in length. With the 1E7 and later generic programs, the Synchronization With EADAS feature uses five existing items in the EADAC call store block.

4.07 The EADAS feature uses parameter set cards ED0030 and ED1545 to determine the collection intervals for H and C traffic measurement data for EADAS. Set card ED0030 is set to one when collection of the H and C schedule traffic measurement data for EADAS is on a 30-minute basis, ie, collection on the hour and the half hour. Set card ED1545 is set to one when collection of the H and C schedule traffic measurement data for EADAS is on a 30-minute basis, ie, collection quarter past the hour and quarter

til the hour. In order to collect H and C schedule traffic measurement data for the EADAS on a 15-minute basis (every 15 minutes), ED0030 and ED1545 must be set to one.

FEATURE OPERATION

4.08 When a 1ESS switch is operating with EADAS, traffic data is transmitted from the ESS switch to EADAS via a data link. Initiation of the data transferal process begins with a poll request from EADAS. The ESS switch returns each character of the poll request received from EADAS as an error check. Bit 7 and/or bit 6 of the first character (8 bits) of the poll indicates the type of request. The feature flow diagram for operation of the ESS switch with the EADAS is shown in Fig. 4.

4.09 The basic traffic information poll for H, C, Daily, and Weekly Traffic Measurements schedules consists of three characters. The first character (8 bits) contains a one in bit position 7, and bits 6 through 0 are zero. The character received by an

36	23	22	0
0		*	
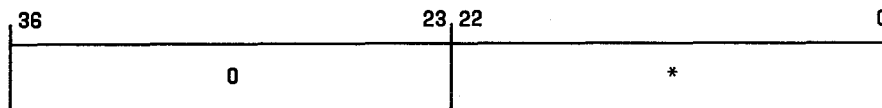
PROGRAM STORE
* Equal to EADASB in CC 1ESS switch. Equal to
  SPEDPR in SP 1ESS switch.

LEGEND:
    EADASB - Address of 273-word EADAS input/output buffer
    SPEDPR - Address of 257-word EADAS input/output buffer

Fig. 2—Parameter Word N2EADAS—EADAS Buffer Pointer

36	23	22	0
0		EADAC	
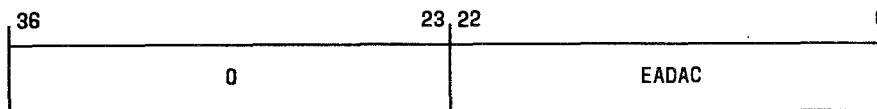
PROGRAM STORE

LEGEND:
    EADAC - Address of a block of call store used for
        control purposes by the EADAS feature

