SWITCHING SYSTEMS MANAGEMENT
NO. 4A/4M CROSSBAR
PERIPHERAL BUS COMPUTER
TRAFFIC DATA ADMINISTRATION SYSTEM

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FIGURES

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1. GENERAL

1.01 In addition to the onsite data processing and analysis of reports by the peripheral bus computer (PBC) for the No. 4 Crossbar Switching System, the PBC also has two methods to distribute data to the Traffic Data Administration System (TDAS) for downstream reports processing. This section will provide the network administrator with an overview of TDAS and PBC data collection and a general description of the methods for transmitting of data to TDAS.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 The title for each figure includes a number(s) in parentheses which identifies the paragraph(s) in which the figure is referenced.

2. TRAFFIC DATA ADMINISTRATION SYSTEM

2.01 As information is distributed from the 4A Electronic Translation System (ETS) office to the TDAS data base, it is identified as follows:

(a) Switching office identification

(b) Data collection unit (DCU) name

(c) Data collection device (DCD) number.

2.02 The first eight characters of the common language location identification (CLLI) for the switching office, which provides the city, state and building, will be used for the identification requirements.

2.03 The DCU name is a three character code that indicates the office type, office number, and data type. All 4A offices will be indicated with an "X" character for the office type. The office number will be a numeric character from 1 through 9. This number, which is supplied from Form Code 11 input, will be used by TDAS to distinguish between two or more 4A offices that are located in the same building and would therefore use the same first eight character CLLI. The data type provides a grouping or block of the data and is presently identified by the alpha characters of A, B, or D. Examples of the three DCU names are indicated below:

OFFICE TYPE	OFFICE NUMBER	DATA TYPE	GROUPING/BLOCK
X	n	A	Trunk Group Data
X	n	B	Traffic Separations Data
X	n	D	Common Control Data

Note: Data type "C" is unassigned at present time.

2.04 The DCD number defines the register within the DCU category. The terms ***DCD*** and ***register*** can be interchanged. Given the DCU name and the DCD number, a register is completely defined. The centralized TDAS data base maintains an entry for each DCU/DCD pair for each office. The entry specifies the information that the register contains (eg, the peg count for IT marker 0). A register definition record will define data type (peg count, overflow count, total usage, etc), circuit identification in common language form (for example, a trunk group name), and a qualifier to indicate whether the data contained in the register is scaled (divided by 10), slow scan, or fast scan usage. Figures 1, 2, and 3 indicate DCD/Register contents for DCU A, B, and D. The DCU D block has the DCD/Register contents further defined by peg count and usage on Fig. 4 and 5.

3. PERIPHERAL BUS COMPUTER DATA COLLECTION

3.01 The PBC collects data through three separate hardware interfaces:

(a) Bus to bus access circuit (BBAC)

(b) Traffic data converter (TDC)

(c) Traffic usage interface (TUI).

3.02 Data from the three PBC interfaces is accumulated in the 24-hour history file on the PBC disk storage unit. This master file consists of 48 separate files, each containing one hour's worth of 4A office performance data. On the hour and the half-hour, the oldest of the 48 files is destroyed to make room for the data for the 60-minute period just beginning. Since a new file is started every 30-minutes, the data in adjacent files overlap. One file contains data from 10 am to 11 am, for example, while the next contains data from the 10:30 am to 11:30 am period. At any given time, due to the overlap, two of the files do not contain a full hours worth of data, since they are currently being used to accumulate new data coming into the PBC. Figure 6 illustrates the historical data file concept.

3.03 Each of the 48 one-hour data files can be thought of as consisting of three sections.

The A section (corresponding to DCU A) consists of trunk group data; the B section (DCU B) consists of traffic separation data; the D section (DCU D) consists of common control equipment data. During normal PBC operation, these 48 data files provide an hour-by-hour record of traffic and plant data for the past 24 hours. These are the 48 files from which data will be selected for processing by the TDAS center.

3.04 In addition to the collection of data for the hourly files, the PBC periodically makes a record verification check (RVC) to determine the exact quantity of terminations associated with each DCD/usage register in the data collection units. This record verification check routine is run automatically once a day at 0215 hours and at system startup to scan PBC data tables. The RVC can also be manually initiated at any time to ensure up to the minute records. The results of this routine will be stored in a RVC file which will become like a 49th file for data collection results. There will be one termination count DCD in the RVC file for each usage DCD in the hourly files.

3.05 Figure 7 shows an example of the incoming trunk group usage portion of DCU A as it would be located in the hourly and RVC files. DCD 4000 contains a data integrity count of 360 in the hourly file and one RVC integrity count in the RVC file. Next DCD 4001 reflects data for an assigned trunk group (incoming use register 0001) of 20 hundred call seconds (CCS) in the hourly file and 10 registrations in the RVC file. That would equate out to two CCS per trunk circuit in the group. This arrangement would then continue for the remaining assignments as shown in the example.

4. TDAS-PBC INTERFACES—GENERAL

4.01 The two methods for distributing data from the switching system office to the TDAS are shown in Fig. 8. Method 1 enables the PBC through the TDAS selection schedules and tape generation program to produce an 800 bits per inch (BPI) magnetic tape. Information on the tape will consist of TDAS scheduled data from the hourly files and the most recent RVC results. Upon completion of the required transfer or dumping of data, the magnetic tape is then mailed to the TDAS location for preparation of downstream reports. Method 2 utilizes an optional dial up port (DUP) feature. This more sophisticated method requires a DEC serial input/output channel equipped with a 1200 baud 202S data set with automatic answering capability, which is connected to a standard 2-wire local subscriber loop at the switching office. The TDAS location must have a traffic data concentrator unit (TDCU) linked to a Digital Equipment Corporation (DEC) auto calling unit. With these features the TDCU may collect data from several switching offices on one magnetic tape which reduces the tap handling expense and minimizes the chance of human error in dumping or scheduling of data.

4.02 Presently only trunk group data (DCU A) is distributed to the TDAS location. For reporting purposes, these trunk groups are organized into eight administrative groupings, or categories. While setting up the PBC data base, office personnel will assign each trunk group to one of the eight administrative groups. The office has considerable flexibility when defining the eight categories, but the recommended definitions are listed below.

ADM GRP	CATEGORIES FOR TRUNK GROUPS
0	Associated company intertoll finals
1	Associated company intertoll high usage
2	Toll completing
3	Miscellaneous — (announcements, etc.)
4	Long lines intertoll finals
5	Long lines intertoll high usage
6	Overseas
7	Long lines — Associated company joint ownership

4.03 Onsite TDAS tapes generated by the PBC include data for all trunk groups, regardless of administrative category. However, the TDCU requests trunk group data for specific administrative groups of interest, in order to reduce data transmission time. The data base in the TDCU determines which administrative groups will be requested. The PBC can and will respond with data for any requested combination.

5. TDAS MAGNETIC TAPE PROCEDURES

5.01 The TDAS data selection schedules determine which traffic data is selected from the hourly data files for transfer to the TDAS tape. Each data type (A, B, or D) is controlled by a separate schedule. The three schedules are listed as part of the network administrator's schedule report, which can be requested on channel 23 using a scheduling input message. The TDAS portion of the schedule report is illustrated in Fig. 9. In the printout, and "XX" indicates that the associated data will be placed on the TDAS tape when the tape generation procedure is executed. A "—" indicates that the associated data will not be selected for the TDAS tape.

5.02 The 48 positions in each schedule represent the 48 one-hour data collection intervals in the day. The first row of the schedule refers to the even numbered intervals, which begin on the hour (0000, 0100, ----, 2300). The second row refers to the odd numbered intervals, which begin on the half (0030, 0130, ----, 2300). The times indicated by the column and row headings are start times for an interval.

5.03 The schedules can be set or altered anytime prior to the generation of the tape. They will remain in effect until the network administrator alters them using a scheduling input message or overwrites them using a copy-restore input message. The TDAS schedules are part of the network administrator's schedule file. The system maintains two versions or copies of this file: an active copy, which is the one that has effect, and a passive backup copy. Only the active copy of the file is altered by the schedule update commands. The relationship between the files is as follows:

(a) On system restarts or tape reloads, the active file is overwritten by the backup file. Since restarts are inevitable, any changes made to the active file are temporary changes.

(b) More permanent changes are made by changing the active file and then using a copy-save input message to copy the active file into the back-up file. These changes will then remain in effect until the next PBC reload from tape.

(c) Temporary changes in the active file can be erased at anytime by using a copy-restore input message to copy the backup file into the active file.

(d) To make schedule changes permanent, a new schedules and office data tape (service observing type) must be made after step (b) above is implemented.

