

**AUTOMATIC MESSAGE ACCOUNTING
FEATURE DOCUMENT
1A ESS™ SWITCH
AUTOPLEX™ SYSTEM 100**

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REASON FOR REISSUE

1.02 This practice is reissued to incorporate information for Release 2 and Release 3 of the AUTOPLEX System 100 generic programs. The major changes in this practice include new data groups for new and improved cellular services capabilities and features as follows:

(a) The major changes for Release 2 include:

- Custom Calling Services
- Roamer II Service
- Carrier Interconnect.

(b) The major changes for Release 3 include:

- Direct Connect
- Cellular Networking.

Note: Due to the complexity of CN (Cellular Networking), AMA information for CN is provided in a separate practice. For detailed CNAMA information, see reference A(1) in Part 10.

ECONOMIC WORTH

1.03 Billing information contains data necessary to generate revenues. Statistical information contains data that may be used to evaluate various services (e.g., overflow records) and facilities (e.g., 3-port facilities).

FEATURE AVAILABILITY

1.04 The AMA feature for System 100 is initially available with the 1AE7 generic program. Release 2 is initially available with the 1AE8A generic program. Release 3 is initially available with the 1AE9 generic program.

FEATURE ASSIGNMENT

1.05 The AMA feature is provided on a per-switch basis for System 100 MTSOs.

1. INTRODUCTION

DEFINITION

1.01 The AMA (Automatic Message Accounting) feature automatically collects, formats, and records billing and statistical information on magnetic tape at the MTSO (Mobile Telephone Switching Office) that serves a cellular call. The AMA magnetic tapes can be processed later by a RAC (Revenue Accounting Center) to obtain the billing and statistical information.

BACKGROUND

1.06 The 1A switch serves as a System 100 MTSO to provide telecommunications services for cellular services subscribers. A MTSO switches calls to and from the PSTN (public switched telephone network), sets up and monitors calls by interfacing with the cell sites, and supervises overall system maintenance and administrative functions.

1.07 A MTSO may be connected by either wireline voice or carrier facilities to a distributed array of cell sites which, in turn, communicate via radio voice channels and data paths with subscriber units. A message switch and wireline data links or carrier facilities provide the necessary communication medium for the MTSO and cell sites. A MTSO interconnects with the PSTN through wireline voice facilities to one or more class 5 zone offices. The CI (Carrier Interconnect) feature provides the local exchange network interconnection ICs (Inter-LATA Carriers) and INCs (International Carriers). The DC (Direct Connect) feature provides for direct connection to ICs and INCs. For information concerning the MTSO, CI, and DC features, see references A(2), A(3), and A(4) in Part 10.

1.08 The AMA feature for System 100 provides the MTSO with facilities that automatically collect and record billing information on magnetic tapes. The MTSO must record not only standard wireline telephone usage charge data but also charge data for radio usage on voice channels. All calls that use voice channels have a charge record made that includes voice channel seizure and release times.

1.09 The AMA feature is implemented via software programs that accumulate, format, and transfer the billing and statistical information as AMA data to the ADS (Auxiliary Data System). The AMA data is transferred from call store to an ADS tape unit assigned to the AMA function. The ADS is a data handling system utilizing magnetic tape storage.

2. USER PERSPECTIVE

USER PROFILE

2.01 The AMA feature is designed for any cellular services provider who provides cellular telecommunications services using a System 100 MTSO. The information in this practice is intended for cellular services providers.

Note: A customer who uses cellular services is referred to as a subscriber. A cellular services subscriber requires a unit that is designed to operate with cellular systems.

GENERAL

2.02 The AMA feature for the System 100 MTSO uses ADS tape facilities and software programs commonly used by the 1A ESS switch AMA feature to record AMA data for wireline calls.

Note: A wireline call is any incoming or outgoing call via a trunk (referred to as a wireline) to another end office in the telephone network.

2.03 Since the MTSO must record not only AMA data for calls involving wirelines, but also AMA data for subscriber unit radio usage on voice channels, there are two unique AMA capabilities for the MTSO. The two unique capabilities are as follows:

(a) A unique AMA data accumulation function, MAMAAMPS (mobile automatic message accounting), collects AMA data for all subscriber unit calls and converts the AMA data for each call into a single-entry AMA format. The MAMAAMPS data accumulation function operates in conjunction with the AMAC (AMA data accumulation) function to accumulate all AMA data. The MAMAAMPS function handles mobile specific AMA data. The AMAC function handles general (other than mobile specific) AMA data and provides AMA administrative functions.

(b) The MTSO AMA feature records AMA data in a MCR (mobile call register) as the data become available during a call. A MCR is associated with each subscriber unit call (originating and terminating) to serve both call processing functions and the AMA function. The first part of a MCR is referred to as a mobile AMA block. This block contains unique data fields for mobile AMA data. Each mobile AMA block contains data for a single subscriber unit since a mobile-to-mobile call is double switched. A mobile AMA block is referenced directly by its MCR address.

2.04 The 1A ESS switch system clock is used to derive the billing times entered on the AMA tape. If the clock is incorrect, erroneous billing may occur. The clock should be checked periodically as specified in the equipment test list.

INTERACTIONS

2.05 The MTSO AMA feature interacts with the AMA-related features listed in Table A. Refer to the applicable AT&T practice for details.

TELEPHONE COMPANY EQUIPMENT

2.06 The MTSO AMA feature utilizes ADS tape units to record AMA data on magnetic tape. Normally, two tape units of the ADS are allocated for AMA to ensure reliability and to augment maintenance operations. One tape unit is designated as active and the other as standby. The AMA tape units are switched either at a predetermined time, when trouble is detected with the active AMA tape unit, or when the end of tape is sensed. When a reel of tape is full, the reel must be manually removed and replaced with another reel (according to tape handling procedures). The AMA tapes require processing by a RAC.

A. Auxiliary Data System

2.07 The following information is a high level description of the ADS. For a detailed description of the ADS, see references A(5) through A(9) in Part 10. The ADS may be made up of one or two communities, each comprised of the following:

- Two DUSs (data unit selectors)
- From 2 to 16 DUC (data unit controller) and DU (data unit) pairs.

2.08 The PPI (processor peripheral interface) frame provides scan and SD (signal distributor) points for all DUSs and the DUCs in the first community. The using system must supply the scan and SD points for the DUCs of the second community.

2.09 Figure 1 shows the layout of the ADS and its interface with the CC (central control). The DUSs are located on the AU (auxiliary unit) bus. Each DUS of a pair is permanently associated with a particular AU bus. The DUS 0 is connected to AU bus

0, and DUS 1 is connected to AU bus 1. If the second ADS community is used, DUS 2 is connected to AU bus 0 and DUS 3 is connected to AU bus 1. The DUS-to-DUC interface is accomplished with duplicated internal buses called DU bus 0 and DU bus 1. Each DU bus is permanently assigned to a DUS. However, each DUS in the pair is capable of communication with any of the DUCs in the community. The term "data unit controller" is the generic term for either a tape unit controller or a data link controller. The term "data unit" is the generic term for either a tape transport or a data set. Tape unit controllers and tape transports are utilized for AMA.

2.10 The ADS consists of the tape frame J5A002A-1 and the DUS residing in the file store frame. The tape frame (Fig. 2) is 7 feet high and 2 feet 2 inches wide. The tape control logic unit, commonly referred to as a TUC (tape unit controller), is located at the top of the tape frame. Under the TUC is the tape transport and the dc-to-dc converter. The DUS resides in the uppermost portion of the file store frame (bay 0) J5A004A-1. This frame is 3 feet 3 inches wide and 7 feet high. The TUC and tape transport contain controls and indicators applicable to the AMA operation.

B. Tape Unit Controller J5A002AA-1

2.11 The TUC is located in the tape frame at vertical positions 69 through 82 (Fig. 3). The TUC contains the circuit packs that provide the means for AMA data to transfer from the TUC to the tape and for communication with the DUS. The 24C fuse blocks, a KS-20738, L3 power switch, and a display panel are located across the lower part of the TUC. The TUC controls and indicators located on the display panel are listed in Table B and are discussed below:

(a) **Unit Mode:** The four unit modes are AMA, UTL (utility), SR (system reinitialization), and UNA (unassigned). Whenever a TUC is serving the AMA function, the TUC will be in the AMA mode. The AMA mode is set by program control and may be reset by either activating another mode key, by removing the tape, by program control, or via a TTY input message.

(b) **Unit Status:** The unit status for AMA may be one of the following:

- Active—Presently being used for the AMA function.

- Standby—Available for immediate use as the unit for the AMA function.
- Trouble—Not available for AMA use. A unit with this status may require repair or mounting of a new AMA tape.

(c) **Volume Status:** The status of a tape volume is as follows:

- Read-only—Volume may only be read.
- Read/write—Volume may be read or written. The AMA volume status will always be read/write.

(d) **File Status:** The status of a file is as follows:

- Open—The system has not completed operation on the file associated with the unit.
- Closed—System use of a file on this unit is complete. The AMA tapes should not be demounted unless the file is closed. In some cases, the system may not be able to close a unit file due to hardware or system faults. In such cases an output message is printed.

C. Tape Transport KS-20571, L1

2.12 The tape transport is located in the tape frame (Fig. 2) at vertical positions 34 through 66. The tape transport is designed to operate with tape reels up to 10-1/2 inches in diameter with American National Standards Institute type hubs. The tape used is 1/2 inch wide. The tape transport swings out of its housing to permit access from the front. The recorder is equipped with an interlocked cover door with a transparent area for observing tape reel motion during operation. A full width erase head, a 9-track record head, and a 9-track reproduce head all interface directly with the TUC. The tape transport is equipped with a local control panel (Fig. 4.) The tape transport local control panel controls and indicators are listed in Table C. Tape transport trouble-locating procedures are provided in reference A(7) in Part 10. For ADS trouble-clearing procedures, see reference A(9) in Part 10.

INPUT/OUTPUT MESSAGES

A. Input Messages

2.13 Input messages discussed below may be used to control particular AMA functions. For detailed input message descriptions, see reference B(1) in Part 10.

(a) **AMA-ACT:** This message causes the TNN (trunk network number) for all trunk calls requiring AMA to be recorded. System response is OK.

(b) **AMA-BILL:** This message causes the system to initiate or terminate one of two of the following AMA billing services:

- Detailed billing of message rate calls.
- The AMA billing entries for all call attempts are recorded, including entries for incomplete calls that are normally chargeable. System response is either OK or NG.

Note: The AMA-BILL message is not desirable to use for trunk studies because it causes intraoffice incomplete call records that are not required for trunk studies to be recorded.

(c) **AMA-OFF:** This message cancels the AMA-ACT message and causes the AMA function to stop recording the TNN on all trunk calls requiring AMA. System response is OK.

(d) **SW:AMA:** This message is used to request a switch of AMA tape units. It causes the system to make the currently active AMA tape unit standby and the currently standby AMA tape unit active. System response is PF followed by the SW:AMA output message.