Fig. 3—Parameter Word N2EADAC—EADAS Control Pointer
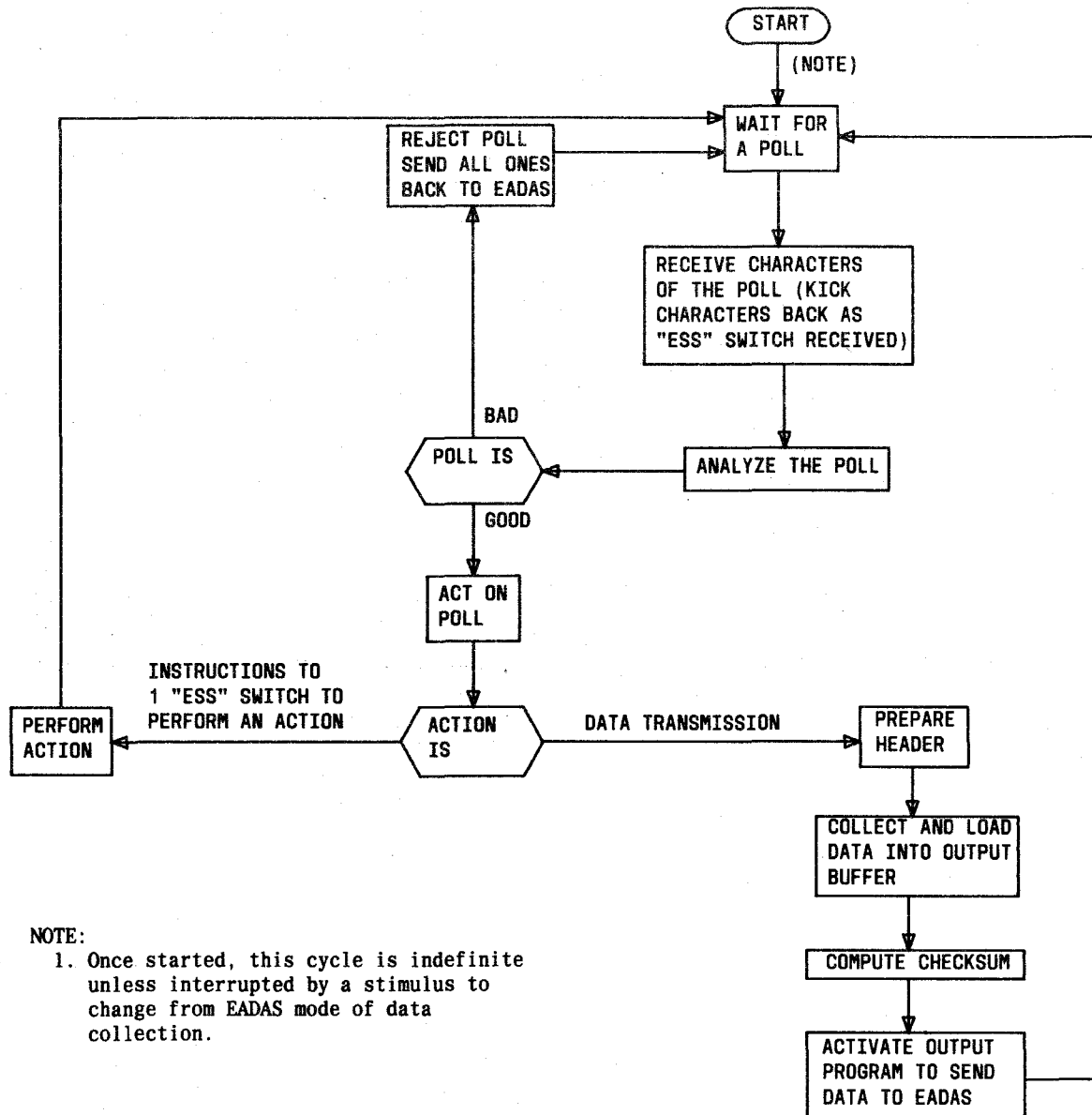
Fig. 4—Operator With EADAS Feature Flow Diagram

ESS switch is analyzed for abnormalities. If no abnormalities exist, an identical character is transmitted back to EADAS over the data link. Upon receiving the returned correct character, EADAS sends the second character indicating the block number of the traffic poll. (See Table C for applicable block numbers index.) This character is echoed back to EADAS. Finally, the third character, consisting of all zeros, is sent by EADAS. Error checking is then performed by the ESS switch. If no errors exist in the format of the poll, the character is transmitted back to EADAS. If an error appears in any character of the requested poll, the ESS switch sends back an all ones character to EADAS indicating an error condition. An all ones returned request poll character is also an indication to EADAS to start the poll once again. Similarly, the EADAS sends an all ones indication when the ESS switch returns a character of a poll request if the character gets mutilated in retransmission over the data link.

TABLE C

TRAFFIC DATA POLLS

```
7   6   5   4   3   2   1   0
┌───┬───┬───┬───┬───┬───┬───┬───┐
│ 1 │ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │
├───┴───┴───┴───┴───┴───┴───┴───┤
│         BLOCK NUMBER          │
├───┬───┬───┬───┬───┬───┬───┬───┤
│ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │
└───┴───┴───┴───┴───┴───┴───┴───┘
```