5.04 The scheduling input message allows the network administrator to set up a suitable TDAS data selection schedule. The message has three basic formats, illustrated below. In all cases, the first parameter of the message is one character schedule identifier (A, B, or D) that indicates which schedule is to be altered. The second parameter is a subcommand (ON, OFF, or CLEAR) that indicates how the schedule will be altered. The ON subcommand is used to add an interval on the schedule. The OFF subcommand is used to delete an interval from the schedule. In both of these cases, a third parameter, the start time of the interval, must be specified. The CLEAR subcommand is used to erase an entire schedule, so that no data of that type will be included on the tape. It also supplies a quick way to force a schedule into a known state so that subsequent alterations can be made. The examples show three changes for the "A" schedule (trunk group data). The first input message adds the 1300 to 1400 interval to the schedule, while the second message deletes the 1330 to 1430 interval. The last example would clear the entire "A" schedule.

SKED:TDAS:A ON 1300

SKED:TDAS:A OFF 1330

SKED:TDAS:A CLEAR

5.05 A TDAS tape can be generated at any time. However, several factors should be considered before selecting a time of day for the job. The TDAS tape dump should be scheduled in the off-peak hours, sometime after the first period of interest (the last selected data collection interval) has passed. If the last selected interval is 1400 to 1500 (2 pm to 3 pm), for example, the tape dump can be scheduled anytime after 3 pm. It is also acceptable to schedule the TDAS dump in the early morning hours. For example, if the first period of interest of the day is 0900 to 1000 (9 am to 10 am), a dump of the previous day's data can be accomplished anytime before 9 am.

5.06 The TDAS tape generation routine puts a substantial load on the resources of the PBC (disk, tape unit, and memory). Therefore, the generation of tapes should be initiated during the less busy portions of the hour, if possible, and not right on the hour or half-hour, when the PBC is normally busiest.

5.07 The TDAS tape dump procedure basically consists of three steps.

(a) Mount a write-enabled tape on the PBC tape drive and make the drive ready.

(b) Instruct the PBC to begin the process of selecting, formatting, and transferring the PBC data onto the tape.

(c) When the tape rewinds to its start, remove and store it.

5.08 The magnetic tape selected for the TDAS dump must have a write ring. A label should be attached to the plastic tape reel in plain view, and should have a 6-character volume name (tape name) specified on it. The first character of the name must be a letter, the other five characters can be letters or numbers. After the tape is mounted on the tape unit, the tape unit switches should be operated to bring the unit to an on-line, ready state. In this state, only the power (PWR), select (SEL), ready (RDY), and load point (LD PT) lamps should be lighted. At this point, the tape and tape unit are ready to receive data.

5.09 The TDAS dump input message initiates the transfer of data from PBC disk to TDAS tape. The user must specify in the input message whether the tape is to be treated as a new tape or as one already containing some relevant TDAS data. In the first case, the program will begin writing at the beginning of the tape, destroying any information previously on the tape. In the second case, the program will space forward to the end of the existing data and then append the new TDAD data.

5.10 If a TDAS data dump must be aborted because of a disk or tape error, an abort output message will be generated to indicate the cause of the failure. In general, any data on the tape ***may*** be destroyed as a result and the tape should be treated as a new tape when the next dump is attempted. If the tape contains irreplaceable data from previous days, it may be forwarded to the TDAS location with a written warning that the tape may be flawed.

5.11 In order to describe the magnetic tape format, the following terminology applies to the TDAS/PBC context.

- ***Byte:*** Eight bits of information containing one American Standard Code for Information Interchange (ASCII) coded character. The tape unit hardware writes data onto the tape (or reads data from the tape) a byte at a time.

- ***Record:*** Some logical number of data bytes which are processed as an entity by the software. A TDAS data record is 380 bytes long and contains 50 data register values plus necessary identification.

- ***Block:*** Some number of data bytes read from or written to tape, as a unit, by the software. A data block, normally consists of one or more records. On the TDAS tape, each data block consists of ten records (3800 bytes):

- ***File:*** A collection of data containing all the data pertaining to a general subject. The TDAS data on a TDAS tape may be referred to as a file.

- ***Volume:*** A physical unit of storage media. A TDAS tape is referred to as a volume.

- ***Tape Mark:*** A tape mark (or end-of-file mark) is a short block with a special pattern that can be written and recognized by the tape unit. The tape unit can be instructed to write a tape mark or to search for one.

5.12 The TDAS tapes generated by the PBC conform to present or proposed American National Standards Institute (ANSI) standards for tape format. All data and internal labels on the tape are in ASCII code. The overall tape format is illustrated in Fig. 10. The first blocks on the tape are the tape volume label and the file header label. Each label consists of 80 ASCII characters which provide information about the source of the tape and the contents of the file. Figure 11 illustrates the format of the volume label. Each ASCII character occupies one byte on the tape, so the label block is 80 bytes long. The majority of the label field has fixed contents; only the volume name and the owner identification (ID) vary. The volume name is extracted from the dump-TDAS (long form) input message. The 9-character owner ID comes from the office CLLI name (8 characters) and from the TDAS office number (one character).

5.13 The second block on the tape will be the file header label (Fig. 12) which is also 80 bytes long. The header label has one variable field; the other characters are fixed as shown in the figure. The 6-character volume name is a duplication of the tape name field in the volume label. The file header label is followed by a tape mark which illustrates the end of the label section of the tape and the beginning of the data section.

5.14 The TDAS data record consists of 380 bytes of ASCII code information. The format is illustrated in Fig. 13. The first 28 bytes form the record header which contains all necessary information about the origin of the data. The various fields of the header are described below.

(a) ***Office Name:*** The 8-character office name is obtained from the first 8-characters of the switching office CLLI name, which is stored in the PBC.

(b) ***DCU Identifier:*** The first character of the DCU code (always X) indicates that the data source is a No. 4 Crossbar System. The second character is the TDAS office number, obtained from a data table in PBC. The third DCU character indicates the data type.

(c) ***Julian Date:*** The first two characters of the Julian date indicate the year. The last three characters indicate the day of the year (1-365) on which the data was collected.

(d) ***Register (DCD) Number:*** The DCD number of the first register in the record is specified here.

(e) ***Start Time Index:*** The day is broken into 15-minute segments for TDAS purposes, numbered 1 through 96. The time at which data collection started is indicated by segment number in this field. The start time for the data in Fig. 13 was 8 am.

(f) ***Period of Date:*** Indicates the number of 15-minute segments for which data was accumulated in the registers given in the record.

(g) ***Qualifiers:*** The qualifier code is used to distinguish between normal data and RVC results, and also indicates the length in bytes of each data register in the record.

(h) ***Data Registers:*** Each data register in the TDAS record is six bytes long. Each 6-digit number is right justified with leading zeros included.

(i) ***Register Code:*** Each 6-byte register is followed by a one-byte register code. An ASCII zero in this byte indicates that the data in the preceding register contains TDAS data. An ASCII six implies that the preceding register is filler, and should be ignored.

5.15 Each time data is transferred to a TDAS tape, data is added to the tape in a sequence determined by the following rules.

(a) Data is ordered by time of day. Data from the 0100 to 0200 period, if selected, precedes data from 0200 to 0300, etc.

(b) Data for a selected period is ordered by DCU code. The DCU A data precedes DCU B data, which precedes DCU D data, assuming all three types were selected.

(c) Within a DCU data is organized by ascending DCD number. (See Fig. 1 through 5.)

(d) The RVC data follows all normal data. Rules (b) and (c) above apply.

Note: There is no RVC data for DCU B.

(e) If data is added to an existing TDAS tape by using the dump-TDAS (short form) input message, the data and RVC results from the latest dump will follow up the data and RVC results for all previous dumps.

5.16 Presently only trunk group data is distributed to the TDAS location. Registers 0 to 3999 contain outgoing trunk group data; within each type in this DCD range, data is organized by trunk group traffic register index (TRI). For example, the data for the trunk group with TRI 0 will be in the following registers:

Peg count—Register (DCD) 0001

Overflow—Register (DCD) 1001

Outgoing usage (CCD)—Register (DCD) 2001

2-way usage (CCS)—Register (DCD) 3001.