(e) **TC-WORK:** This is a multipurpose message used to set and reset flags and activity bits associated with work timetables. This message is used for AMA to cause the tape units assigned for the AMA function to be automatically switched at midnight on the particular day of week specified by the values of set cards SUN, MON, TUE, WED, THU, FRI, and SAT or as manually requested using the TC-WORK message. System response is OK if

the request was accepted or NG if an invalid request.

Note: The TC-WORK message is used for requesting midnight switches according to the parameters or for requesting manually selected midnight switches. Manually selected midnight switch requests override the midnight switch parameters specified by the set cards SUN through SAT.

B. Output Messages

2.14 Output messages related to the AMA feature are discussed below. For detailed output message descriptions, see reference B(2) in Part 10.

- (a) **AM01:** This message indicates that an AMA call has been in progress for at least 24 hours but for not more than 9 days. This message is printed as part of the normal AMA routine at midnight, when such calls exist.
- (b) **REPT:ADS FUNCTION AMA ACTIVE:** This message is printed when a TUC is assigned for AMA. The message contains the TUC member assigned and the state and status of the unit assigned.
- (c) **REPT:ADS FUNCTION AMA DUPLEX FAILED:** This message reports that no TUC is currently in service for the critical AMA function. The currently assigned TUC(s) for AMA and the TUC status are included as part of this output message.
- (d) **REPT:ADS FUNCTION AMA SIMPLEX:** This message reports that only one in-service TUC is assigned for the critical AMA function. The currently assigned TUC(s) for AMA and the TUC status are included as part of this output message.
- (e) **REPT:ADS FUNCTION STATE CHANGE:** This message reports a change of state for a TUC assigned to the AMA function (as well as other functions). The member number, function, state, and status are included as part of this output message.

(f) **REPT:DEMOUNT TAPE FROM TUC:** This message is printed to request that the tape be demounted from a particular unit.

(g) **REPT:END OF AMA TAPE ON TUC:** This message is printed when the EOT is detected for the active AMA tape unit.

(h) **REPT:UNABLE TO RECORD AMA DATA:** This message is printed when AMA data cannot be recorded on tape. A tape unit should be assigned for AMA.

(i) **SET:TUC:** This message is printed in response to a SET:TUC input message or when the AMA key is depressed on the TUC and the tape mounted is not blank. This message contains the volume header of the tape on the TUC or the reason why the tape could not be read.

(j) **SW:AMA COMPL TUC:** This message is printed when either a manual or automatic switch of the active and standby AMA tape units has been completed successfully.

(k) **SW:AMA NOT STARTED:** The requested switch of AMA tape units cannot be done because the standby AMA TUC is out of service. The standby AMA TUC should be restored to service and an AMA switch manually requested. If the standby TUC cannot be restored to service, a new tape should be mounted on the AMA tape unit or another tape unit should be assigned to the AMA function.

TAPE FORMAT

2.15 The AMA tape format conforms to the USASI (USA Standards Institute) 800 bpi (bits per inch) recorder magnetic tape standards. One tape character is defined as nine bits recorded laterally on the tape. Figure 5 depicts the AMA tape format. Eight of these bits (called a data character) contain the AMA data while the other bit represents odd parity for the data. The basic unit of AMA information is a modified BCD (binary coded decimal) character which consists of four bits. Two BCD characters (called BCD characters A and B) form one data character. One tape character consists of one data character (BCD characters A and B) plus one bit for odd parity. (Refer to Fig. 6.)

2.16 Each BCD character is comprised of four BCD bits, with each of these bits having a value of zero or one. Thus, there are 16 unique combinations of bit values for each BCD character. The BCD character values and the assigned meanings are listed in Table D. The BCD characters represent decimal digits or alphabetic characters "V" through "Z". The alphabetic characters are used in labels to identify and separate data. Noncheck dummy characters are used to pad (fill) AMA data when necessary. The AMA information for each call must be a multiple of five tape characters; thus, noncheck dummy characters are used as required to provide a multiple of five tape characters.

TAPE LABELS

2.17 Tape labels provide nonbilling data essential in processing an AMA tape. The four types of labels used are header, trailer, transfer, and time change labels. All labels contain exactly 20 tape characters (40 BCD characters) and begin with a distinctive first data character (the label identification). (See Fig. 7.) Header and trailer labels are used to define the billing data for one day. Transfer labels are used to indicate either a scheduled or unscheduled switch of AMA tape units. Time change labels are written when the system clock is updated. Labels and statistical data entries on the AMA tape are identified by specific BCD character pairs listed in Table E.

A. Header Label

2.18 A header label marks the beginning of a new business day and is written on the active AMA tape as part of the midnight routine. The header label format is shown in Fig. 7. Table F lists and defines the header label information.

B. Trailer Label

2.19 During the midnight routine, after the last AMA tape block for the day is written, a trailer label is written on the active AMA tape. The trailer label format is shown in Fig. 7. The trailer label represents the end of the billing information for the day. If the physical EOT mark is detected while the last AMA tape block or trailer label is being recorded, an end-of-file mark (Table E) is written immediately after the trailer label. Table G lists and defines the trailer label information.

C. Transfer Label

2.20 A switch of AMA units may be the result of a normally scheduled switch, a malfunction in the active AMA unit, a maintenance TTY input message, or the active AMA unit sensing the EOT mark (physical). A normal midnight switch does not cause a transfer label to be written. When any other switch in AMA units is made, a transfer label (Table H) is written in accordance with the following conditions:

- (a) If the switch is due to a malfunction in the active AMA unit, the transfer label is written on the standby (newly activated) AMA tape. An attempt is made to write a transfer label on the tape of the malfunctioning unit, but this may not be successful.
- (b) If the switch in AMA units is due to a TTY input message, the recording continues on the active AMA unit until the data block in progress is written. The units are then switched, and a transfer label is written on both tapes. Under this condition, a switch back to the originally active AMA unit is permissible. A second switch in AMA units would result in transfer labels being written on each unit, but it would not effect a writing of a header and/or trailer label.
- (c) If the switch in AMA units is due to a sensed EOT (end of tape) mark, recording on the active AMA unit continues until the data block in progress is written. The units are then switched, and a transfer label is written on both tapes. Additionally, an end-of-file mark is written on the originally active AMA tape. Under this condition, a switch back to the originally active AMA unit is not possible until the AMA tape has been replaced.

D. Time Change Label

2.21 A time change label is used whenever it is necessary to update the system clock. An update is made via the maintenance TTY and causes the time change label to be written on the active AMA tape. The format of the time change label is shown in Table I. If there are calls in progress at the time of the time correction, a time change indication is marked in the mobile AMA blocks of the MCRs associated with those calls.

E. Statistical Entries

2.22 Records of calls may be required for other than billing purposes (e.g., traffic measurements). Depending on the circumstances involved, a call may or may not be a completed call for which an AMA record is made. The AMA data recorded may vary with each case. Examples are traffic sampled calls, traffic service observed calls, calls on predesignated trunk groups, and calls to predesignated codes. A nonbilling AMA record made for statistical data only is identified by the character pair VZ (Table E). The statistical data format is shown in Table J.

Note: If an AMA record is required for billing as well as for other purposes, only one AMA record is made. In this case, entries in the AMA record are used to indicate nonbilling information. For example, a traffic sample indication may be included in data group A2.

F. Error Designation Code

2.23 The error designation code ZY (Table E) is reserved for RAC use during tape processing. This code may be inserted during tape processing to indicate erroneous data.

G. End-of-File Mark

2.24 The end-of-file mark is the single tape character "13" (Table E). An end-of-file mark is recorded on every AMA tape following either a trailer or a transfer label.

3. AMA REQUIREMENTS AND FORMATS

GENERAL INFORMATION

3.01 A MTSO provides telecommunication services for a particular CGSA (Cellular Geographic Service Area). The CGSA from which subscriber units subscribe service is referred to as the home CGSA. A MTSO provides service for both home subscriber units and roamer units. A home subscriber unit is a subscriber unit that operates in the CGSA from which service is subscribed. A roamer unit is a subscriber unit that operates in a CGSA other than the home CGSA.

3.02 A MTSO records AMA data for calls using wireline facilities and for subscriber unit radio usage on voice channels. The AMA data for each call is collected and stored in a MCR. The AMA data for wireline calls are collected and stored in MCRs. Additional and unique AMA data required for subscriber units are also stored in MCRs.

3.03 All subscriber unit calls that use voice channels (whether originated from a subscriber unit, terminated to a subscriber unit, answered, or not answered) have an AMA record made. Standard and unique AMA data are required for both home and roamer subscriber unit calls. All AMA records for subscriber unit calls include voice channel seizure and release times. The AMA record format contains standard and optional data fields (data groups). The standard AMA data groups provide AMA data common for all calls (e.g., call entry information, connect time, disconnect time). The optional data groups provide AMA data unique to each call. Unique AMA data for subscriber units are written into the optional data groups (e.g., mobile information, voice channel usage, and mobile identification). The standard and optional data groups are listed in Table K.

COMMON REQUIREMENTS AND DATA GROUP FORMATS

3.04 All AMA records for subscriber unit calls have common requirements. Each AMA call record begins with the start of entry code (the letter V) immediately followed by a 2-digit type entry code. Standard and optional data are contained in data groups, which are recorded following the type entry code. The particular data groups required for a call depend on the type of call (type entry code). Each particular data group has a specific format, which is a common requirement for all AMA records. The data group formats are listed in Table L and discussed in the following paragraphs.

3.05 *Data Group A2:* Data group A2 contains call and service feature information for each call.

(a) Call information is indicated by two information digits that convey special information such as service observing, traffic sampling, and operator information.

- (b) Service features indicate services such as 3-way calling and call forwarding.

3.06 Data Group A3: Data group A3 contains the connect time, which is the answer time (answer supervision time).

3.07 Data Group B2: Data group B2 contains the calling or billing number that is entered in each AMA record. A cellular service provider option allows either a 7-digit billing number (office code and station number) or a 10-digit billing number (including the NPA) to be recorded for home subscriber units. In the case of the 10-digit billing number option, the NPA is recorded in data group J.

Note: When the 10-digit billing number option is chosen, the NPA for a roamer subscriber unit is recorded in data group J and is also recorded in data group U4000. If the 10-digit billing number option is not chosen, the NPA for a roamer subscriber unit is still recorded in data group U4000.

3.08 Data Group C: Data group C contains the disconnect time and a count of the midnights passed.

3.09 Data Group D: Data group D contains the called number that is entered in all AMA records. The term "called number" is used in two different contexts. The "called number" is either the destination code entered by the calling party or the billing number recorded on an incoming call to a subscriber unit. In both cases the called number can contain up to ten digits.

- (a) For destination codes, the format of the number recorded depends on the type of call. Examples of formats are as follows:

- 7-digit destination (office code and station number are recorded; NCDs are recorded for the NPA)
- 10-digit destination (NPA, office code, and station number are recorded)
- N11 service codes (10-digit format recorded as: NCD NCD NCD N 1 1 0 0 0 0)
- 0- call (10-digit format recorded as: NCD NCD NCD 0 0 0 0 0 0 0)

- Speed calling code (complete destination stored in speed calling list is recorded).