GENERAL FORMAT OF
TRAFFIC DATA POLL

TYPE OF POLL	BLOCK NUMBER	ADDITIONAL DATA CAN BE REQUESTED BY CONTINUATION POLL	CONTINUATION CLASS	POLL CAN BE INTERLEAVED WITH
H Schedule (15 or 30 minutes)	1—39	No	NA	All except C schedule
C Schedule (15 or 30 minutes)	40—59	No	NA	All except H schedule
Daily (TC24A TC24C TC24Z)	64	No	NA	NA
Division of revenue (daily)	65	No	NA	NA
Subscriber line usage (weekly)	128	Yes	0	
Selected concentrator usage (weekly)	129	Yes	0	All except a continued class 0
Total line concentrator usage (weekly)	130	Yes	0	
Trunk switch frame grid usage (weekly)	131	Yes	0	
Network management traffic (5 minute)	60, 61	Yes	NA	All
H and C counts overflowed from block 16	62, 63	No	NA	NA

4.10 After receipt of a correct and valid traffic poll request, the ESS switch transmits a block of data over the data link to EADAS. This block of data is 503 characters long consisting of a 2-character header, 500 characters representing the contents of up to 250 traffic registers, and a 1-character check sum. Each character consists of 8 bits. The first character identifies the block number of the traffic poll. The second character contains the time of the last update of the data block. The format of time gives the hour of the day between 0 and 11 and the minutes to the last 5 minutes. These 2 characters are followed by 500 information characters. Two characters (16 bits) make one word. At the end of the block of data is a check sum character. The check sum character is the

bits in the block of data summed vertically, and the excess over 8 bits is discarded (Fig. 5). The check sum character, sent with the block of data, is used as a reference. After the data is sent, the check sum is computed again and compared to the check sum sent with the data block. If they agree, the data is accepted; if they do not agree, the EADAS requests a repeat of the last block poll.

4.11 Interface polls, similar to traffic polls, are general requests for miscellaneous information. In an interface poll, the first character of the request has ones in bit positions 6 and 7. The remaining six bits of the character are used to identify the data block request.
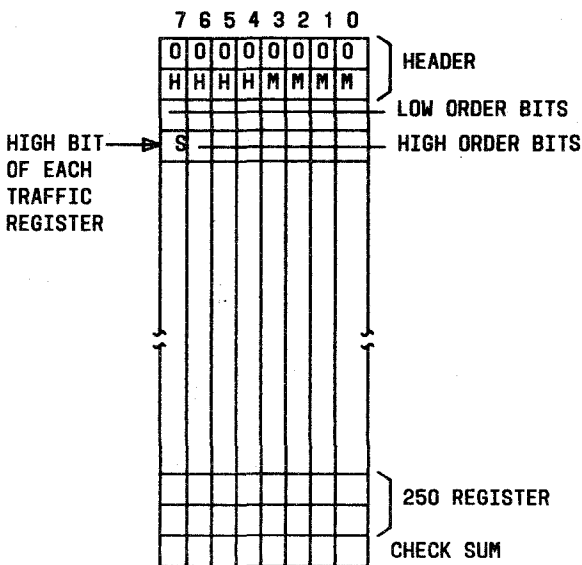

Fig. 5—Traffic Poll and Output Data Block Layout

4.12 Network management polls are identified by a zero in bit 7 of the first character in the poll request. For additional information pertinent to network management polls, see reference A(3) in Part 18.

4.13 Since ESS switch traffic registers use 21 bits of a 23-bit word, while the EADAS data words contain 16 bits, some traffic counts must be scaled. If a traffic count is equal to or greater than 2^{15}, it is scaled by a factor of 64 and rounded by a factor of 32. Bit 15 of the word containing scaled data is set, indicating that the data is scaled. Essentially, the 16 high-order bits (21 through 6) of the ESS switch register are right adjusted, and bit 5 is used for rounding. Thus if the high-order bit of the second character of a word is a one, the word contains scaled data. A word is composed of the two 8-bit characters; the first character contains the low-order bits, and the second character contains the high-order bits.

4.14 Raw data is transmitted to the EADAS as a result of a traffic information poll. No identification of the traffic counts contained in a data block is transmitted with the requested information. Also, the last block of a poll group usually is not useful data, as it contains incorrect information already present in the buffer. Although some useless information is contained in the last data block, the check sum character is computed over the entire block. It is important that the ESS switch personnel, network administrator, and EADAS personnel work together to coordinate the traffic counts and the order in which they are provided.