A maximum of 999 DCD assignments are available for each data type, because the number of outgoing or 2-way trunk groups in an office can approach 1000. Normally, however, the number of trunk groups is far less. To reduce processing time, the TDAS program uses the largest traffic register index (LTRI) data table in PBC to determine the largest TRI assigned to any trunk group and reduce the number of registers transferred to the TDAS tape. In a typical office, for example, LTRI could be around 275. If this were the case, the registers transferred to the tape would be 0 to 276, 1000 to 1276, 2000 to 2276, and 3000 to 3276. This elimination process reduces the amount of data that would otherwise be transmitted by more than 70 percent, in the example. The 249 incoming trunk usage registers (DCDs 4000 to 4249) are always included in the DCU A data.

5.17 The end of file label follows the tape mark which indicates the end of the data on the tape. This label (Fig. 14) has only one variable field, the block count, which indicates the total number of data blocks on the tape.

6. DIAL UP PORT PROCEDURES

6.01 The dial up port (DUP) control program is a standard feature on the PBC generic. The hardware is an option. The program remains inactive until enabled by maintenance personnel, using the data port enable command. Until then, the PBC will ignore incoming calls. After the DUP hardware is installed and tested manually, the control program can be enabled using the following two-step procedure.

(a) On PBC channel 20, use a DUP enable input message to set the enable flag and initialize the hardware device registers. If a system restart occurs, the hardware device registers are not responding properly to memory read-write requests. Otherwise, the DUP will remain enabled until the PBC is reloaded from magnetic tape.

(b) To enable the port permanently, use a memory-dump input message to create a new office schedule and data tape.

6.02 Once enabled, the DUP is ready to answer incoming calls. An incoming call is signalled when ringing is detected by the 202S data set. If the DUP is enabled, the data set will generate a ***ringing interrupt*** which will transfer program control to a small core-resident ring detector routine. The detector routine schedules the disk resident input/output control routine, disables subsequent DUP interrupts, and then returns program control to the system. The input/output control routine, once in core, will remain there until the session is complete. The routine sets up new interrupt vectors for the port, allocates scratch area for data buffers, schedules a command interpreter task, enables DUP interrupts, and starts a 30-second fail-safe timer. This done, the routine instructs the data set to answer the phone. The data set, in response, goes off-hook and signals the calling party with a 2-second answer tone. After a suitable delay, the TDCU should assert carrier to begin the session.

6.03 The DUP control routine will remain dormant in core, ready to service interrupts, until a complete input transmission is received, or until the 30-second timer expires. If the timer expires before a message is received, the control program instructs the data set to hang up, returns control of the port to the ring detector routine, and relinguishes its position in core memory.

6.04 An incoming data transmission is signalled by asserted carrier, and consists of eight or more characters followed by removal of carrier. When a completed message is detected, the control routine passes the message to the command interpreter routine. If the transmission can be decoded as a legal TDCU command, the interpreter will, in turn, call in a routine to formulate and transmit a proper response. If the message is incorrect, the interpreter will transmit an error message in response.

6.05 The first message received from the TDCU must be an introductory request (Fig. 15). If the PBC receives any other message first, an error message will be transmitted in response. In response to a correct introduction, the PBC will identify itself with an introductory response (Fig. 16) and will record the start of the session on channels 20, 22, and 23. Upon completion of the introductory sequence, data transmission can begin. The data transmission portion of the session consists of series of data requests from the TDCU, each request followed by a data block transmission from the PBC.

6.06 The format of a TDCU data request transmission is illustrated in Fig. 17. In general, the TDCU requests a unit of traffic data by specifying a period start time and a data block to data transmission the PBC compares the data specified in the data file, that indicates the day on which the data was collected, with the data specified in the data request. If the data mismatches a block of all zero data will be transmitted in response. All traffic data requests from the TDCU must have data request type "0".

6.07 The TDCU can request the results of the latest record verification check, stored in the RVC disk file, by issuing a data request with the request type indicator set to "1". In this case, the start time field in the request has no meaning. As described earlier, each register in the RVC file corresponds to a usage register in each of the one-hour traffic data files. The data block numbers that apply to usage registers in the one-hour files also apply to the corresponding circuit count registers in the RVC files; only these block numbers can be legally requested. (See Fig. 18.)

6.08 Before the TDCU can request blocks of outgoing and 2-way trunk group data, it must request a trunk group map from the PBC. The trunk group's map request specifies a list of outgoing trunk administrative groups for which the TDCU wants data. This list will apply to all subsequent outgoing trunk data requests. The time period field in the map request has no meaning. The block number specified in the initial map request should be one. In response, the PBC will generate a map, listing all trunk groups which belong to one of the selected categories, and will transmit the first map block back to the TDCU. If the map is longer than one data block, the final block flag in the map header is set to zero; otherwise, the flag is set to one. The TDCU will request subsequent map blocks (blocks two, three, and four) until it detects a final block flag set to one.

6.09 The trunk group map, consisting of a list of TRIs, enables the TDCU to identify each trunk group data item transmitted by the PBC and reorganize the data into the order expected by the TDAS. The PBC keeps a copy of the map and uses it to select trunk group data from the one-hour files in response to subsequent trunk group data requests from the TDCU. After the map has been transmitted, outgoing trunk group data requests can begin. Date, time period, and block number are specified as in other data requests. The administrative group field in the request is ignored, since the list specified in the map request still applies.

6.10 Data is transmitted from the PBC in blocks containing up to 250 data items. The format of a data block is illustrated in Fig. 19. The block consists of a five word header, followed by 1 to 250 data items, followed by a checksum. Each transmission to or from the PBC contains a checksum for error detection. If the PBC detects an error, it returns an error response (6-word transmission) indicating error type. If the TDCU detects an error, it rerequests the data.

6.11 Within the PBC data tables, each outgoing or 2-way trunk group is assigned a TRI indicating which set of data accumulation registers belongs to the trunk groups. The PBC maintains up to 1024 registers of each of the following types: peg count, overflow count, 2-way usage, and one-way out usage. A trunk group with TRI 50, for example, will use peg count register 50, overflow register 50, and usage registers 50. The registers are maintained in four separate memory areas—one for each register type. Each area contains a data integrity register followed by the data registers for TRIs 0 through LTRI, the largest TRI assigned in the office. This organization is maintained within the one-hour data files, as well, and proves to be the most convenient organization for data transmitted to the TDAS from the PBC or the TDCU. As a result, the TDAS data base is set up to expect registers within an outgoing trunk group data block to be in consecutive ascending TRI order, with no register omitted, so that it can associate each data item with the proper trunk group identity. Other data base organizations are possible, but ordering by TRI, with no TRI omitted, ensures that the addition or deletion of trunk groups in the office will not make large changes in the TDAS data base necessary. This organization requires that, within a block of trunk group data, the data registers be ordered exactly as they are maintained in the PBC, even if some of the registers are unused or of no interest.

6.12 All trunk group data registers are not transmitted from the PBC to the TDCU. In order to reduce total transmission time, the TDCU, in its data request, indicates which administrative groupings are of interest, as well as data type and time period. The PBC, in response, will search its data tables to determine which trunk groups meet the administrative group criteria, and will transmit data only for those trunk groups. The data received at the TDCU will be ordered by (ascending) TRI, but due to the selection process, the TRI associated with each register can no longer be determined directly from position within the data block.

6.13 The trunk group map provides this information. Each data item in a map block consists of the TRI associated with the like-positioned data items in the associated out trunk data blocks. The relationship between map blocks and data blocks is shown below. Map block 1, register position 10, for example, contains the TRI associated with register position 10 of data blocks 1, 5, 9, and 13.

MAP BLOCK	TRUNK GROUP DATA BLOCKS
1	1, 5, 9, 13
2	2, 6, 10, 14
3	3, 7, 11, 15
4	4, 8, 12, 16

6.14 The TDCU uses the map to expand the trunk data received from the PBC back into its original form by inserting zeros in the data to replace those registers not transmitted. Thus, the map enables the TDCU to substantially reduce the time needed to collect data from each PBC, and still generate traffic data tapes acceptable to the TDAS system.

6.15 The termination of a session is under the control of the 30-second timer routine in the PBC. The timer is effectively restarted each time a character is transmitted or received over the channel, Thus, a time-out will occur only after 30 seconds of complete silence on the channel. When the TDCU has collected all of the data needed from the PBC, it drops the direct distance dialing (DDD) connection and proceeds to its next task. The PBC will continue waiting for another data request until the timer expires; at this time, the termination routine will release all core memory allocated for the session, instruct the data set to hangup, and return control of the channel to the ring detector routine. Session termination is noted by an output message on channels 20, 22, and 23. The report indicates the total number of data and map blocks transmitted by the PBC during the session.