- (b) The billing number recorded on an incoming call may or may not include the NPA, depending on the option chosen by the cellular service provider. If the NPA is not recorded, NCDs are entered in the NPA position of the 10-digit field. The office code and station number are recorded in the appropriate positions. If the NPA is recorded, it is entered in the NPA position.

Note: Regardless of whether or not the NPA option is chosen, the NPA of roaming units is included on all AMA records in the NPA position of the called number field.

3.10 Data Group J: Data group J contains the calling NPA if the 10-digit billing number option is chosen by the cellular service provider.

3.11 Data Group L: Data group L (alphabetical character "Y") is an entry extender, which indicates that additional data groups follow.

3.12 Data Group M: Data group M indicates whether or not data groups N, P, Q, R, S, and/or T are included in a record.

3.13 Data Group N: Data group N is an overseas number expander used (as necessary) to record the eleventh and twelfth digits of a called number for IDDD (international direct distance dialed) calls.

3.14 Data Group P: Data group P identifies the "U" data group(s) included in a record.

Note: The value of "P" (four digits) is additive if more than one "U" data group is included. For example, if U2 and U40 are included, the value of "P" equals 42 (i.e., P = 0042).

3.15 Data Group Q: Data group Q identifies the TNN used for an outgoing call.

3.16 Data Group R: Data group R is not currently used.

3.17 Data Group S: Data group S identifies the "W" data group(s) included in a record.

3.18 Data Group T: Data group T contains CI information for calls originated via the MTSO. The CI feature requires IC/INC information as follows:

- Carrier identification (identifies the carrier used and contains operator information)
- Carrier connect time
- Carrier connect date
- Carrier call event status
- Routing indicator
- Dialing indicator
- ANI indicator
- TGN (trunk group number) of the outgoing trunk used.

3.19 Data Group U2: Data group U2 records a customer dialed PAS account number, which can contain a maximum of eight digits. A PAS account number is for customer use only and does not affect call charging.

3.20 Data Group U10: Data group U10 is a call class indicator currently used to indicate call answer status.

3.21 Data Group U100: Data group U100 is a MRD (minimum recordable duration) indicator. The MRD is when a call lasts for at least 2 seconds. It is assumed that a signaling error occurred if a call duration is less than 2 seconds.

3.22 Data Group U400: Data group U400 contains subscriber unit call information, which indicates whether or not a fade occurred and includes the initial cell site number and initial radio number selected for the call.

3.23 Data Group U1000: Data group U1000 identifies the host SID (System Identification Number), which is recorded for roamer calls only. The decimal representation of a 15-bit system identification is recorded to identify the host SID (i.e., MTSO), which serves a particular CGSA.

3.24 Data Group U2000: Data group U2000 contains voice channel usage information, which includes the following:

- (a) A time change indicator indicates whether or not a time change occurred due to the system clock being reset.
- (b) Voice channel seizure time is recorded when confirmation is received that a subscriber unit has tuned to the initial voice channel.
- (c) Voice channel answer time is recorded when confirmation is received that a subscriber unit has answered a call.

Note: The VCANS (voice channel answer time) field is used uniquely for three-way and call waiting call records to determine total voice channel usage time. Detailed information is provided for three-way calling and call waiting.

- (d) A midnights passed indicator indicates when a call using radio facilities extends into another day. Up to 9 days can be indicated. The indicator count remains at 9 if a call extends more than 9 days.

- (e) Voice channel release time is recorded when confirmation is received that a subscriber unit has released from the final voice channel.

3.25 Data Group U4000: Data group U4000 contains subscriber unit identification information, which includes the calling NPA and serial number for roamer units. Security type information is also recorded in this data group.

3.26 Data Group U10000: Data group U10000 contains the home SID for a roamer unit. The home SID recorded is a decimal representation of a 15-bit system identification recorded for roamer calls only.

Note: Data group U10000 is a system option, which may be turned on or off for a particular System 100 MTSO.

3.27 Data Group W2: Data group W2 provides LSA (limited service area) indicators, which are used to determine proper charging of LSA customer calls.

For detailed LSA feature information, see reference A(11) in Part 10.

3.28 Data Group W4: Data group W4 contains an 8-digit transaction number (Transaction Code I). This data group is applicable to CNAMA records only.

3.29 Data Group W10: Data Group W10 contains the ESID (Extended System Identification Number) of the CPS. This data group (referred to as Transaction Code II) is applicable to CNAMA records only.

3.30 Data Group W40: Data group W40 contains total voice channel timing information. The information includes the midnight passed count, the first channel seizure time, and the final channel release time.

3.31 Data Group W200: Data group W200 contains switch timing information.

TYPE ENTRY CODES AND RECORD FORMATS

3.32 An AMA entry is written whenever a subscriber unit tunes to a voice channel, whether or not the call is answered. Mobile calls include local and toll calls, operator assisted calls, unrated wireline calls (e.g., 411 calls), and subscriber-terminated calls. Also, whenever a security check fails, an AMA entry is written to indicate the type of security check failure.

3.33 Six major classes of entries are used for subscriber calls. The type entry codes are consistent with the charge class and call class. All type entry codes are available for home subscriber units and roamer mobile units. Table M lists the data groups that may be formatted for each type entry code. The classes of entries are as follows:

- (a) Type entry code 01 is a subscriber originated (toll wireline) call. Table N lists the AMA data groups that may be formatted.
- (b) Type entry code 15 is a subscriber originated (local wireline) call. Table O lists the AMA data groups that may be formatted.

- (c) Type entry code 32 is a mobile-to-mobile (free wireline) call. Table P lists the AMA data groups that may be formatted.

- (d) Type entry code 33 is a subscriber-terminated call. Table Q lists the AMA data groups that may be formatted.

- (e) Type entry code 34 is a mobile security entry. Table R lists the AMA data groups that may be recorded.

- (f) Type entry code 36 is an operator assisted call. Table S lists the AMA data groups that may be recorded.

- (g) Type entry code 63 is an originating LATA overflow record. (See Table T.)

- (h) Type entry code 64 is a terminating LATA record. (See Table U.)

4. RELEASE 2 REQUIREMENTS AND FORMAT MODIFICATIONS

4.01 Release 2 of the AUTOPLEX System 100 generic program established additional AMA data requirements and modified some data groups for the following features.

- Roamer II Service
- Carrier Interconnect
- Custom Calling.

ROAMER II SERVICE

4.02 Roamer II Service established a new general AMA requirement for all roamers and established new AMA format requirements for roamers with TLDNs (temporary local directory numbers).

4.03 A new data group (data group U10000) is available as a system parameter option for roamers with TLDNs (Table L). This system option may be turned either on or off for roamers with TLDNs. Data group U10000 provides the home CGSA information for roamer calls only. The home CGSA is identified using five digits, which are the decimal representation of the 15-bit system identification.

4.04 The AMA requirements for roamers with TLDNs do not alter the requirements for home subscriber units or roamers without TLDNs. A TLDN permits a roamer to obtain the services available to home subscriber units. Therefore, AMA records for a roamer with a TLDN contain call type information previously contained only in records for home subscriber units. The data groups (Table L) contained in each AMA record for roamers with TLDNs have additional or modified usage as follows:

- (a) Data group A2 (call type information) contains custom calling indications for features such as 3-way calling, transfer service, and call waiting.
- (b) Data group B2 (calling or billing number) contains the 7-digit DN (i.e., NXX-XXXX) of the subscriber unit that originates a call.
- (c) Data group D (called number) contains the called 10-digit DN (i.e., NPA-NXX-XXXX) dialed from the subscriber unit that originates a call or the 10-digit DN of the subscriber unit that answers a call.
- (d) Data group J (calling NPA) contains the NPA of the subscriber unit if optional data group J is applicable.

Note: Data group J usage is an option for each cellular service provider.

- (e) Data group U1000 (host CGSA) is included for roamers with TLDNs as well as roamers without TLDNs. This data group is not used for TLDNs assigned to home subscriber units.
- (f) Data group U4000 (mobile identification) is included for roamers with TLDNs as well as roamers without TLDNs. This data group contains the calling NPA for all roamers. This data group is not used for TLDNs assigned to home subscriber units.

CARRIER INTERCONNECT

4.05 The AMA requirements for CI apply to all calls originated at a MTSO (including forwarded calls) that use an IC/INC (inter-LATA carrier/international carrier). Mobile terminated calls are

not affected since the MTSO position in the network precludes identification of the carrier.

4.06 Data group T contains carrier information and is appended for all calls originated via the MTSO which use an IC/INC. The affected type entry code is entry code 01, which is a subscriber originated call using a toll wireline. (See Table M.) Data group T is listed in Table L. Additional requirements are as follows:

- (a) Originating records for cut-through calls and transition plan calls (i.e., 950-WXXX) contain the called number (including the NPA if dialed) in data group D.

Note: For a transition plan call, item "W" is either the digit 1 or 0. Item "XXX" is the interexchange carrier identification code. If an NPA is not dialed, NCDs are recorded in the NPA field.

- (b) Data group B2 (calling or billing directory number) is included for all calls originated via the MTSO which use an IC/INC.

CUSTOM CALLING

4.07 Custom calling features require additional AMA data recorded in several existing data groups. In some cases, the data group content has been modified. The custom calling features are transfer service (forwarded calls), 3-way calling, and call waiting. In order to record use of zone-office trunks and other MTSO resources, entries in AMA record fields normally for voice channel usage are defined for calls or connections that do not correspond exactly to additional voice channel usage. Regardless, the term "voice channel" is used for these cases.

A. Call Forwarding Usage

4.08 A record is generated for each forwarded call. The type of call forwarding used makes no difference. The record format is the same format used for a subscriber-originated call with the following special considerations.

- (a) The service feature code recorded in data group A2 has a value of 12.

- (b) The time an answer signal is received from the terminating office is recorded in data group A3.
- (c) The "forwarding number" is recorded in data group B2.
- (d) The time a disconnect signal is received by the serving office is recorded in data group C.
- (e) The "forwarded to number", including the NPA if dialed, is recorded in data group D.
- (f) If the optional data group J is used in an office, the NPA of the "forwarding number" is recorded.
- (g) Zeroes are recorded in the initial radio number and initial cell site number fields of data group U400 for all types of call forwarding except CFDA (call forwarding don't answer). The radio number and cell site number that are serving the call at the time of forwarding are recorded.
- (h) The data recorded in data group U2000 are as follows:
 - (1) The VCST (voice channel seizure time) recorded is either the time of voice channel confirmation if the subscriber unit was alerted first, or the time the call was forwarded if the subscriber unit was not alerted.
 - (2) The VCANS (voice channel answer time) field is recorded with NCDs.
 - (3) The VCRT (voice channel release time) recorded is the time a disconnect signal is received by the serving office.