4.15 A verify interface poll may be used to establish the order in which traffic counts of the H and C schedules are transmitted to the EADAS center as a result of a traffic poll (Fig. 6). Each traffic count has a number identifier, and a list of the identification numbers of traffic counts may be obtained by interface polls shown in Table C. See reference C(1) in Part 18 for the coding scheme used to relate a specific identifying number to each traffic count. The verification request identifies the type of count and not the accuracy of the data.

4.16 The data sent from the ESS switch in response to an interface request poll depends on the particular poll. The interface polls such as the "Request Verify Information for the H and C Item" poll (000010), the "Verify H Schedule All Data" poll (001001), and the "Verify C Schedule All Data poll

(001100) have a data output containing the information in the "Identification H and C Schedule Traffic Requirements" in Fig. 7. The output data block in Fig. 6 uses a 5-word sequence which produces the alternating information in the buffer format of Fig. 7. The interface poll "Send List of All Trunk Groups Including Number of Trunks and Direction" poll (000111) has a data output containing the information in the "Trunk Group Details" register shown in Fig. 8. The output data block (Fig. 6) uses a 4-word sequence which produces the information in the buffer format of Fig. 8.

4.17 The verify interface polls (Table C) and the weekly traffic polls differ from the H and C traffic polls in the method of continuing the data. In the H and C traffic data, EADAS must know how many blocks of data to request for each ESS switch. Interface and weekly traffic blocks have a continuation indicator in the high-order bit of the second character of the data block. The remaining bits of this second character comprise the subblock number. The EADAS feature can request subblocks of such a poll type via a continuation request interface poll until the continuation bit equals zero.

4.18 The ability to continue data from block to block allows polls to be interleaved. The criteria for interleaving is a consequence of the programming routines. Once EADAS polls for a particular type of data, say the H schedule, the polling must take place in ascending numerical sequence by the block number. The polling does not have to be continuous within the type of data requested; ie, any type of data can be interleaved with the exception of H and C schedule data and data within the same continuation class. The EADAS feature cannot interleave polls for data in the same continuation class. The continuation class codes are as follows:

CODE	CONTINUATION CLASS
0	Weekly polls
1	Network management polls
2	Verify polls.

4.19 The data rate for a poll from EADAS is 1200 baud, with a minimum of 100 ms between characters when transmitting to an ESS switch. The data rate for a transmission from the ESS switch to EADAS is also 1200 baud, with one character being

INTERFACE CONTINUATION POLL FROM EADAS FOR CLASS 2 VERIFY MESSAGES

7	6	5	4	3	2	1	0
1	1	0	0	0	0	1	1
0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

"ESS" SWITCH RESPONSE

7	6	5	4	3	2	1	0
1	1	0	0	0	0	1	1
0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

OUTPUT DATA BLOCK

1	1	X	X	X	X	X	X	} HEADER
F	S	S	S	S	S	S	S	

(followed by DATA block rows and CHECK SUM)

LEGEND:

XXXXXX = 000010 for verify H/C 5-minute items (network management)

= 000111 for trunk group list

= 001001 for verify H all data

= 001100 for verify C all data

F = 1 There is still more data for this block; a continuation poll is necessary to get more data for this block. EADAS should keep requesting next subblocks of data until F = 0

= 0 No more data for this block

SSSSSSS = subblock number, where first requested continuation block is subblock 1, second is 2

CHECK SUM = the check sum is computed as the binary sum of all preceding 8-bit characters with the carry truncated to low 8 bits

Fig. 6—Interface Continuation Poll and Output Data Block Layout

TRANSMISSION WORD		TRANSMISSION WORD	
5 4 3 2 1 0 9 8		7 6 5 4 3 2 1 0	
TMC (0-4)		EGO	
* NUMBER OF EQUIPPED TRUNKS		TRUNK TYPE	TMC (6-5)
0 NO. MTCE BUSY TRUNKS	0	NO. OF MTCE BUSY TRUNKS	
TMC (0-4)		EGO	
* NUMBER OF EQUIPPED TRUNKS		TRUNK TYPE	TMC (6-5)

NOTE:

1. This format will repeat itself throughout the buffer of 500 transmission words. The 500 transmission word buffer (250 call store words) will accomodate 100 traffic register records. Although TMSs 0 thru 4, 6 and 23 are associated with trunk group numbers, only TMC 0 (trunk or service circuit usage) will have TG details transmitted. This avoids redundant computation of trunk group information but requires all trunk group numbers on which details are designed to have TMS = 0 associated with them. The last valid traffic register record will be immediately followed by a dummy record in which the TMC, EGO, trunk type and number of equipped trunks = 0. The trunk type has the following significance:

   000 = TG details not sent
   001 = 1-way outgoing trunk
   010 = 1-way incoming trunk
   011 = 2-way trunk
   100 = Miscellaneous

   Those type measurement codes other than TMC = 0 will result in only the TMC & EGO being transmitted. All other items will be 0.