7. ABBREVIATIONS AND ACRONYMS

ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
BBAC	Bus to Bus Access Circuit
BPI	Bits Per Inch
CAMA	Centralized Automatic Message Accounting
CCS	Hundred Call Seconds
CLLI	Common Language Location Identification
DCD	Data Collection Device
DCU	Data Collection Unit
DDD	Direct Distance Dialing
DEC	Digital Equipment Corporation
DEC CHAN	Decoder Channel
DUP	Dial Up Port
ETS	Electronic Translation System
ID	Identification
INC	Incoming
INWATS	Incoming Wide Area Telephone Service
ITLF	Incoming Trunk Link Frame
IUR	Incoming Usage Register
LD PT	Load Point

LTRI	Largest Traffic Register Index
MC	Machine Congestion
NM	Network Manager
OGT	Outgoing
PBC	Peripheral Bus Computer
PC	Peg Count
PWR	Power
RDY	Ready
RVC	Record Verification Check
SADR	Sender Attached Delay Recorder
SEL	Select
SQH	Sender Queue High
SQL	Sender Queue Low
TDAS	Traffic Data Administration System
TDC	Traffic Data Converter
TDCU	Traffic Data Converter Unit
TRI	Traffic Register Index
TUI	Traffic Register Interface

DCU A

TRUNK GROUP DATA

DCD NUMBER	CONTENTS
0000	Peg count integrity indicator — nominal value of 600 indicates good data.
0001 to 0999	Outgoing and 2-way trunk group peg counts — ordered by TRI.
1000	Overflow count integrity indicator — this register will always match DCD 0000.
1001 to 1999	Outgoing and 2-way trunk group overflow counts. — ordered by TRI.
2000	Usage data integrity indicator — nominal value of 360 indicates good data.
2001 to 2999	Outgoing (one-way) trunk group usage CCS. — ordered by TRI.
3000	Usage data integrity indicator — this register will always match DCD 2000.
3001 to 3999	Two-way trunk group usage CCS — ordered by TRI.
4000	Usage data integrity indicator — nominal value of 360 indicates good data.
4001 to 4249	One-way incoming trunk usage CCS — ordered by incoming usage register (IUR)

Fig. 1—DCU A, Trunk Group Data (2.04, 5.15)

DCU B

TRAFFIC SEPARATIONS DATA

DCD NUMBER	CONTENTS
0000	Data integrity count — value of 600 indicates good data
0001 to 0008	Categories N-N, N-A .... N-G
0009 to 0016	Categories 1-N, 1-A 1-G
0017 to 0024	Categories 2-N, 2-A 2-G
0025 to 0032	Categories 3-N, 3-A 3-G
0033 to 0040	Categories 4-N, 4-A 4-G
0041 to 0048	Categories 5-N, 5-A 5-G
0049 to 0056	Categories 6-N, 6-A 6-G
0057 to 0064	Categories 7-N, 7-A 7-G

Fig. 2—DCU B, Traffic Separation Data (2.04, 5.15)

DCU D

COMMON CONTROL DATA

DCD NUMBER	CONTENTS
0000	Usage data integrity indicator — value of 360 indicates good data
0001 to 0499	Common control usage data — data is the result of a 10 sec scan rate, so CCS = register contents/10.
0500 to 1523	Common control peg counts
1297	Peg count integrity indicator. — value of 600 indicates good data.

Fig. 3—DCU C, Common Control Data (2.04, 5.15)

DCU D

COMMON CONTROL USAGE
DCD ASSIGNMENTS

DCD	EQUIPMENT TYPE	USAGE TYPE*
0000	INTEGRITY INDICATOR	
0001 to 0010	MARKER, IT	TOTAL
0011 to 0020	MARKER, IT	MNC
0021 to 0030	MARKER, TC	TOTAL
0031 to 0040	MARKER, TC	MNC
0041 to 0050	DEC CHAN	TOTAL
0051 to 0060	DEC CHAN	MNC
0061 to 0120	CONTR GRP	TOTAL
0121 to 0180	CONTR GRP	MNC
0181 to 0212	TELCO MISC	TOTAL
0213	TEST BUSY	TOTAL
0214 to 0232	SENDER GROUPS	TOTAL
0233 to 0251	SENDER GROUPS	MNC
0252 to 0281	INCOMING REG LINKS	MNC
0282 to 0311	INCOMING REG LINKS	MNC
0312 to 0335	TRANSVERTERS	TOTAL
0336 to 0359	TRANSVERTERS	MNC
0360 to 0401	RECORDERS	TFC
0402	CAMA POSITIONS	TFC
0403 to 0405	PRETRANSLATORS	TOTAL
0406 to 0408	PRETRANSLATORS	MNC
0409 to 0410	DRE GRP A, B	TOTAL
0411 to 0412	DRE GRP C, D	TOTAL
0413 to 0414	SQL, SQH (A)	TOTAL
0415 to 0416	SQL, SQH (B)	TOTAL
0417 to 0491	UNASSIGNED	
0492	ITLF, IT	TOTAL
0493	ITLF, TC	TOTAL
0494 to 0499	UNASSIGNED	

*MNC — maintenance usage
TFC — traffic usage
TOTAL — maintenance and traffic usage

Fig. 4—DCU D, Common Control Usage (2.04, 5.15)

DCU D

COMMON CONTROL PEG COUNT

DCD ASSIGNMENTS

DCD NUMBER	CONTENTS
0500 to 0505	PERMANENTLY UNASSIGNED
0506 to 0507	INCOMING TRUNK LINK PC (IT AND TC)
0508 to 0511	TPC CLASS (NONE, OUT, IN, THROUGH)
0512 to 0530	SADR-BASE COUNT (BY SENDER GROUP)
0531 to 0549	SADR-DELAY COUNT (BY SENDER GROUP)
0550 to 0569	MARKER PC (IT AND TC) BY UNIT
0507 to 0571	FINAL REORDER ANNOUNCEMENT (PC AND OF)
0572 to 0573	FOLLOW WITH SECOND TRIAL (IT AND TC)
0574 to 0575	CANCEL FOLLOW WITH SECOND TRIAL (IT AND TC)
0576 to 0577	NO CIRCUIT ANNOUNCEMENT (IT AND TC)
0578 to 0579	NO CIRCUIT DUE TO NM CONTROL (IT AND TC)
0580	NO CIRCUIT ANNOUNCEMENT DUE TO NM CONTROL
0581	SENDER RETRIALS
0582 to 0584	INWATS (BY TYPE)
0585 to 0586	INWATS (ROUTED AND NOT ROUTED)
0587	REROUTES
0588 to 0589	DIRECTIONAL RESERVATION EQUIPMENT PC (UNITS (UNITS A AND B)
0590 to 0611	TRAFFIC OVERLOAD REROUTE CONTROL
0612 to 0626	INC SENDER FINAL ATTEMPT TROUBLE RECORD (BY GROUP
0627 to 0641	INC SENDER RETRIAL — NO SENDER (BY GROUP)
0642 to 0656	INC SENDER PERMANENT SIGNAL (BY GROUP)
0657 to 0671	INC SENDER RETRIAL — INTEGRITY CHECK FAILURE (BY GROUP)
0672 to 0686	INC SENDER RETRIAL — DIAL PULSE DELAY (BY GROUP)
0687 to 0716	INC REGISTER PERMANENT SIGNAL (BY LINK)
0717 to 0721	OVERSEAS CLASSIFICATIONS
0722	OVERSEAS SENDER RETRIAL — NO SENDER AHEAD
0723	OVERSEAS SENDER FINAL ATTEMPT TROUBLE RECORD
0724	OVERSEAS SENDER ELECTRICAL BUSY

Fig. 5—DCU D, Common Control Peg Count DCD Assignments (Sheet 1 of 3) (2.04, 5.15)