B. Call Forwarding Activation/Deactivation

4.09 A record is generated for each activation and deactivation of immediate call forwarding, CFBL (call forwarding busy line), and CFDA. The type of call forwarding makes no difference. Unique considerations for activation and deactivation records are as follows:

- (a) An activation record has the format of either a V01, V15, or V32 record, depending on the type of call (i.e., toll, local, or mobile-to-mobile) that is

applicable. Special considerations for an activation record are as follows:

- (1) The service feature code recorded in data group A2 has a value of 55.
- (2) The time of activation is recorded in data group A3.

Note: Data group A3 is not present in a V32 record.

- (3) The "activating number" is recorded in data group B2.
- (4) The time a disconnect signal is received by the serving office is recorded in data group C.

Note: Data group C is not present in a V32 record.

- (5) The "forward to" number, including the NPA if dialed, is recorded in data group D.
- (6) If the optional data group J is used in an office, the NPA of the "activating number" is recorded.

(b) A deactivation record follows the format of a V32 record with the following special considerations:

- (1) The service feature code recorded in data group A2 has a value of 55.
- (2) The "deactivating number" is recorded in data group B2.
- (3) The called NPA and called number fields in data group D are recorded with NCDs.
- (4) If the optional data group J is used in an office, the NPA of the "deactivating number" is recorded.

Note: A V32 deactivation record can be distinguished from a V32 activation record by the information recorded in data group D. For a deactivation record, data group D contains NCDs. For a V32 activation record, data group D contains the "forward to" number.

C. Speed Calling Activation

4.10 A record is generated for each speed calling activation. (Redefinition of a speed calling code is treated as a speed calling activation.) There is no unique indicator to identify speed calling usage. The record format for speed calling activations has the following special considerations.

- (a) The service feature code recorded in data group A2 has a value of 54.
- (b) The "activating number" is recorded in data group B2.
- (c) The "activated number", including the NPA if dialed, is recorded in data group D.

Note: If speed calling activation is used for storing a PAS account number, NCDs are recorded in data group D.

- (d) If the optional data group J is used in an office, the NPA of the "activating number" is recorded.
- (e) If speed calling activation is used for storing a PAS account number, the dialed account number digits (eight maximum) are left justified and recorded in data group U2. If an account number contains less than eight digits, NCDs are used to pad the 8-digit PAS account number field.

D. Three-Way Calling

4.11 A standard AMA record is made for an original call during which three-way calling is used. A separate record is generated for a call to a third party using three-way calling. This record is in addition to and independent from the record generated for the original call. A record generated for a three-way call follows the standard format of either a V01, V15, V32, or V36 record with the following special considerations.

- (a) The service feature code recorded in data group A2 has a value of 10.
- (b) The radio number and cell site serving the call when a three-way call is initiated are recorded in the applicable fields of data group U400.

(c) The time recorded in the VCST field in data group U2000 is the time that three-port facilities (i.e., three-port conference circuit and associated register) are seized and initialized for a three-way call.

(d) The use of the VCANS field in data group U2000 is unique for a three-way call. The information recorded in the VCANS field is based on call events. There are four cases to consider.

- (1) The three-way call attempt is unanswered and the subscriber abandons the attempt.
- (2) The third (added) party disconnects or is released by the subscriber during a three-way call.
- (3) The subscriber releases, which ends both calls.
- (4) The original party disconnects during a three-way call.

If any one of the first three cases occurs, the VCRT for the three-way call is recorded in both the VCANS field and the VCRT field (i.e., VCANS = VCRT).

If case four occurs (i.e., the original party disconnects), the VCRT for the original call is recorded in the original call record and is also recorded in the VCANS field of the three-way call record. A two-party call is established between the subscriber and remaining (third) party. The transition from a three-party call to a two-party call is referred to generally as "dropback." Thus, the time of transition (dropback) to a two-party call is recorded in the three-way call record.

(e) The time recorded in the VCRT field in data group U2000 is the time that the voice channel is released for the three-way call due to disconnect/release actions by either the subscriber or third party.

Note: For detailed information regarding three-way calling, see reference A(12) in Part 10.

4.12 The original call record and three-way call record are separate and independent records. The time that the voice channel is shared and not shared for a three-way call can be determined from the

times recorded in the VCANS field and the VCRT field of the three-way call record (i.e., service feature code equals 10 in data group A2). Whenever the time recorded in the VCANS field is the same time recorded in the VCRT field (i.e., VCANS = VCRT), the voice channel was shared for the duration of the three-way call. In all cases except one, the voice channel is shared for the duration of the three-way call. The exception is if the original party disconnects first during a three-way call and a transition is made to a two-way call. In this case, the time of transition (i.e., VCANS) and the time of voice channel release (i.e., VCRT) are not the same. The difference in time between VCANS and VCRT is the time the voice channel was not shared for the three-way call. The total voice channel usage can be determined as follows:

- (a) If VCANS equals VCRT in the three-way call record, the voice channel was shared for the duration of the three-way call. In this case, the total voice channel usage can be determined using the VCST and VCRT recorded in the original call record.
- (b) If VCANS does not equal VCRT in the three-way call record, the difference between these times (i.e., VCRT - VCANS) is the amount of time the voice channel was not shared for the three-way call. Adding that time difference to the total usage calculated for the original call (i.e., VCRT - VCST) will determine total voice channel usage.

E. Call Waiting

4.13 A separate record is generated for an incoming call that results in call waiting. This record is in addition to and independent from the record generated for the original call. A record generated for call waiting follows the format of a V33 record for a subscriber-terminated call with the following special considerations:

- (a) The service feature code recorded in data group A2 has a value of 10.
- (b) The radio number and cell site serving the call when call waiting is invoked are recorded in the applicable fields of data group U400.

- (c) The time recorded in the VCST field in data group U2000 is the time that three-port facilities are seized and call-waiting tone is sent to the subscriber.
- (d) The use of the VCANS field in data group U2000 is unique for call waiting and the purpose is the same as for three-way calling. The information recorded in the VCANS field is based on call events. There are four cases to consider.

- (1) The call waiting call is not answered within 30 seconds after call waiting tone is sent or the calling party abandons the call prior to answer.
- (2) After answer, the calling party disconnects while the original party is on hold.
- (3) After answer, the subscriber disconnects from both the incoming call and the original call.

Note: If the subscriber disconnects and callback occurs in response to call waiting tone, the call waiting call is considered unanswered. In this case, another record is generated for the callback call.

- (4) The original party disconnects after a call waiting call is answered.

If any one of the first three cases occurs, the VCRT for the call waiting call is recorded in both the VCANS field and the VCRT field (i.e., VCANS = VCRT).

If case four occurs (i.e., the original party disconnects), the VCRT for the original call is recorded in the original call record and is also recorded in the VCANS field of the call waiting call record. A two-party call is established between the subscriber and remaining party. Thus, the time of transition (dropback) to a two-party call is recorded in the call-waiting call record.

- (e) The time recorded in the VCRT field in data group U2000 is the time that the voice channel is released for the call-waiting call.

Note: For detailed information regarding call waiting, see reference A(13) in Part 10.

4.14 The time that the voice channel is shared and not shared for a call-waiting call can be determined from the times recorded in the VCANS field and the VCRT field of the call-waiting call record. The total voice channel usage can be determined for the original call and call-waiting call in the same manner as described for a three-way call.

4.15 A separate record is generated for automatic callback regardless of whether or not the callback is answered. Automatic callback occurs when the subscriber disconnects from an active call-waiting call and one of the other parties (i.e., original call party or call-waiting call party) is remaining on hold. Callback is an attempt to reestablish the call with the held party. A callback record follows the format used for the previous segment of the call between the subscriber and the party remaining on hold (referred to as the callback party) with the following special considerations.

- (a) If the callback party is the call-waiting call party, the callback record indicates entry code V33. Otherwise, the callback party is the original call party, and the callback record indicates the same entry code as the original call record.
- (b) If callback results in CFDA call forwarding, a call forwarding record is generated. The CFDA call forwarding is possible for a callback call only if the previously associated call was a subscriber-terminated call (i.e., entry V33). The CFDA feature is disabled for a callback call associated with a subscriber-originated call to the original call party.
- (c) For a callback call record, the service feature code recorded in data group A2 has a value of 00.
- (d) For a callback call that has a subscriber-originated entry code, the time the subscriber disconnected (which caused the callback) is recorded in data group A3.

Note: Data group A3 is not present in a V32 record.

- (e) The time the callback party disconnects or is released is recorded in data group C.

Note: Data group C is not present in a V32 record.

- (f) The radio number and cell site serving the call when callback occurs are recorded in data group U400.
- (g) The time the subscriber seizes a new voice channel to continue the call is recorded in the VCST field of data group U2000.
- (h) For a callback call that has a subscriber-terminated entry code V33, the time that the callback party is removed from hold and connected to the subscriber is recorded in the VCANS field of data group U2000. If the callback is unanswered, NCDs are recorded in the VCANS field. Also, NCDs are recorded for a callback call that has a subscriber-originated entry code.
- (i) The time that either the callback party or subscriber disconnects is recorded in the VCRT field of data group U2000.

5. DIRECT CONNECT REQUIREMENTS AND FORMAT MODIFICATIONS

OVERVIEW

5.01 The AMA records for the DC (Direct Connect) to CI (Carrier Interconnect) feature format data group T, which provides carrier information. Records are formatted for both originating LATA and terminating LATA calls associated with the DC to CI feature. The type entry codes and data groups applicable to CI are listed in Table V.

5.02 *Originating and Terminating Access Records:*
For an originating LATA call, the 1A switch formats an AMA record using entry code V01.

For a terminating LATA call, two records may be formatted. One record uses entry code 64, which provides carrier information. A V64 record is generated optionally, depending on the state of the CIAMA bit in the trunk group supplementary translator. A V64 record does not contain any cellular specific data groups (e.g., U400, U2000). The other record is a V33 record, which does not contain any carrier information (i.e., data group T).

5.03 Custom Calling Records: The AMA record(s) for a three-way call or a call waiting call contains the T data group if necessary. Entry codes V64 and V33 are formatted for a call waiting call if the 1A switch serves as a terminating LATA. Records generated as a consequence of callback also contain the T data group if necessary. For terminating LATA calls that are forwarded, the 1A switch formats a V64 record and the appropriate record for call forwarding (which may require data group T).

5.04 Overflow Record: A standard AMA record for overflow calls is formatted every hour as entry code V63. If no calls overflow, no overflow record is generated for that hour.

5.05 Records for Test Calls: The terminating LATA formats a V64 AMA record for a test call, but no V33 record is necessary since no voice channel is used.

5.06 Cellular Networking Records: Originating LATA calls may become CN calls via interswitch handoff. Terminating LATA calls may become CN calls via interswitch handoff or via CN termination (i.e., Interswitch Call Termination). The CPS (Control Point Switch) FAT (Facility and Airtime) record formats the T data group for originating LATA calls.