* TMC (7)

LEGEND:
   TMC - Type measurement code
   EGO - Equipment group/office number

Fig. 7—Identification of H and C Traffic Requirements

sent every 15 ms. At this rate, a 503-character transmission (the most common data block) from the ESS switch to the EADAS requires approximately 7.6 seconds. Internal to the T/R interface, each 8-bit character is formatted into 11 bits. The three additional bits are used for framing in the actual data transmission circuitry.

4.20 Normally, the H and C schedules are polled at 15- or 30-minute intervals. The 30-minute intervals may occur on the hour and on the half hour or on the quarter hour and three-quarters of an hour.

However, EADAS cannot function with the three-quarters of an hour option. Data collection schedules vary according to office parameters. When EADAS fails to poll for data within a certain allocated amount of time, the EADAS interface is switched to the non-EADAS mode automatically by the ESS switch program. When operating on a 15-minute schedule, the switching occurs when no poll is sent within 30 minutes. On a 30-minute schedule, the switching occurs after a 45-minute absence of a poll. The NMEA mode requires traffic data on a 5-minute schedule and switches after a 10-minute absence of

TRANSMISSION WORD									TRANSMISSION WORD							
5	4	3	2	1	0	9	8	7	6	5	4	3	2	1	0	
NO. MTCE BUSY TRUNKS								TGN								
0	0	NUMBER OF EQUIPPED TRUNKS											TRUNK TYPE			MBY

NOTE:

1. This format will repeat itself throughout the buffer of 500 transmission words. The 500 transmission word buffer (250 call store words) will accomodate 125 trunk group number records. When trunk group details are requested for a single TGN, only one TGN record will be transmitted. When TG details are requested for all TGNs in the office, the complete 500 word data buffer will be transmitted. The last transmission buffer may be less than completely full; however, the complete buffer will be transmitted with the remaining unused words containing garbage. For a single TGN request, if the TGN is unassigned, only the TGN will be sent with the remaining items of the record equal to zero. When all TGNs are requested, only details on active trunk groups are sent. The last valid trunk group record will be immediately followed by a dummy record in which TGN = 0.

LEGEND:

TGN = Trunk group number
MBY = Make busy

Fig. 8—Trunk Group Details

a poll. See reference A(3) in Part 18. Once the ESS switch changes modes from EADAS to the non-EADAS mode, the data received at the traffic TTY on the first printout in the non-EADAS mode may be useless, because it is not a true representation of a full hour measurement. In the non-EADAS mode, traffic data is under control of the traffic map. In EADAS, traffic data is under control of the ESS switch program guided by the above-mentioned parameter information. The data loss resulting from the mode switch occurs in both directions, since traffic registers are initialized and used in different manners between the two modes of operation.

4.21 If an operational failure causes EADAS to go down, the ESS switch will (after failing to receive polls within the time periods specified above) automatically switch to the non-EADAS mode. A message is printed on both the traffic and maintenance TTY channels indicating an EADAS failure.

An ESS switch remains in the non-EADAS mode until manually restored to the EADAS mode of operation by a request on the maintenance, network administration, or network management TTY channel. The ESS switch may also be restored to the EADAS mode upon command from the EADAS. All polling of the ESS switch from EADAS while in the non-EADAS mode is ignored.

4.22 The EADAS feature is capable of sending an interface poll directing the ESS switch not to switch from the EADAS mode for a specified time in hours, even though the ESS switch is not receiving polls. However, in this circumstance, the ESS switch must have prior knowledge that EADAS is temporarily down. A maximum of 5 hours is allowed before the ESS switch changes to the non-EADAS mode. The ESS switch does not inhibit the reception of polls during the specified time interval; therefore, EADAS can resume polling before the end of the specified

time interval, and receipt of a poll cancels any inhibit-switch information previously received by the ESS switch. Thereafter, timing for polls once again occurs, as described in paragraph 4.19, unless another inhibit-switch interface poll is received.