DCD NUMBER	CONTENTS
0725	OVERSEAS INCOMING OVERSEAS SCREENING
0726	OVERSEAS SENDER RETRIAL — UNEXPECTED STOP
0727 to 0741	INCOMING SENDER PARTIAL DIAL (BY GROUP)
0742 to 0756	INCOMING SENDER PULSING ERROR (BY GROUP)
0757 to 0771	INCOMING SENDER MUTILATED DIGITS (BY GROUP)
0772 to 0787	INCOMING SENDER RETRIAL — UNEXPECTED STOP (BY GROUP)
0788 to 0801	INCOMING SENDER RETRIAL — MISCELLANEOUS (BY GROUP)
0802 to 0831	INCOMING REGISTER LINK PARTIAL DIAL (BY GROUP)
0832 to 0846	INCOMING SENDER RETRIAL — LOCK OUT (BY GROUP)
0847 to 0850	OUTGOING SENDER PARTIAL DIAL (BY GROUP)
0851 to 0866	OUTGOING SENDER STUCK SENDER (BY GROUP)
0867 to 0896	INCOMING REGISTER LINK STUCK REGISTER (BY LINK)
0897 to 0956	TRUNK BLOCK CONNECTOR PC (IT AND TC)
0957 to 1016	LINK CONTROLLER PC
1017 to 1026	DECODER CHANNEL PC
1027 to 1028	INCOMING LINK SAMPLE PC (IT AND TC)
1029 to 1032	CHANNEL OVERFLOW FIRST AND SECOND TRIAL (IT AND TC)
1033 to 1034	HOLD ROUTING — INITIAL AND SUBSEQUENT
1035	NONHOLD ROUTING — SUBSEQUENT
1036	DECODER CHANNEL SECOND TRIALS
1037 to 1052	INCOMING SENDER PC
1053 to 1056	OUTGOING SENDER PC
1057 to 1086	INCOMING REGISTER LINK PC
1087 to 1090	TEST CALLS — DMT, ITT, OGT, AND SDT
1091 to 1092	MARKER TROUBLE SECOND TRIAL (IT AND TC)
1093	DECODER CHANNEL TROUBLE SECOND TRIAL
1094 to 1113	MARKER TROUBLE FIRST TRIAL (IT AND TC)
1114 to 1123	DECODER CHANNEL TROUBLE FIRST TRIAL
1124 to 1183	LINK CONTROLLER TROUBLE
1184	INCOMING REGISTER LINK TROUBLE — NON-CAMA
1185 to 1260	RESERVED FOR TELEPHONE COMPANY USE
1261	SENDER QUEUE LOW (UNIT A)
1262	SENDER QUEUE HIGH (UNIT A)

Fig. 5—DCU D, Common Control Peg Count DCD Assignments (Sheet 2 of 3) (2.04, 5.15)

DCD NUMBER	CONTENTS
1263	SENDER QUEUE LOW (UNIT B)
1264	SENDER QUEUE HIGH (UNIT B)
1265	TDC MAINTENANCE POINT
1266 to 1283	ANNOUNCEMENT PC AND OF
1284 to 1289	SADR BASE COUNT (BY SENDER TYPE)
1290 to 1295	SADR DELAY COUNT (BY SENDER TYPE)
1296	TDC SANITY COUNTER
1297	DATA INTEGRITY COUNTER
1298 to 1299	DIRECTIONAL RESERVATION (UNITS C AND D)
1300	INCOMING REGISTER LINK TROUBLE — CAMA
1301 to 1342	RECORDER TROUBLE
1343 to 1346	MASTER TIMER TROUBLE
1347 to 1362	POSITION LINK CONTROLLER TROUBLE
1363 to 1386	TRANSVERTER TROUBLE FIRST TRIAL
1387 to 1388	TRANSVERTER TROUBLE SECOND TRIAL
1389 to 1392	INCOMING SENDER REORDER — CAMA
1393	CAMA SENDER IDENTIFICATION FAILURE
1394	CAMA SENDER AUTOMATIC NUMBER FAILURE
1395 to 1424	INCOMING REGISTER LINK CAMA SERVICE CODE
1425 to 1448	TRANSVERTER PC — OPERATOR IDENTIFIED
1449 to 1472	TRANSVERTER PC — AUTOMATIC IDENTIFICATION
1473 to 1474	TRANSVERTER MATCH CHECK (GROUPS A AND B)
1475 to 1476	TRANSVERTER BULK BILLED (GROUPS A AND B)
1477 to 1478	TRANSVERTER WRONG CALLING CODE (GROUPS A AND B)
1479 to 1520	RECORDER PC (GROUPS A AND B) BY UNIT
1521	POSITION DISCONNECT
1522	NO POSITION AVAILABLE
1523	CAMA POSITIONS

Fig. 5—DCU D, Common Control Peg Count, DCD Assignments (Sheet 3 of 3) (2.04, 5.15)

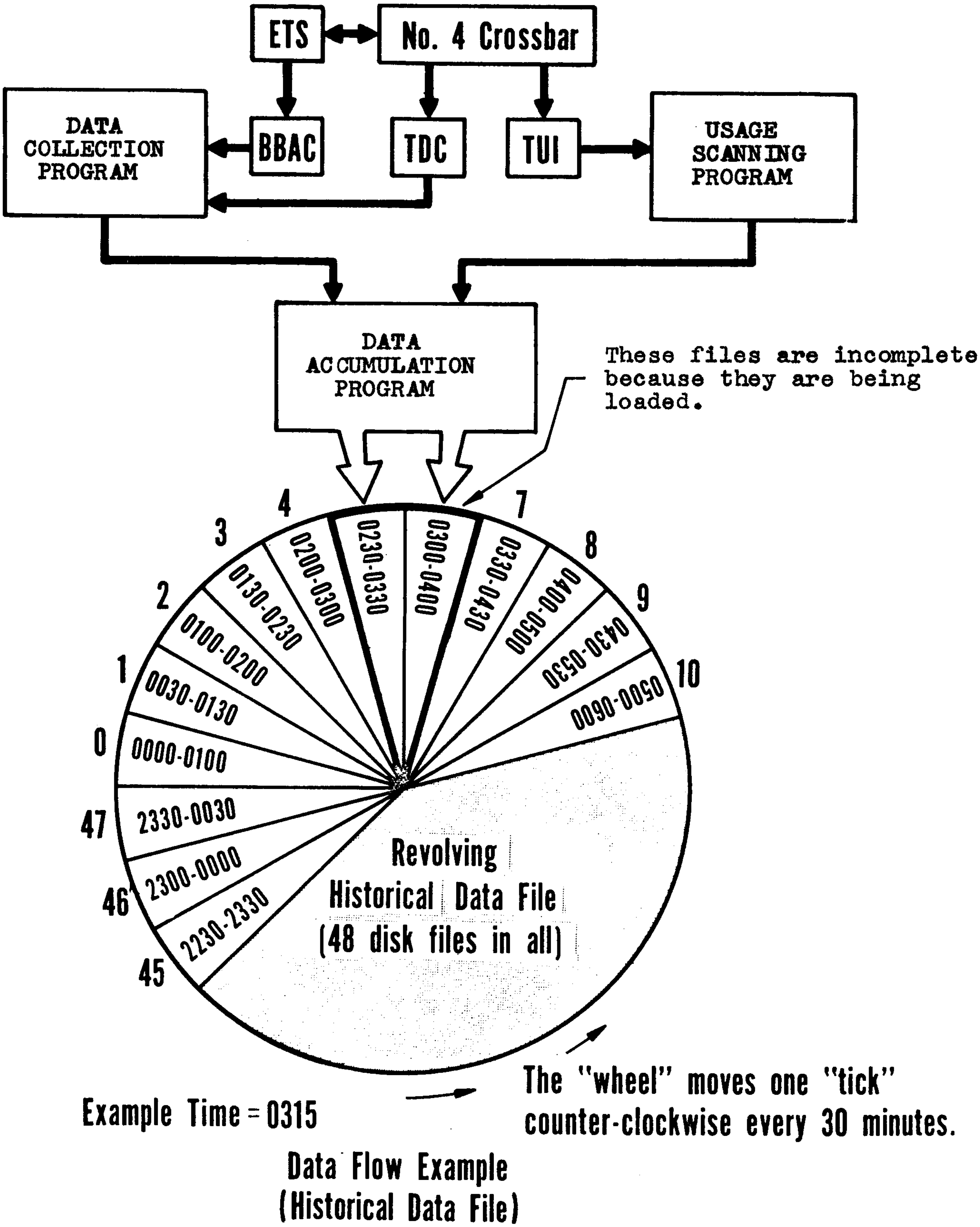


Fig. 6—Data Flow Example (3.02)