RECORD DESCRIPTIONS

5.07 Fields normally included in AMA records for entry codes V01, V33, V34, V63, and V64 are formatted as originally defined unless specified otherwise in this part. (See Table V.) Fields normally included in AMA records associated with other features are formatted as originally defined unless specified otherwise. The following data groups are especially important for DC AMA records:

- (a) Data group M indicates that data group T is formatted.
- (b) Data group T contains carrier information.

A. Originating LATA Records

5.08 Entry code V01 is used to format originating access records. The time that the first wink was received from the IC/INC is referred to as the CCT (Carrier Connect Time) for the originating LATA.

5.09 International Calls: Entry code V01 is used to format INC calls as well as IC calls. An INC call (i.e., call outside the North American Numbering Plan) contains the overseas number expander field, data group N.

5.10 Calls to an IC/INC Operator: Entry code V01 is used to format operator assisted calls. An access record is generated by the 1A switch for calls to an IC/INC operator service facility. The call event status field contains an indication if the call progresses to the state where an off-hook is received by the 1A switch from the operator services facility after the called number is sent. The 1A switch does not receive answer supervision (i.e., called party answer) when the operator services facility does not return an acknowledgement wink.

5.11 Overflow Records: Entry code 63 (Interchange Carrier Overflow Record) is used to provide an hourly count of overflows to an IC/INC. The overflow is a count of the number of calls that could not be delivered to the IC/INC because no outgoing trunk was available. Such records are produced only at the originating LATA for calls delivered via a direct connection from the 1A switch to the carrier.

If a carrier has both a direct connection and an overflow to a tandem office, no count of calls that overflow to the tandem office is made at the 1A switch. In addition, no count of calls that are blocked (due to both direct and tandem connections being busy) is made at the 1A switch.

An overflow count is made at the tandem office for calls which do not complete because of no trunk availability from the tandem office to the carrier. The entry type 63 record contains the time of recording (records are produced hourly) and peg counts for up to four carriers.

5.12 Security Entry: Entry code V34 is used to format originating access security entries, but does not include the T data group.

B. Terminating LATA Records

5.13 Entry code V64 (Interexchange Carrier Terminating Call Record) is used to format terminating access records. The terminating AMA access record is generated optionally by the office in which the call

enters the LATA. The generation of a V64 record depends on the state of the CIAMA bit in the trunk group supplementary translator. A per-call access record is made for all calls that progress to the stage where the trunk seizure is processed. The time the trunk seizure is processed is referred to as CCT for the terminating LATA.

Entry code 64 records do not contain originating/calling NPA or number, dialing indicator, or ANI indicator. Those fields within data group T are formatted with NCDs.

Entry code V33 is used to separately format the voice channel usage.

5.14 International Calls: Access charges for INC calls that terminate to a LATA are formatted using entry code 64. If traffic for an INC is routed via an IC to the LATA (1A switch), the IC/INC prefix field identifies the IC.

5.15 Call Attempts: The 1A switch outputs V64 records for call attempts since the AMA data creation process begins before answer is detected. The call event status in these records has a value of 01.

5.16 Test Calls: Test calls made by an IC/INC to the 1A switch are formatted as V64 entries. Digit 2 in data group A2 indicates that the call is a test call.

5.17 Security Entry: Entry code V34 formats terminating access security entries, but does not include the T data group. Entry code V64 is also formatted.

DIRECT CONNECT AMA INTERACTIONS

5.18 Cellular Networking: The AMA for direct connect calls in a CN (Cellular Network) environment involves expanding the basic DC AMA to include data groups W4, W10, and W40. These data groups are associated with the FAT record generated at the CPS for the originating LATA. The FAT record uses entry code V01.

Terminating LATA records (V64) are unaffected by cellular networking.

5.19 Roamer I and II: The AMA for direct connect calls for roamers involves expanding the basic DC AMA to include data groups U1000 and U4000 for Roamer I and II calls, and U10000 (as necessary) for Roamer II calls.

5.20 Custom Calling: Data group T is formatted as necessary for call forwarding calls, call waiting calls, and three-way calling calls. An AMA record for the outgoing leg of a call forwarding call or a three-way call formats entry code V01 with the T data group according to the requirements for originating access records.

An AMA record for the incoming leg of a call forwarding call or a call waiting call formats entry code V64 with the T data group according to the requirements for terminating access records. A V33 record is also formatted (as usual) for call waiting.

5.21 Callback: If a callback call involves an IC/INC originating call, the new CCT and date for the new V01 entry is the same as the previous disconnect time in data group C.

If a callback call involves an IC/INC terminating call, a new V64 record is formatted. The new CCT and date is the same time as the previous disconnect time.

5.22 Limited Service Area: If an intraswitch LSA (Limited Service Area) change of state involves an IC/INC originating call, then the new CCT and date for the "outside-LSA" record is the time of the previous disconnect time from the "inside-LSA" record.

If an intraswitch LSA change of state involves an IC/INC terminating call, then no special considerations are required since the data for the V64 record is collected independent of the handoff (i.e., only one V64 entry is required for an LSA call).

DATA GROUP DESCRIPTIONS

5.23 The following explanations define the usage of the data groups required for direct connect.

5.24 Data Group A2: Data group A2 contains information digits and service feature digits as follows:

(a) **Information Digits 1 and 2:** The time change indication in the second information digit is marked for all calls that were in progress (CCT to disconnect) when a change in the system clock occurred. A value of 1 in digit 2 indicates a time change.

The test call indication, also in digit 2, is marked for test calls made by the IC/INC to the 1A switch, except those in which a time change has occurred. A value of 9 in digit 2 indicates a test call. If a time change occurs while a test call is in progress (CCT to disconnect), the time change indication is marked.

(b) **Service Feature Digits 3 and 4:** For terminating LATA records, digits 3 and 4 of the A2 data group are the same for entry codes V64 and V33.

5.25 Data Group A3 (Answer Time): For test calls, the time the test facility was seized is formatted. For calls to an IC operator services facility, the operator connect time (i.e., time of off-hook from the IC/INC) is formatted. For unanswered calls, the abandon time is formatted.

5.26 Data Group B2 (Calling Number): This field is formatted with NCDs for terminating access records (V64).

5.27 Data Group C (Disconnect Time): For calls to a test panel, this field is formatted with the time the test panel was released. For calls to an IC operator services facility, the operator release time is formatted. For unanswered calls, this field is formatted with NCDs.

5.28 Data Group D (Called Number): For cut-through calls (10XXX + #) or transition plan calls (950-WXXX), this field is formatted with NCDs.

5.29 Data Group J (Calling/Billing NPA): Data group J contains the NPA of the calling or billing number. This field is an office option that is formatted for entry codes V01, V15, V32, V33, V34, and V36 if the option is set.

Note: Entry code V64 suppresses data group J.

5.30 Data Group M: Data group M follows data group L to indicate which of the N, P, Q, R, S and/or T groups are formatted.

5.31 Data Group N (Overseas Number Expander): Data group N is a 2-digit field containing the eleventh and twelfth digits of the called number on international calls outside the NANP. Data group N may contain NCDs if the called number is shorter than 12 digits. This data group is a 2-digit continuation of data group D on international calls.

5.32 Data Group T (Carrier Information): Data group T contains 25 characters which provide the inter-LATA carrier or international carrier identification, carrier connect time and date, carrier call event status, routing indicator, dialing indicator, ANI indicator, and trunk group number. This data group is used to record information for inter-LATA and international calls and is used with entry codes V01 and V64. The individual fields in the data group are formatted as follows:

(a) **Carrier Identification—4 Digits**

(1) Digits 1 through 3 of this field identify the carrier used. Carrier identification represents either a domestic IC or an INC. If a domestic IC delivers a call to an INC, the INC code is formatted. To determine which domestic carrier was involved requires a table access based on originating NPA-NXX and INC codes. If an INC delivers a call through an IC to terminating LATA, the IC code is formatted.

(2) Digit 4 of this field contains operator information as follows:

- 0 = (10XXX) + 0+, (10XXX) + 0-, and (10XXX) + 01+ calls—(This indicates the call was a domestic or international call that was operator assisted.)
- 1 = (10XXX) + (1)+ and (10XXX) + 011+ calls—(This indicates the call was a domestic or international call that was direct dialed.)
- 2 = Cannot determine if IC/INC operator was involved [i.e., 10XXX + # calls (cut-through), 950-WXXX calls (transition plan), or terminating access records].

(b) *Carrier Connect Time (CCT)—8 Digits*

(1) Digit 1 is defined as follows:

- NCD = No time change occurred between CCT and disconnect.
- 0 = Time change occurred between answer and disconnect, not a test call.
- 1 = Time change occurred between CCT and answer, not a test call.
- 2 = Time change occurred between answer and disconnect on a test call.
- 3 = Time change occurred between CCT and answer on a test call.

Note: If a value of 0, 1, 2, or 3 is present, the second information digit of data group A2 contains a 1. Values of 0 or 2 indicate message time was affected. Values of 1 or 3 indicate only carrier time was affected.

(2) Digits 2 through 8 of this field are formatted as HHMMSSST (i.e., hours, minutes, seconds, and tenths of seconds). For originating LATA records, the last seven digits of this field indicate the time that the first wink was returned by the IC/INC. For terminating LATA records, the last seven digits of this field are used to format the time that the incoming trunk was seized or a MCR was put on the call.

Note: For international calls delivered to the INC by an IC, the CCT is that of the IC.

(c) *Carrier Connect Date—4 Digits:* Digits 1 through 4 of this field are formatted as MMDD (i.e., month and day). For originating LATA records, the date that the first wink was returned by the IC/INC is formatted. For terminating LATA records, the date that an incoming trunk was seized or a MCR was put on the call is formatted.

(d) *Carrier Call Event Status—2 Digits:* This field provides information about events occurring in the originating and terminating exchange (i.e., call

progress information for the last known event on the call). This field is formatted as follows:

- 00 = This may occur if attempt recording is in effect and the first wink is not received (originating LATA).
- 01 = First wink from IC/INC (originating LATA); incoming trunk seized or MCR record put on call (terminating LATA).

Note: A value of 01 is formatted for call attempts.

- 02 = Abandon or time-out before dialing is complete (originating LATA).
- 03 = Second start dial wink from IC/INC (originating LATA).
- 04 = Time-out waiting for acknowledgement wink (originating LATA).
- 05 = Operator services or CAMA signaling—off-hook from IC/INC after receipt of called number (originating LATA).
- 06 = Call terminated due to Network Management feature (terminating LATA).
- 07 = Acknowledgement wink received.
- 08 = Invalid called number (terminating LATA).
- 09 = All features (except invalid called number) for which the call cannot be set up to the terminating office (e.g., all trunks busy to the terminating office, incomplete called number, or time-out waiting for wink from the terminating end office) (terminating LATA).
- 10 = Answer (originating or terminating LATA).
- 11 = Time-out waiting for second start dial wink for calls using INC signaling wink (originating LATA).
- 12 = Operator services or CAMA signaling—time-out waiting for off-hook signal (originating LATA).
- 13 = Off-hook rather than second start dial wink for calls using INC signaling (originating LATA).