4.23 In summary, the ESS switch can be placed into the non-EADAS mode from the EADAS mode either automatically, as described above, or manually by TTY request. The default after zeroing phases (phase 4 or higher) is the EADAS mode (assuming office parameters define an EADAS interface).

4.24 The existence of a time schedule for data transfer between EADAS and the ESS switch requires close clock synchronization. There is no direct connection which allows EADAS and the ESS switch to operate from the same clock. Each system independently maintains its own time-of-day clock in software. The maximum anticipated time error is 20 seconds; therefore, if EADAS desires data after a specific time, the request should come 20 seconds after the desired time. If there is any observed discrepancy in time, EADAS may poll for time verification (interface poll identifier number 11 [Fig. 9]). The ESS switch responds with what it calculates to be the correct time to the nearest 100 ms. Also, each traffic data block contains the time of its last update. Significant time differentials are easily recognized. Loss of clock synchronization causes data loss and alarms at the EADAS center.

4.25 One other area of concern related to the clock time is the order of polling for traffic counts. If a certain traffic count is updated every 30 minutes, the EADAS center has a 30-minute interval to poll for the count. The EADAS should not schedule to collect a sequence of data blocks near the end of the 30-minute interval with the 30-minute traffic counts located near the end of the sequence, because the possibility of losing the data becomes greater. With NMEA, some H and C items are flagged for 5-minute collection; therefore, in an ESS switch with NMEA, poll scheduling is even more critical.

4.26 With 1E7 and later generic programs, the Synchronization With EADAS feature minimizes clock synchronization problems in that it provides added intelligence to the EADAS interface in the ESS switch. The synchronization with EADAS polling protocol affects only the 5-minute and H and C schedule blocks (blocks 1, 40, and 60). These polls

are always the first to be requested. The protocol for all other types of polls (division of revenue, daily counts, weekly counts, and all interface polls) remains unchanged.

4.27 When the first poll of a new polling period is received, the ESS switch first checks to see if the traffic data has been collected. If it has, the ESS switch sends the data response immediately. If it has not, the ESS switch checks its clock to see if traffic collection for the pending poll starts within 25 seconds. If it starts, the ESS switch waits for traffic to complete before sending the data response. Because traffic collection may take a maximum of 10 seconds to complete, the EADAS can expect a maximum wait of 35 seconds for a data response from the ESS switch. Each poll received early results in an EAD01-CLK output message being printed at the network management, traffic 1, traffic 2, and local maintenance TTY channels.

4.28 The EADAS feature has the option of sending an abort character rather than waiting for the response to an early poll or when the 35-second timeout period has expired. This abort poll zeroes the "early poll" indicator so normal polling can resume.

CHARACTERISTICS

5. FEATURE ASSIGNMENT

5.01 The EADAS feature is provided on a per 1ESS switch basis.

6. LIMITATIONS

6.01 With EADAS, the majority of the 1ESS switch traffic data is sent to the EADAS (in the EADAS mode); the only measurements available on the local TTY are the TC15, DA15, S1, S2, and S3.

6.02 Once a poll from EADAS is received early, the ESS switch does not allow any more polls of any type until the response to the early poll has been sent. With 1E7 and later generic programs, an "abort poll" message can be sent by EADAS, which resets the ESS switch to a "waiting for a poll" status. All other polls, including the 30-second discrete indicators for network management and all interface polls, are not allowed during this time.

TIME VERIFICATION
POLL FROM EADAS

7	6	5	4	3	2	1	0
1	1	0	0	1	0	1	1
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

"ESS" SWITCH RESPONSE

7	6	5	4	3	2	1	0
1	1	0	0	1	0	1	1
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

OUTPUT DATA BLOCK

HEADER

NUMBER OF WORDS
OF TRANSMISSION
(EXCLUSIVE OF
CHECK SUM)

DATA

HOURS
MINUTES
SECONDS
100 MSECS.