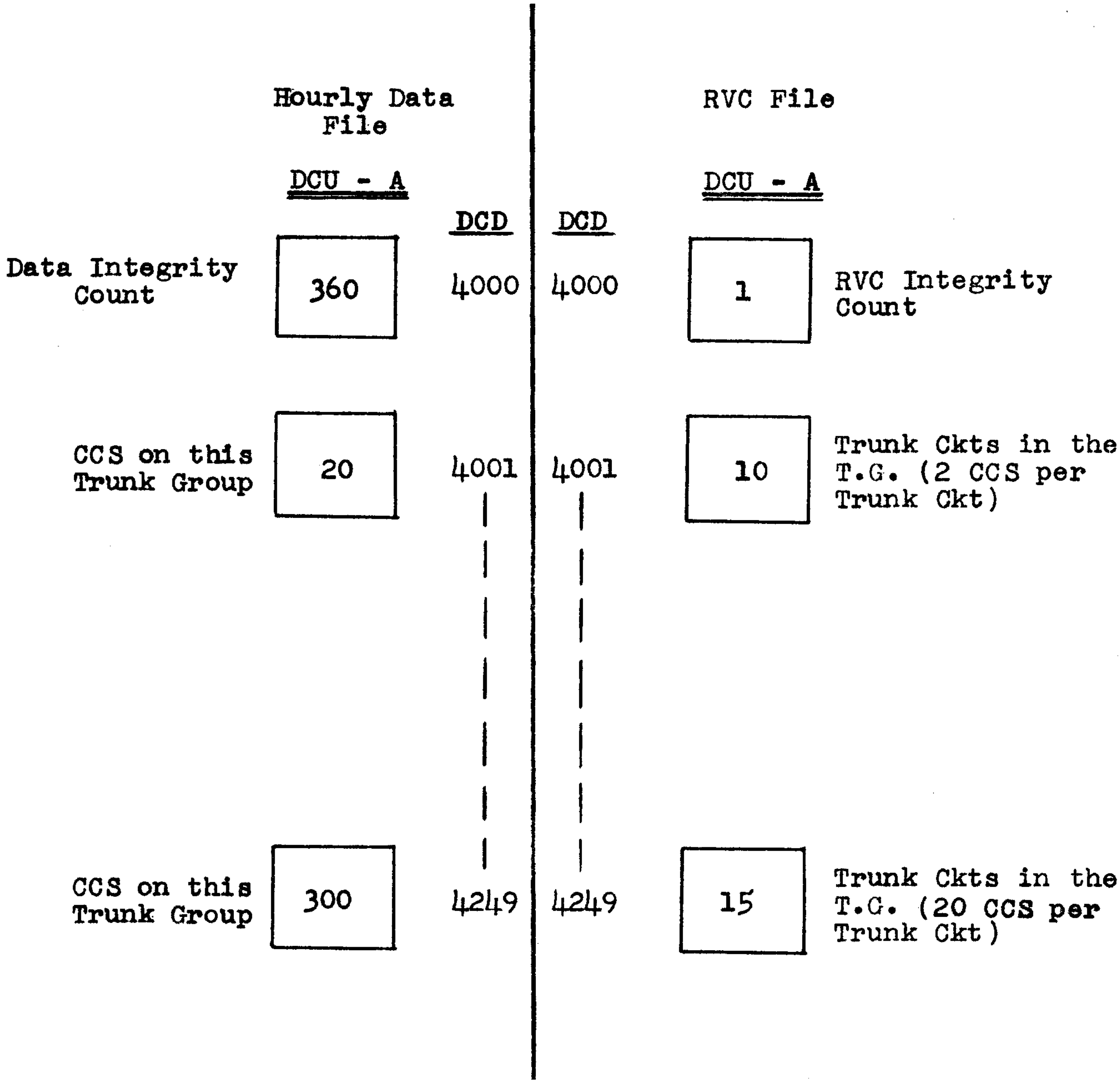


Fig. 7—Hourly Data File and RVC File (3.05)

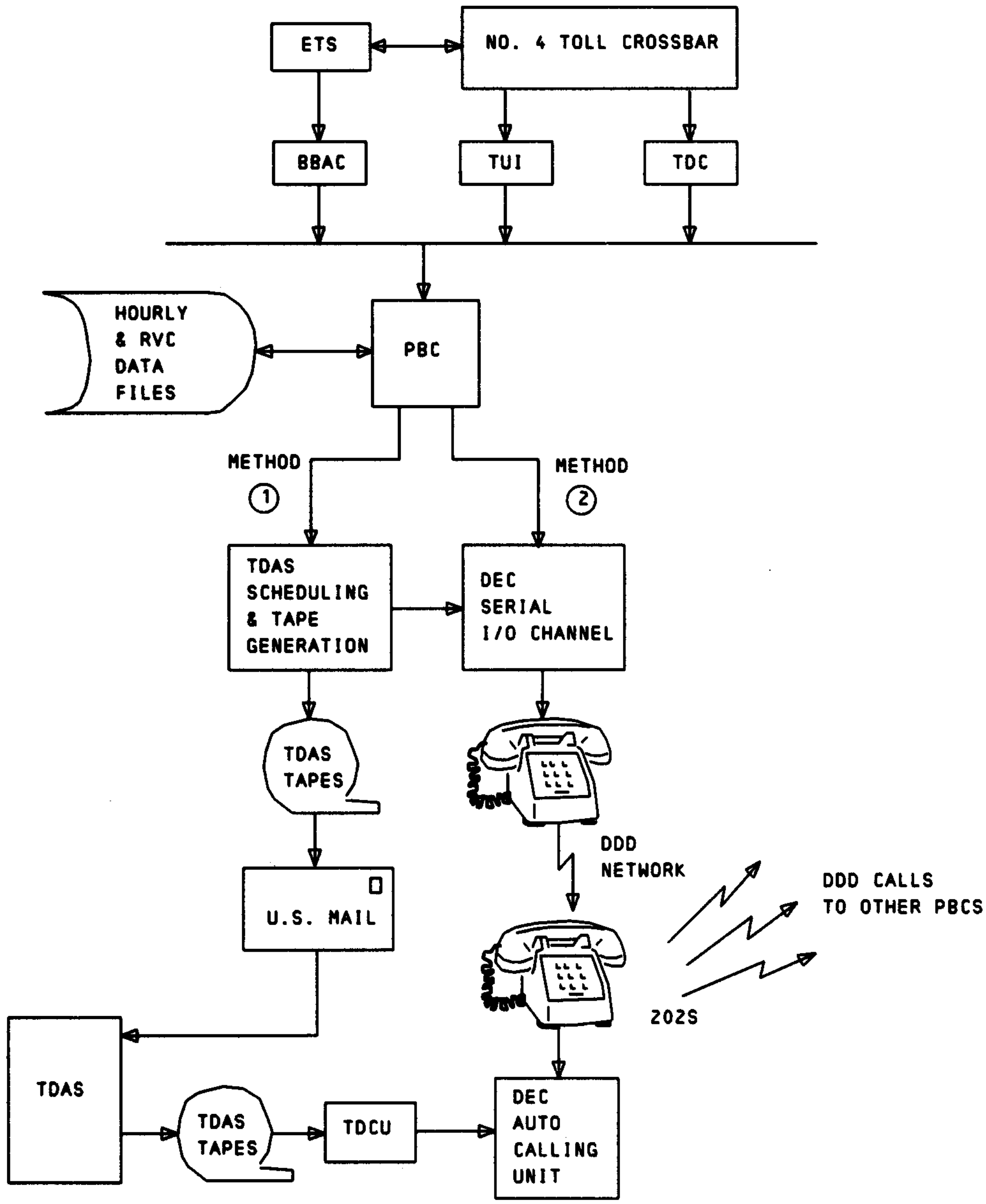


Fig. 8—Methods for Distributing Data (4.01)

TDAS Data Selection Schedule:

Schedule X1A Trunks

Hours:	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
00	-	-	-	-	-	-	-	-	XX	XX	XX	XX	XX	XX	XX	XX	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Schedule X1B TSEP

Hours:	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
00	-	-	-	-	-	-	-	-	XX	XX	XX	XX	XX	XX	XX	XX	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Schedule X1D Common Cntl

Hours:	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
00	-	-	-	-	-	-	-	-	XX	XX	XX	XX	XX	XX	XX	XX	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Fig. 9—TDAS Portion of Network Administrator's Schedule Printout (5.01)