(e) **Routing Indicator—1 Digit:** This field defines whether direct or tandem routing was used for originating calls. The digit is defined as follows:

- 0 = Direct connection
- 1 = Access tandem routing
- 2 = Neither direct connection nor access tandem routing.

Note: A value of 0 indicates a direct connection from the originating exchange to the carrier. A value of 1 indicates a tandem routing from the originating exchange to the carrier. A value of 2 indicates neither direct connection nor access tandem routing, (e.g., a zone office trunk group was used). This field contains a value of 0 for terminating LATA records (V64).

(f) **Dialing Indicator—1 Digit:** This field contains an indicator for originating LATA records. The digit is defined as follows:

- 1 = 10XXX or 950-WXXX not dialed (W = 0 or 1)
- 2 = 10XXX dialed
- 3 = 950-WXXX dialed.

Note: A value of 1 indicates that the presubscribed or default carrier was used and the calling party did not dial 10XXX or 950-WXXX. A value of 3 indicates that the call is actually a feature group B call. This field contains a NCD for terminating LATA records (V64).

(g) **ANI Indicator—1 Digit:** This field contains an indicator for originating LATA records. The digit is defined as follows:

- 0 = No ANI provided
- 1 = ANI provided.

Note: This field contains a NCD for terminating LATA records (V64).

(h) **Trunk Group Number—4 Digits:** This field contains the incoming TGN for terminating

LATA records (V64) and the outgoing TGN for originating LATA records. Digits 1 through 4 indicate the TGN (i.e., xxxx).

Note: It is necessary to use the office ID or NPA-NXX and TGN to determine carrier POP (point of presence) for those cases where a carrier has more than one POP in a LATA.

6. FEATURE OPERATION

GENERAL

6.01 The AMA feature operation is accomplished using four software programs that perform the following functions:

- Data accumulation
- Data transfer and tape writes
- Tape label generation
- Time change recording
- Midnight routine
- Midnight tape unit switch
- TTY requested tape unit switch
- End-of-tape tape unit switch.

The four software programs are identified and are briefly described prior to descriptions of the AMA functions.

SOFTWARE PROGRAMS

6.02 The four software programs that accomplish the AMA feature operations are:

- MAMAAMPS (mobile automatic message accounting)
- AMAC (AMA data accumulation)
- AMDX (AMA data transfer)
- DUAD (data unit administration).

Collectively, these programs contain routines that perform all tasks required to accomplish the AMA functions.

A. MAMAAMPS Program

6.03 The MAMAAMPS program accumulates and handles mobile specific data and related AMA data, such as time changes and midnights passed. This program operates in conjunction with the AMAC program to accumulate, format, and store all subscriber unit AMA data entries. Routines in MAMAAMPS accomplish the following functions:

- Initialize AMA part of a MCR.
- Record security entries.
- Record voice channel seizure time and answer time.
- Record cell site and radio number.
- Record disconnect time and voice channel release time.
- Record time change indicator.
- Record midnights passed count.

B. AMAC Program

6.04 The AMAC program accumulates and handles data other than mobile specific data. The AMAC program (in conjunction with the MAMAAMPS program) accumulates, formats, and stores all AMA data entries required for both subscriber unit calls and wireline calls. Routines in AMAC accomplish the following functions:

- Accumulate and store data other than mobile specific data.
- Format entries and load AMAC buffer.
- Perform midnight routines.
- Perform time change tasks.

C. AMDX Program

6.05 The AMDX program unloads the AMAC buffer, reformats the data, and stores the data in an AMDX output buffer until the data is written on tape by the DUAD program. Routines in AMDX accomplish the following functions:

- Perform data transfer and tape write tasks.
- Generate and write header, trailer, transfer, and time change labels and end-of-tape marks.
- Perform tape unit switches.

D. DUAD Program

6.06 The DUAD program administers ADS resources required for the AMA feature. The DUAD program executes requests from AMDX to write AMA tape blocks, labels, and other AMA related data onto tape. The validity of a request is checked by DUAD prior to initializing ADS facilities. The job status is verified by DUAD. The DUAD program returns job status data (success or failure) to the AMDX program.

DATA ACCUMULATION

6.07 Data accumulation is accomplished collectively by the MAMAAMPS and AMAC programs. Data is initially available during call processing in either a MOR (mobile originating register), OR (originating register), or IR (incoming register). A MCR is initialized for either a mobile originated or subscriber-terminated call. The data entered during initialization of a MCR depends on whether the call is a mobile originated or terminated call. In either case, the call type is entered during initialization. The call type later determines the type entry code that determines the data groups that may be recorded. (See Table L and Table M.)

6.08 As setup of a call progresses and charge related data becomes available, the data accumulation function stores the data in the AMA part of the MCR. Radio facility usage is recorded for all subscriber unit calls. This applies to both subscriber originated and subscriber terminated calls (even if the called party fails to answer). For a terminating call, only charge data related to radio facility usage is recorded. If wireline facilities are also used for any subscriber unit

call, wireline information is also recorded. Refer to Table L and Table M for AMA data which may be recorded for each call type. All AMA data is accumulated in the MCR for the duration of the call.

6.09 After completion of the call, the AMA data is formatted and temporarily stored in the AMAC buffer before the MCR is released from the call. If space is not available in the AMAC buffer, the MCR is entered on a FIFO (first-in, first-out) queue. The message is written when space becomes available and the MCR is idled.

6.10 If a call is abandoned, data group U10 is appended to the AMA record. The time of abandon is recorded in the answer time field.

6.11 An AMA record containing a security entry is written whenever an unassigned number or invalid serial number is detected during a call or if roamer service is denied on a call attempt. A security message is written if there is space available in the AMAC buffer; otherwise, no message is written. A MCR containing a security entry is not idled after the security message is written. In this case, the MCR is returned to call processing for disposition.

DATA TRANSFER AND TAPE WRITES

6.12 After each AMA record is written into the AMAC buffer, a check is made for a buffer full condition. When the AMAC buffer contains 250 or more tape characters, AMAC requests AMDX to unload the AMAC buffer. When the AMAC buffer is full, MCRs with AMA records to be written into the AMAC buffer are placed on a FIFO queue.

6.13 Each AMA data group consists of an exact multiple of five BCD (binary coded decimal) characters. Each BCD character contains four bits. Data is stored in the AMAC buffer in a packed format of five BCD characters per word. (See Fig. 8.) Two BCD characters form one tape character. The letters "A" and "B" designate the two BCD characters per tape character.

6.14 Due to the design of the ADS, the TUCs require data to be in a six BCD characters per-word format. Therefore, AMDX reformats the five characters per-word data (received from the AMAC buffer) to a six characters per-word format. (See Fig. 9.) The

reformatted data is stored in an AMDX buffer until it is written onto tape.

6.15 There are two AMDX output buffers. Each buffer can store up to 575 tape characters. Therefore, when an AMDX output buffer receives a second transfer of 250 or more tape characters from the AMAC buffer, the contents of that AMDX buffer can be written onto tape.

Note: Parameter word AB1BLKSIZE specifies the number of tape characters in an AMA tape data block.

6.16 When an AMDX buffer contains a sufficient number of tape characters to write an AMA tape data block, AMDX requests DUAD to perform the tape write operation. The AMDX pointers are updated to point to the other AMDX buffer.

6.17 The ADS resources (i.e., tape units) are administered via DUAD. The AMDX request to transfer and write the AMDX output buffer data to tape is executed by DUAD. The DUAD program checks the validity of the request, initializes the ADS facilities, verifies job completion, and returns job status to AMDX. When AMDX receives the job status, AMDX determines whether or not the tape write was successful.

6.18 The AMDX maintains a count of the number of AMA records per block and the number of blocks per tape. These counts are used to validate the tape and to construct the AMA tape labels. When AMDX receives a delayed return for the tape operation from DUAD, the status of the request (success or failure) is determined and the tape block and call record counts are incremented. If AMDX determines that there may be a problem with the ADS, a DUAD audit routine is requested.

6.19 When AMDX determines that AMA data is being lost (i.e., AMDX is waiting on an outstanding tape operation and starts to overwrite a buffer which contains valid data), a TTY output message (REPT:UNABLE TO RECORD AMA DATA) is printed and a critical alarm is sounded. The AMDX function keeps a count of all AMA call records that are lost.

TAPE LABEL GENERATION

6.20 Tape labels (described in Part 2) are generated by the AMDX program. All AMA tape labels contain 20 tape characters.

- (a) Header labels are generated and written to mark the beginning of a new business day. Refer to Fig. 7 and Table F.
- (b) Trailer labels are generated and written to mark the end of billing data recorded for a business day. Refer to Fig. 7 and Table G.
- (c) Transfer labels are generated and written to indicate an unscheduled switch of AMA tape units. A transfer label is written on both the active and standby tape units if possible. Refer to Fig. 7 and Table H.
- (d) A time change label is generated and written whenever the system clock is updated. Refer to Fig. 7 and Table I.

TIME CHANGE ROUTINE

6.21 Whenever a time change is made to the system clock (via TTY request), AMAC is entered by the main program. All currently active MCRs are marked to indicate that a time change has occurred. After the MCRs are marked, AMAC requests AMDX to generate and write the time change label on the AMA tape.

MIDNIGHT ROUTINE

6.22 The AMAC program is entered at midnight of each day by the executive control main program to execute functions associated with the end of the day. The AMAC and AMDX functions accomplish the midnight routine. All MCRs are checked for a busy condition. For busy MCRs found, other checks are made to determine the number of midnights passed since each of the calls originated, and the midnight passed item in each busy MCR is incremented. Up to nine midnights passed counts are kept. Midnight counts of two to nine cause an AM01 output message to be generated and printed on the maintenance TTY. The AM01 message includes the calling DN, number of midnights passed since the call originated, and the address of the MCR serving the call.

6.23 After the final AMA record for the day has been loaded in the AMAC buffer, the remainder of the buffer is filled with NCDs. After the buffer is full, AMAC requests AMDX to unload the last buffer of the day.

6.24 The AMDX program reformats and stores the AMA data in the current AMDX buffer, fills out the remainder of the AMDX buffer with NCDs to form a complete AMA tape block, and determines if a midnight switch is to be accomplished. The AMDX program requests DUAD to write the last AMA tape block of the day. The AMA record count is set to zero, and the midnight switch routine is requested. The AMDX program generates a trailer label for the day passed and a header label for the new business day.

MIDNIGHT TAPE UNIT SWITCH

6.25 The active and standby AMA tape units are switched on a regular basis to allow an orderly replacement of the AMA tape with a new blank tape. The schedule for switching the tape units varies from office to office and depends on the volume of billing data and administrative practice. The schedule is defined by parameter word OD1AMASCHED. Each of the first seven bits of OD1AMASCHED corresponds to a day of the week. During the midnight routine, parameter word OD1AMASCHED is checked. If the current day bit is set to one, the AMA tape units are switched at midnight.