CHECK SUM

LEGEND:

DATA - Returns the time indicated
by the 1ESS switch clock.
The time returned is 24-hour
military style time.

CHECK SUM - The check sum is computed as
the binary sum of all
preceding 8-bit characters
with the carry truncated to
low 8 bits.

Fig. 9—Time Verification Poll and Output Data Block

7. INTERACTIONS

7.01 With 1E7 and earlier generic programs, the Network Management Code Blocking on Toll Translators (NMTC) feature group must be installed in an ESS switch if the EADAS feature group is to be used. ▶The NMTC feature group is not used with 1E8 and later generic programs.◀

7.02 The Synchronization With EADAS feature requires that the EADAS computer increases its time-out period from the current value of 4 seconds to 35 seconds to allow the ESS switch time to respond to an early poll.

8. RESTRICTION CAPABILITY

8.01 The EADAS feature can be denied access to a 1ESS switch via a TTY input. This TTY message, EADAS-STAT, enables the ESS switch to change to the EADAS mode from the non-EADAS mode and vice versa. Also, this message can be used to request an output message defining the current mode of operation in an ESS switch. Access to the ESS switch may be manually denied via TTY input, or automatically denied by system operation as described in paragraph 4.20.

INCORPORATION INTO SYSTEM

9. INSTALLATION/ADDITION/DELETION

9.01 The installation/addition/deletion procedures provide the 1ESS switch with the EADAS feature as described in Fig. 10. Refer to Part 13 for testing.
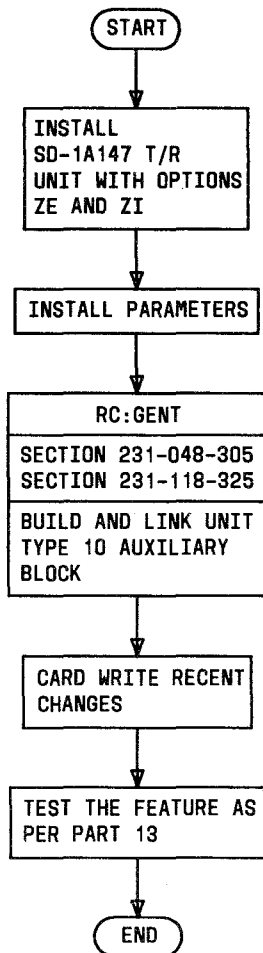


```
        ( START )
            |
            v
    +-----------------+
    | INSTALL         |
    | SD-1A147 T/R    |
    | UNIT WITH OPTIONS|
    | ZE AND ZI       |
    +-----------------+
            |
            v
    +-----------------+
    | INSTALL PARAMETERS|
    +-----------------+
            |
            v
    +-----------------+
    | RC:GENT         |
    +-----------------+
    | SECTION 231-048-305|
    | SECTION 231-118-325|
    +-----------------+
    | BUILD AND LINK UNIT|
    | TYPE 10 AUXILIARY |
    | BLOCK           |
    +-----------------+
            |
            v
    +-----------------+
    | CARD WRITE RECENT|
    | CHANGES         |
    +-----------------+
            |
            v
    +-----------------+
    | TEST THE FEATURE AS|
    | PER PART 13     |
    +-----------------+
            |
            v
        ( END )
```

Fig. 10—Operation With EADAS Feature Installation Procedure

9.02 The following set cards are applicable to the EADAS feature:

- 9SEDAS—EADAS interface and network management feature group set card

- ♦9SNMTC—Network management code blocking on toll translators feature group set card (1E7 and earlier generic programs only)♦

- 9FEDAS—EADAS interface and network management feature package set card

- 9FNMEA—Network management EADAS feature package set card

- ♦9FNMTC—Network management toll code blocking feature package set card (1E7 and earlier generic programs only)♦

- EDAS—Set card defining whether or not the EADAS feature is provided

- ED0030—Set card indicating that the H and C traffic data for the EADAS is collected at 0 and 30 minutes past the hour

- ED1545—Set card indicating that the H and C traffic data for the EADAS is collected at 15 and 45 minutes past the hour.

See reference C(3) in Part 18 for further set card details.