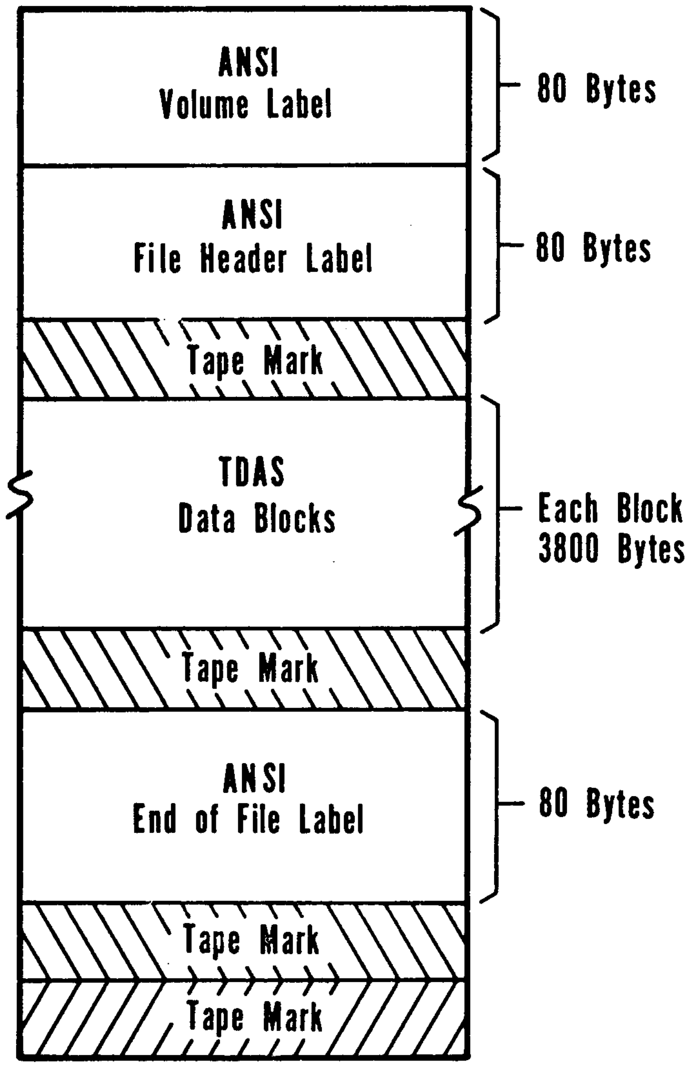
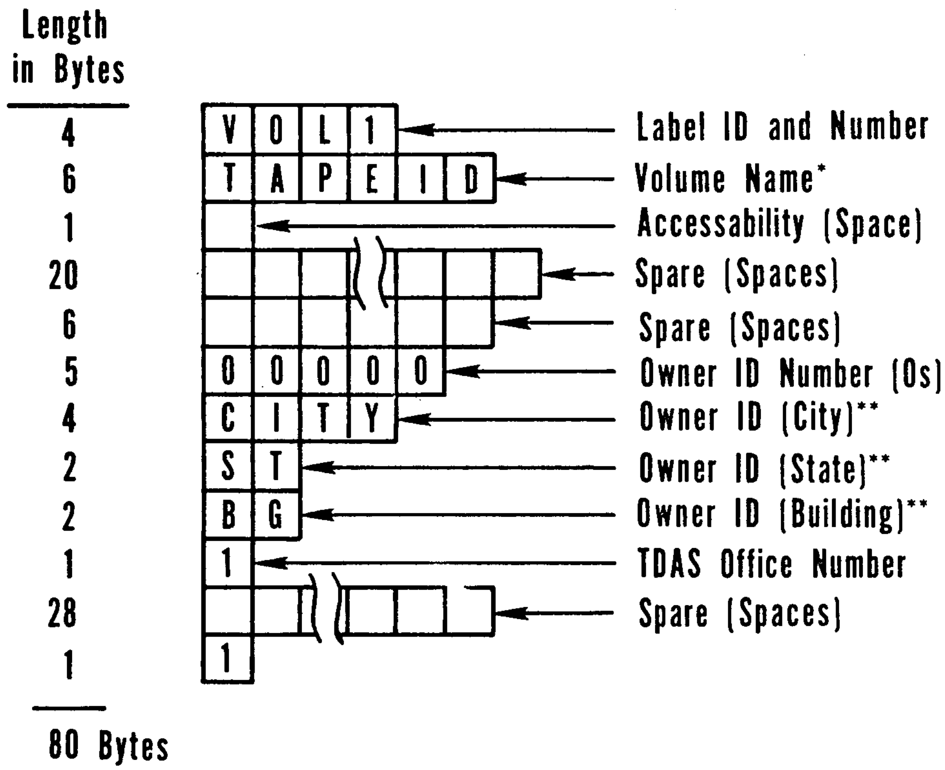


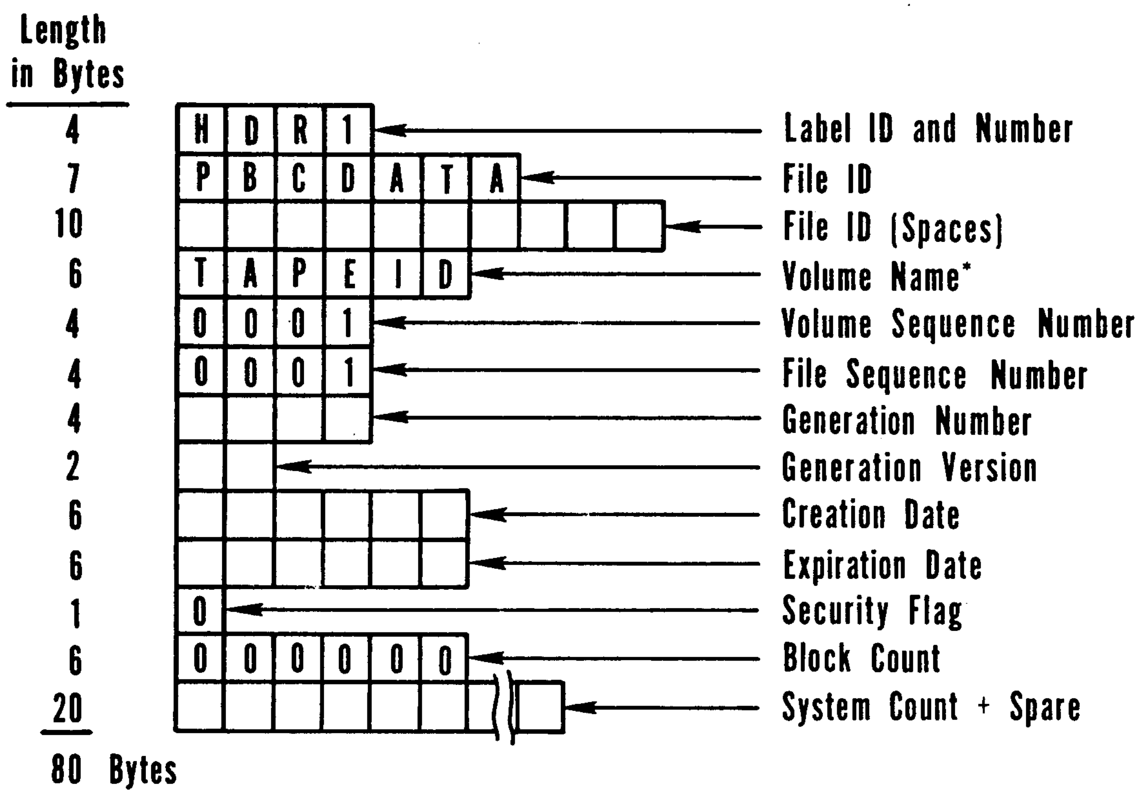
Fig. 10—TDAS Tape Format (5.12)



*These 6 Characters are Derived from the Six-Character Tape Name Given in the Dump:TDAS Command. They Should Match the Name on the External Tape Label.

** From the CLLI office name.

Fig. 11—TDAS Volume Label Format (5.12)



Each Square Represents One Byte. Empty Squares Represent the ASCII "Space" or "Blank" Character.

*Obtained from the Tape Name Parameter of the DUMP:TDAS Input Message.

Fig. 12—TDAS File Header Label Format (5.13)