6.26 If parameter word OD1AMASCHED indicates an AMA tape unit switch is required, transfer labels are written on both AMA tape units and AMDX requests DUAD to switch the active and standby AMA tape units. The tape units are switched by DUAD, and the standby file is closed. The "SW:AMA COMPL TUC" output message is printed after the switch is completed. At this time, the standby AMA tape unit contains the previous day(s) AMA tape. This tape can now be demounted from the standby AMA tape unit and replaced with a new blank tape.

MANUALLY REQUESTED TAPE UNIT SWITCH

6.27 The AMA tape units may be switched using the TTY input message SW:AMA. The AMDX function writes transfer labels on both the active and standby AMA tape units and requests DUAD to accomplish the switch. Following the switch, the

standby AMA tape unit is placed in the file-closed state and the output message "SW:AMA COMPL TUC" is printed. If the switch cannot be accomplished, the output message "SW:AMA NOT STARTED" is printed.

END-OF-TAPE TAPE UNIT SWITCH

6.28 The DUAD program informs AMDX when the EOT is detected on an AMA tape unit. This information is passed with the delayed return from DUAD for a tape write operation. Upon detecting the EOT, AMDX writes transfer labels on both AMA tape units, DUAD performs the unit switch, and AMDX closes the standby file. The TTY output message "REPT:END OF AMA TAPE ON TUC N" is printed to indicate that the AMA tape should be dismounted.

6.29 If there is not a standby AMA tape unit in service at the time the EOT is detected on the active AMA tape unit, AMDX performs the following:

- (a) Writes a transfer label on the active tape unit and closes the file.
- (b) Turns the AMA function off.

Note: This causes a major alarm. The TTY message "REPT:UNABLE TO RECORD AMA DATA" is printed.

- (c) Records a transfer label when a tape unit is assigned for AMA.

7. ENGINEERING

7.01 These guidelines are for planning purposes only. The COEES (Central Office Equipment Engineering System) should be used to manually order and engineer the 1A ESS switch. The standard recommended automated procedure is COEES-MO (Mechanized Ordering).

HARDWARE

7.02 The AMA feature uses ADS hardware as discussed in Part 2. For detailed ADS information, see references A(5) through A(9) in Part 10.

SOFTWARE

A. Base Generic Program

7.03 Approximately 20,000 words are required in a System 100 MTSO for the AMA feature.

B. Parameters/Call Store Areas

Note: For detailed parameter, call store, and set card information, see references B(3), B(4), and B(5) in Part 10.

Parameters

7.04 The number of parameter words required is as follows:

- 7 parameter words defined by Compool for the two AMDX output buffers
- 1 parameter word defined by Compool for the AMA office type
- 1 parameter word for the AMA tape identification
- 1 parameter word for the AMA tape unit switching schedule.

7.05 The parameter words for AMA are as follows:

(a) Parameter words AB1MINTPBK1, AB1MAXTPBK1, and AB1NUMTPBK1 define the starting address, ending address, and size of the AMA output buffer number one. Parameter words AB1MINTBK2, AB1MAXTPBK2, and AB1NUMTPBK2 define the starting address, ending address, and size of AMA output buffer number two. These fixed program store parameter words are defined by Compool and provide data necessary to define the two output buffers in duplicated call store which are used by AMDX. The two output buffers are referred to as tape blocks in duplicated call store and are defined by Compool as AB2TAPBLK1 and AB2TAPBLK2, respectively.

(b) Parameter word AB1BLKSIZE defines the size of the AMA tape blocks by specifying the number of AMA tape characters to be written in each AMA output buffer (AMA tape blocks 1 and

2). This fixed program store parameter word is defined by Compool. Parameter word AB1BLKSIZE has a maximum value of 575.

(c) Parameter word AB1OFFTYP defines the AMA office type. This fixed program store parameter word is defined by Compool.

(d) Parameter word OD1TAPID, built by set card AMAT, provides the 6-digit number for the AMA tape identification label for a particular office.

(e) Parameter word OD1AMASCHED provides the AMA tape unit switching schedule as specified according to set cards SUN, MON, TUE, WED, THU, FRI, and SAT.

Call Store

7.06 The number of call store words required is as follows:

- 134 words for the AMAC buffer
- 438 words for the two AMDX buffers.

7.07 The start of the AMA output buffer in call store used by AMAC is defined by Compool as $A8AMA9 + 100$. This buffer (referred to as the AMAC buffer) contains 114 words plus an overflow area of 20 words. The AMA data from the MCRs are formatted and stored in the buffer by AMAC. When the AMAC buffer becomes full, the AMAC buffer data is unloaded, reformatted, and stored in one of the two AMDX output buffers.

7.08 Two data blocks in call store are defined by Compool as AB2TAPBLK1 and AB2TAPBLK2. These two data blocks are used by AMDX to store formatted AMA output data until the data is written on the active AMA tape unit. These two data blocks are referred to as the AMDX output buffers. Each of these buffers contain approximately 219 words, and each buffer is capable of storing up to 575 8-bit tape characters. Parameter word AB1BLKSIZE specifies the number of tape characters in an AMA data block. Two control words, AB1TAPBK and AB1TAPBKX, contain the starting address of the current buffer and the next available entry in the buffer, respectively.

7.09 The AMA data are initially stored in MCRs, which are engineered on a per-system basis. Set card NMCR specifies the number of MCRs required.

REAL TIME

7.10 Approximately 1000 to 1300 cycles are required to accumulate and enter AMA data in the AMAC buffer. The number of cycles required to accumulate and enter AMA data in the AMAC buffer depends on the type of call.

7.11 Approximately 1900 cycles are required to transfer the AMAC buffer data, reformat the data, and load the AMDX buffer.

7.12 Approximately 500 cycles are required to unload the AMDX buffer and enter the AMA data on magnetic tape.

7.13 The cycle time for the 1A ESS switch is 0.7 microsecond.

8. IMPLEMENTATION

8.01 The AMA feature is implemented by inputting set cards to build parameters and call store areas. The AMA records are formatted according to DN and routing and charging translation data, which reflects entries established on translation forms.

SET CARDS

Note: For detailed set card, parameter, and call store information, see references B(3), B(4), and B(5) in Part 10.

8.02 Set cards required for AMA are as follows:

- (a) Set card AMAT specifies the 6-digit office identification included on the AMA tape. The 6-digit identification number (usually the 3-digit area code plus the 3-digit office code) is determined by the telephone company.
- (b) Set card NMCR specifies the number of MCRs equipped in an office.
- (c) Set cards SUN, MON, TUE, WED, THU, FRI, and SAT specify the weekly schedule for automatically switching the active and standby

AMA tape units during the midnight routine. The tape units are switched at the beginning of the first hour of the day indicated. If a set card value equals one, the standby tape unit is made active and the active tape unit is made standby for that particular day. If a set card value equals zero, no scheduled AMA tape unit switch occurs for that particular day. A minimum of four scheduled switches per week must be specified.

TRANSLATION FORMS

Note: For detailed translation information, see references B(6) and B(7) in Part 10.

8.03 Translation items established according to entries on DN and routing and charging translation forms determine the AMA data collected and recorded in an office. The entire 1300 series of forms are applicable to routing and charging. The main forms applicable to AMA are as follows:

- 1101—Directory Number Record
- 1107—Supplementary Information Record
- 1302—Office Charge Record
- 1304—Rate and Route Chart
- 1305—Rate and Route Pattern Record
- 1306—Line Class Code Record
- 1333—Interexchange and International Carrier Common Block Record
- 1334—Class of Service Information.

9. MEASUREMENTS

9.01 No traffic measurements are provided for the AMA feature per se. Standard traffic measurements are available for the System 100. For example, traffic measurements are available for MCR peg, usage, and overflow counts. These are TMC 116 (type measurement code 116), EGO 023, 025, and 024 (equipment groups 023, 025, and 024), respectively. These are available on the hourly H and C, DA-15

(selected quarter-hour), and S (special study) schedules. For a description of System 100 traffic measurements, see reference A(10) in Part 10.

10. SUPPLEMENTARY INFORMATION

GLOSSARY

10.01 Terms frequently used in this practice are defined as follows:

Cellular Geographic Service Area—A CGSA is a geographical area that is provided cellular telecommunications services by one MTSO and its associated cell sites.

Roamer—A subscriber unit that operates in a CGSA other than the CGSA from which service is subscribed (i.e., home CGSA).

Voice Channel—A radio frequency channel on which a voice conversation occurs and on which brief digital messages may be sent from a cell site to a subscriber unit or from a subscriber unit to a cell site.

REFERENCES

10.02 The following documentation contains information pertaining to or affected by the AMA feature.

A. AT&T Practices

- (1) 231-290-618—Cellular Networking Automatic Message Accounting—Feature Document
- (2) 231-290-600—Mobile Telephone Switching Office Feature—Feature Document
- (3) 231-090-120—Carrier Interconnect Feature—Feature Document
- (4) 231-290-628—Carrier Interconnect Feature (including Direct Connect)—Feature Document
- (5) 254-201-000—Auxiliary Data System Description 1A Processor
- (6) 254-201-001—Auxiliary Data System Theory 1A Processor

- (7) 034-369-301—Recorder KS-20571 Trouble-Locating Procedures
- (8) 254-280-112—Auxiliary Data System Operational Programs Software Description 1A Processor
- (9) Task Oriented Practice 254-251-010—1A Processor Auxiliary Data System
- (10) 231-290-604—Traffic Measurements—Feature Document
- (11) 231-290-624—Limited Service Area—Feature Document
- (12) 231-290-609—Three-Way Calling—Feature Document
- (13) 231-290-610—Call Waiting—Feature Document.

B. Other Documentation

- (1) Input Message Manual IM-6A001
- (2) Output Message Manual OM-6A001

- (3) Office Parameter Specification PA-6A001
- (4) Parameter Guide PG-1A
- (5) Call Store Data Layout Manual PK-6A006
- (6) Translation Guide TG-1A
- (7) Translation Output Configuration PA-6A002
- (8) 759-100-000 BISP—Subject Index—Central Office Equipment Engineering System (COEES)
- (9) 759-100-100 BISP—General Description—Central Office Equipment Engineering System (COEES).

11. COMMENT FORM

11.01 A comment form is located at the back of this practice to provide a communications channel from the user to the writer.