10. HARDWARE REQUIREMENTS

10.01 The hardware required for the EADAS feature consists of a modified TTY T/R unit, SD-1A147-02, with options ZE and ZI. Option ZE is the addition of one bipolar central pulse distributor point and one supervisory master scanner number. Option ZI is the addition of the A1128 circuit pack (SG26). The modified TTY circuit, SD-1A147-02, requires 2 bipolar central pulse distributor points and 13 supervisory master scanner number scan points for system operation. The TTY T/R unit is mounted on the miscellaneous trunk frame J1A033C requiring six 2-inch mounting plates per unit. The current drain per equipment unit is 2.4A at +24V and 0.25A at −48V for the talking signal. For further details on EADAS hardware, see reference A(2) in Part 18.

11. SOFTWARE ENGINEERING

MEMORY

11.01 Software engineering data is provided herein for program stores (PS), unduplicated call

stores (UCS), duplicated call store (DCS), and file stores (FS) or, where applicable, the Attached Processor System (APS).

A. Base Generic Program (PS and FS or APS)

11.02 Approximately 110 words are required to provide the EADAS feature. These costs apply whether or not the feature is used.

B. Optionall Loaded Feature Package (PS and FS or APS)

11.03 ♦The EADAS feature requires the EDAS, NMEA, and NMTC (1E7 and earlier generic programs only) feature packages. The EDAS feature group consists of two feature packages (EDAS and NMEA) containing a total of 2900 words (1E6 and earlier generic programs only). With 1E7 and later generic programs, the EDAS and NMEA feature packages consist of 3014 words. The NMTC feature package consists of approximately 1430 words (1E7 and earlier generic programs only). Effective with the 1E8 generic program, the EADAS feature requires only EDAS and NMEA feature packages, not the NMTC feature package.♦

C. Parameters (UCS and FS or APS)

11.04 The EADAS feature requires two words. These words are fixed.

D. Call Store Requirements (DCS)

♦**11.05** The EADAS input/output buffer is equal to 273 words in a CC switch (EADASB), and the size is equal to 257 words in an SP switch (SPEDPR). The EADAS control block (EADAC) is equal to 14 words.♦

E. Translation (UCS and FS or APS)

11.06 When the EADAS feature is applied, six translation (program store) words are required for the unit type 10 translations. These six words consist of one word in the subtranslator and five words in the unit type 10 auxiliary block.

REAL TIME IMPACT

11.07 The real time impact of the EADAS feature is the difference in cycle time between a 1ESS switch with EADAS capabilities and a non-EADAS ESS switch. Each ESS switch collects the traffic counts; however, in an ESS switch with EADAS, the data is sent to EADAS instead of printing the data on the traffic TTY. The real time costs of sending data to EADAS is approximately 7125 cycles per block. The real time costs for data preparation in the ESS switch are listed in Table D. The cycle times for an ESS switch are as follows: 5.5 microseconds (0 percent speedup), 5.24 microseconds (5 percent speedup), or 5.0 microseconds (10 percent speedup). Clock speedup is available with all active generic programs.

12. DATA ASSIGNMENTS AND RECORDS

TRANSLATION FORMS

12.01 The following translation forms, detailed in reference C(1) in Part 18, are applicable to the EADAS feature.

(a) *ESS 1400—Traffic Register Assignment Record:* This form specifies traffic register assignment for use on the H and C schedules and selected quarter-hour (DA15) schedule. Also, this form contains traffic measurement assignments for the 5-minute traffic data polls used by NMEA. These assignments are supplied in a new column on the 1400 form. This form may also be used as an update form to indicate desired translation changes.

(b) *ESS 1600—Master Scanner Record:* This form is used to furnish master scanner assignment data. (Transmit/receive unit SD-1A147-02 with option ZE and ZI, used in the EADAS feature, requires a new supervisory scan point [SC13] for UTYP 10 member number 23.)

(c) *ESS 1601—Central Pulse Distributor Record:* This form is used to furnish central pulse distributor unit type translation data. The data link, modified T/R unit SD-1A147-02 with options ZE and ZI, requires a new bipolar central pulse distributor point. This changes the quantity of central pulse distributor points to two for UTYP 10, member number 23.

RECENT CHANGES

12.02 Not applicable.