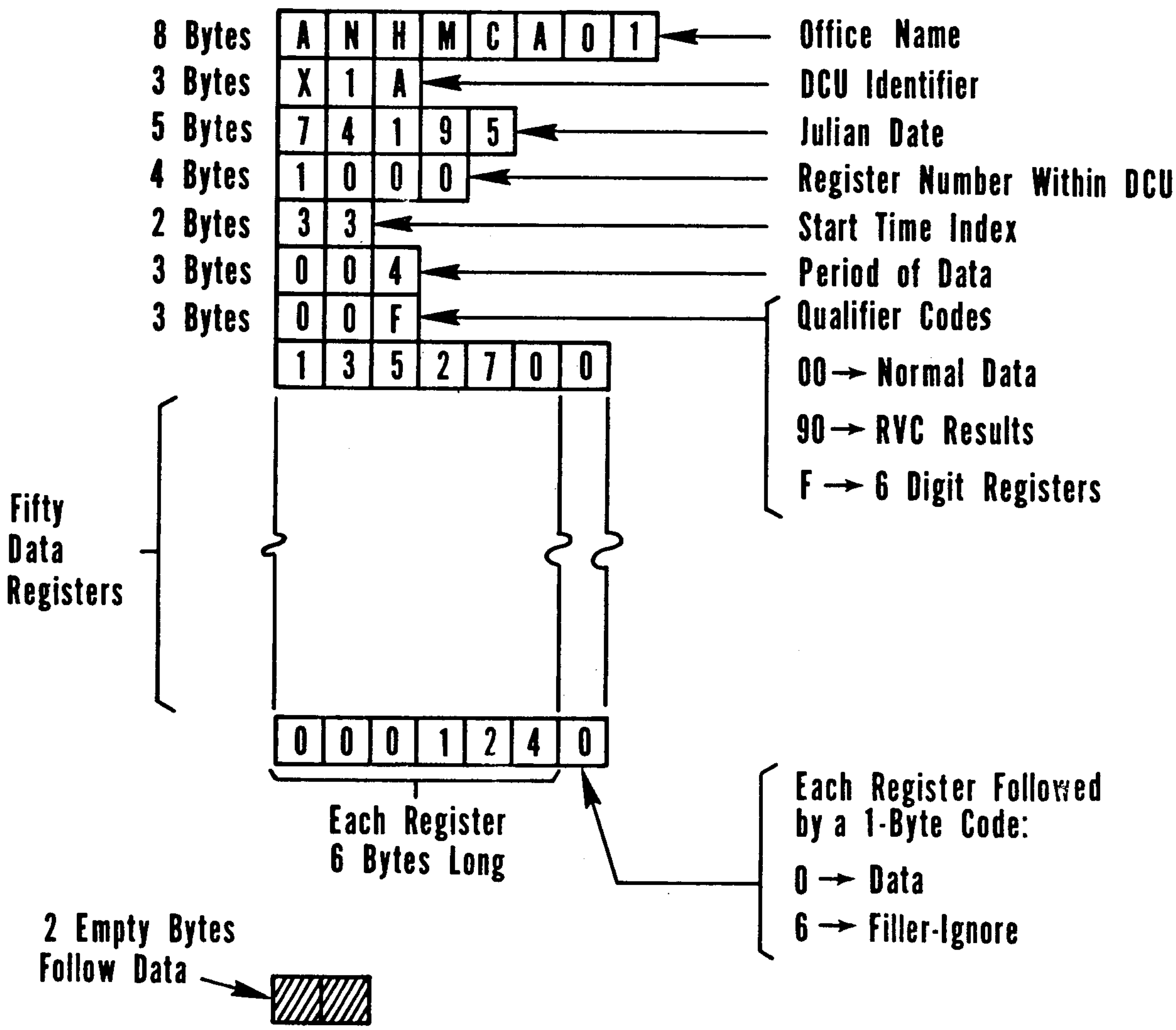
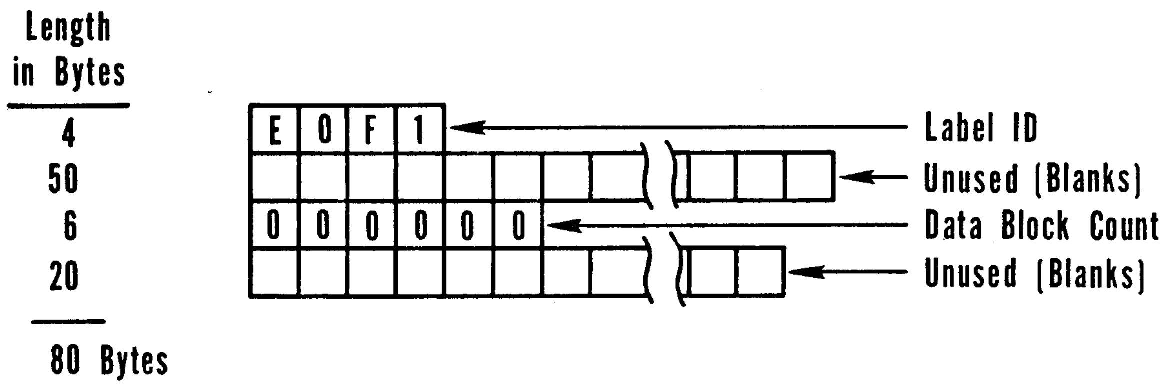


Fig. 13—TDAS Record Format (5.14)



The Data Block Count is the Only Variable Field in the EOF Label.
The Field Indicates the Total Number of Data Blocks Written on the Tape.

Fig. 14—TDAS End of File Label Format (5.17)

WORD	16 BITS: 15 – 8	16 BITS: 7 – 0	SIGNIFICANCE
1	0 0 0 0 0 0 0 1	0 0 0 0 0 0 0 1	SOH - ASCII - 001_8 "start of heading" sent twice (one 16 bit word)
2	ASCII	ASCII	Calling station identification - two **ASCII characters**
3	ASCII	ASCII	Password - two ASCII characters. **Specified by BTL.**
4	CHECK SUM		Sum of words 1 through 3 with any carry beyond BIT 15 ignored

WORD

Fig. 15—Introducting Request Format (6.05)

WORD	15 – 8	7 – 0	
1	0 0 0 0 0 0 0 1	0 0 0 0 0 0 0 1	SOH, SOH
2	2nd CHARACTER	1st CHARACTER	11 character office ID: city (4), state (2), building (2), TDAS DCU (3)
3	4th CHARACTER	3rd CHARACTER	
4	6th CHARACTER	5th CHARACTER	
5	8th CHARACTER	7th CHARACTER	Error Status = 0 no error = 1 improper check sum = 2 invalid password = 4 improper block/ request = 5 other error
6	TDAS office number	ASCII "X"	
7	Φ(don't care)	ASCII "A"	
8	0 | ERROR STATUS	0	
9	CHECK SUM		sum of words 1 through 8 with any carry beyond bit 15 ignored

Fig. 16—Introductory Response Format (6.05)

WORD	16 BITS		SIGNIFICANCE
	15 … 8	7 … 0	
1	0 0 0 0 0 0 0 1	0 0 0 0 0 0 1 0	SOH, STX ("start of text") - ASCII
2	BLOCK NUMBER	ADMGRPs	Binary block number - blocks 25-34, similar to EADAS. Blocks 1-16 are for outgoing trunk groups. ADMGRPs bit x set is request for ADMGRP x.
3	REQUEST TYPE	START TIME	Data collection start time index 0-47 (multiples of 30 minutes). 0=0000, 1=0030, 47=2330. Request type = 0 data = 1 Record Verificat-ion Check (RVC) = 2 map
	15 … 9	8 … 0	
4	YEAR 0 - 99	DAY 0 - 366	Julian date of data collection
5	CHECK SUM		Sum of words 1 through 4 with any carry beyond bit 15 ignored

Fig. 17—Request Form (6.06)

DIAL UP PORT BLOCK NUMBERS

	DATA ITEM	MAXIMUM REGISTERS	DCD (REGISTER) NUMBERS	TDAS DCU	DUP BLOCK NUMBERS
A.	Outgoing Trunk Group Peg Count	1000	0000 to 0999	X_A	1 to 4
B.	Outgoing Trunk Group Overflow	1000	1000 to 1999	X_A	5 to 8
C.	Outgoing Trunk Group Usage One-Way	1000	2000 to 2999	X_A	9 to 12
D.	Outgoing Trunk Group Usage 2-Way	1000	3000 to 3999	X_A	13 to 16
E.	Incoming Trunk Group Usage	250	4000 to 4249	X_A	25
F.	Common Control Usage	500	000 to 0499	X_D	26, 27
G.	Miscellaneous Peg Counts	1024	0500 to 1423	X_D	28 to 30, 33, 34
H.	Traffic Separations	65	0000 to 0064	X_B	31

Fig. 18—Dial Up Port Block Numbers (6.07)

WORD	16 BITS (15 … 8 | 7 … 0)	SIGNIFICANCE
1	0 0 0 0 0 0 0 0 | 0 0 0 0 0 0 1 0	SOH, STX
2	F | ERROR STATUS | N	N = number of registers in block (binary) $0 \leq N \leq 250$ F = continuation flag = 0 if block not last of sequence = 1 if last block of sequence Error Status = 0 no error = 1 improper check sum = 2 invalid password = 3 improper date/time = 4 improper block request = 5 other request
3	BLOCK NUMBER | ADMGRPS	Word 2 of request
4	REQUEST TYPE | START TIME	Word 3 of request
5	YEAR 0 - 99 | DAY 0 - 366	Word 4 of request
6 ⋮ N+5	⋮	Up to 250 binary data items
N+6	CHECK SUM	Sum of words 1 through N+5 with any carry beyond bit 15 ignored

Fig. 19—Response Format Header (6.10)