12. ISSUING ORGANIZATION

Published by
The AT&T Documentation Management Organization

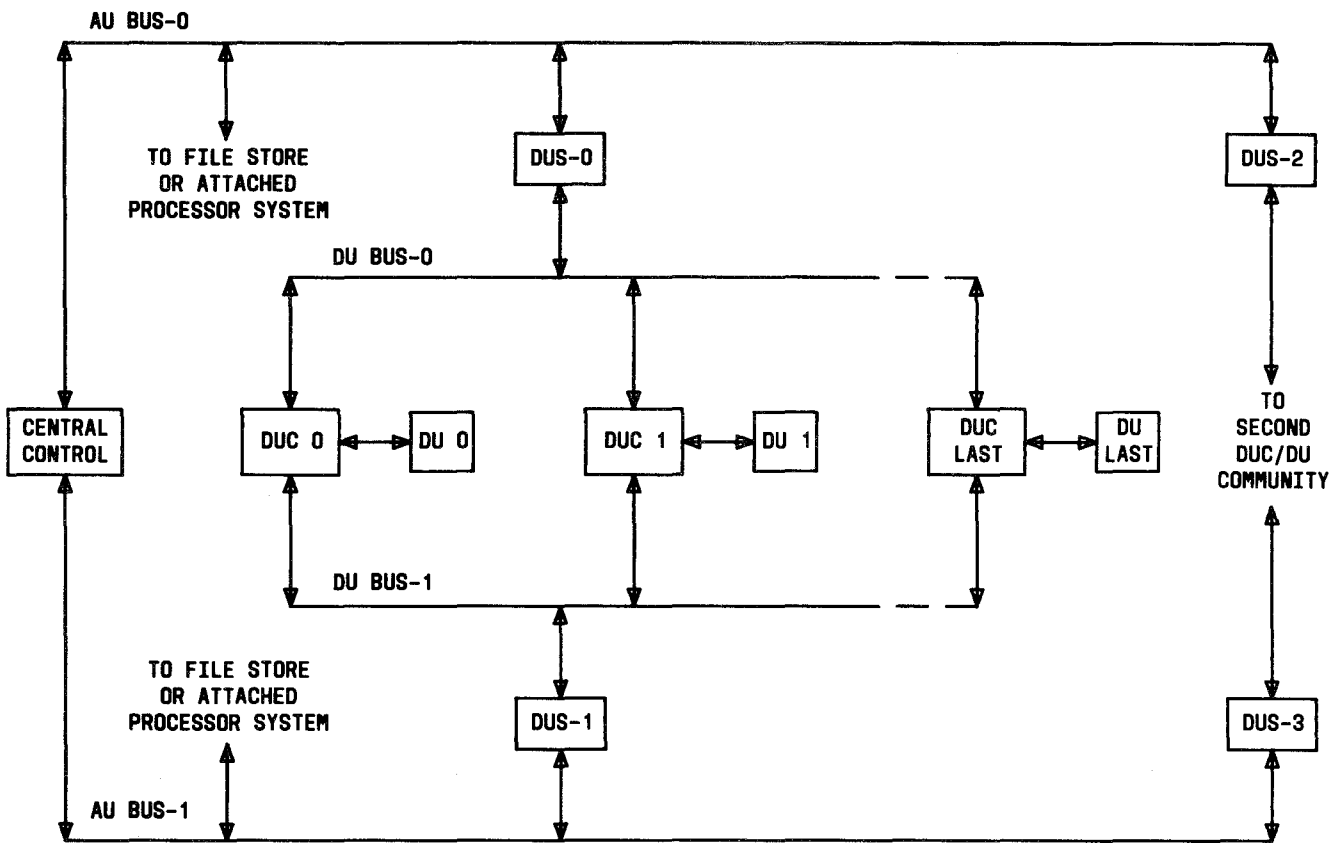


Fig. 1—Auxiliary Data System Interface Diagram

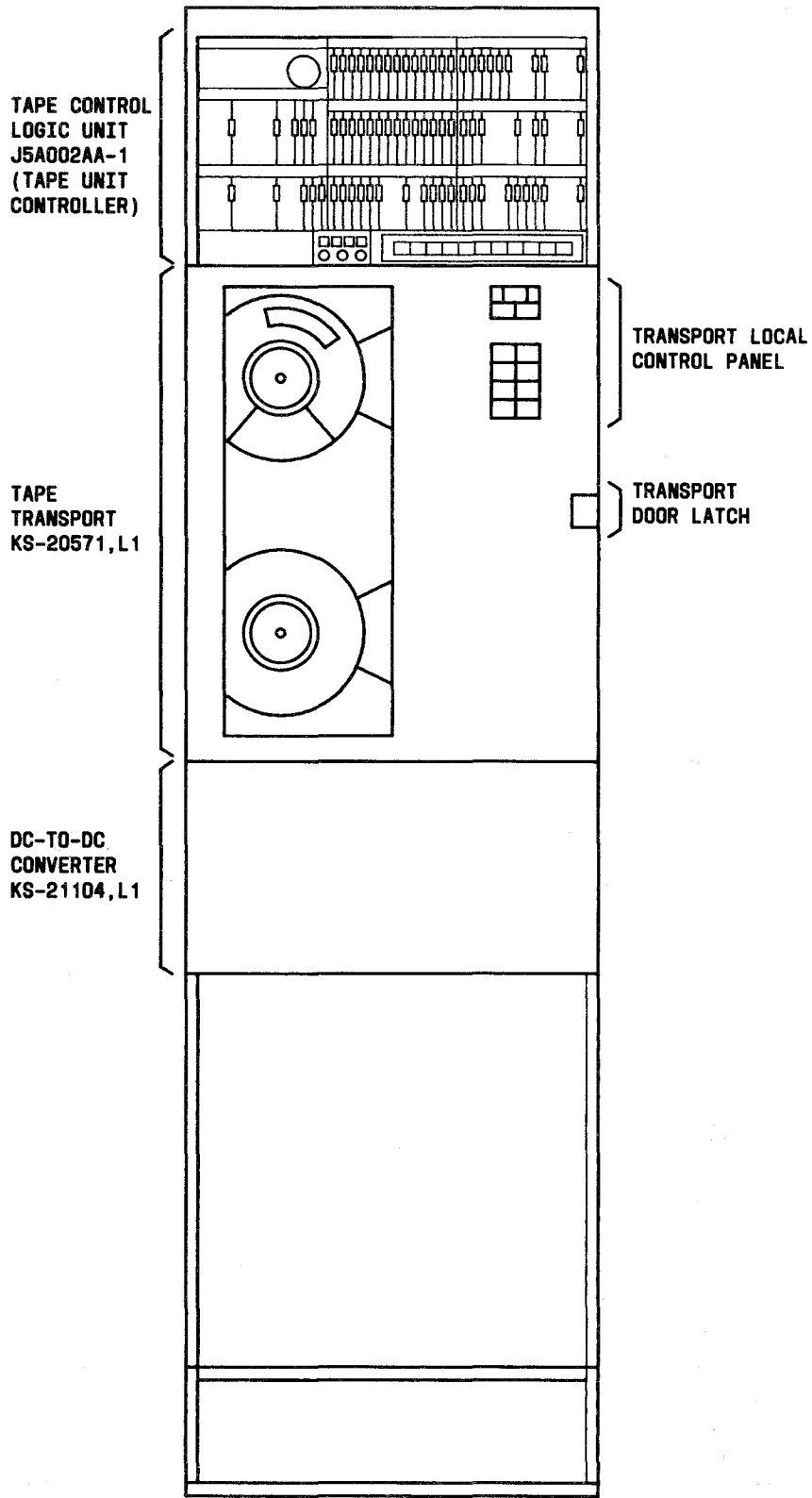
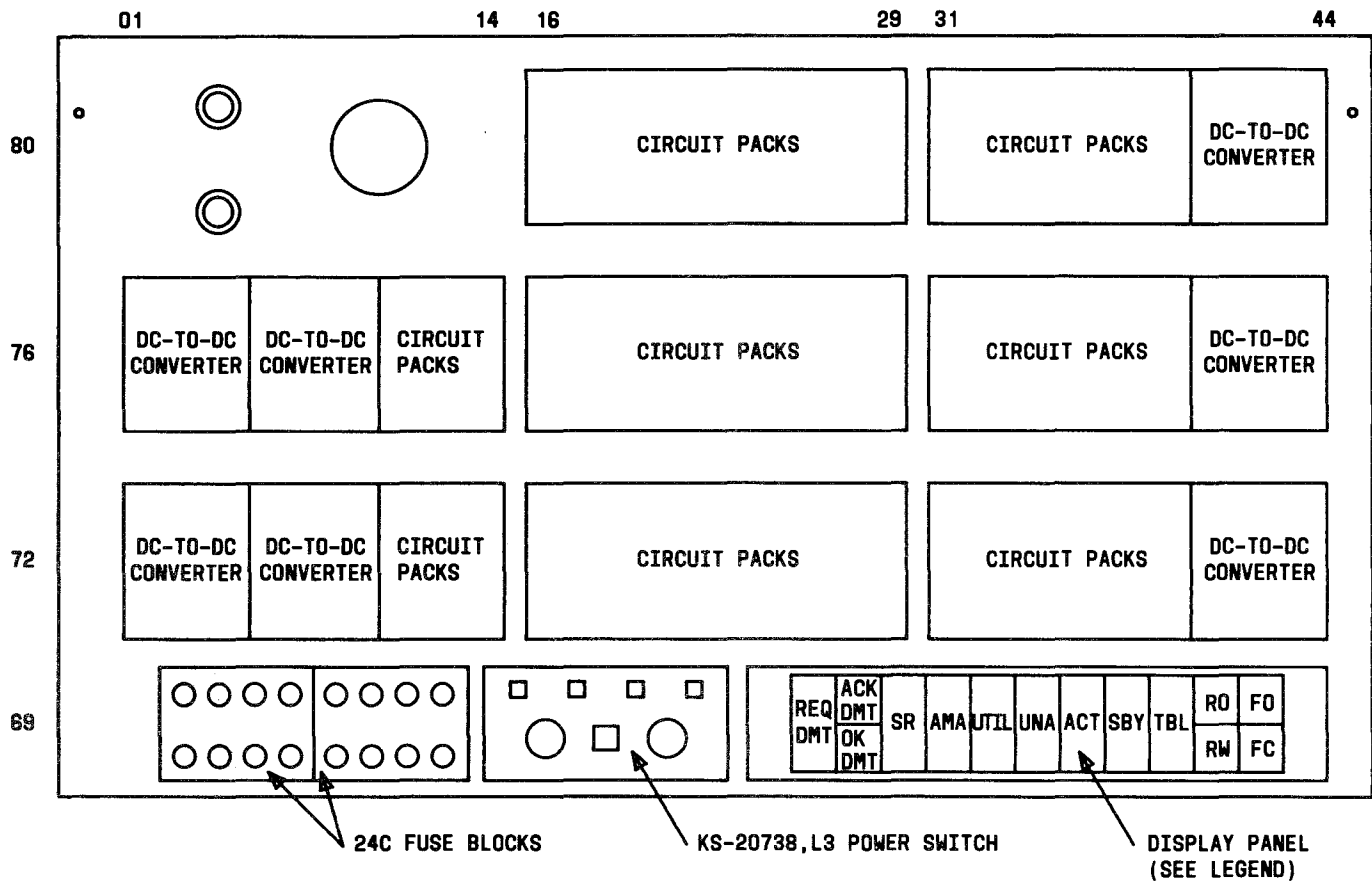


Fig. 2—Tape Frame J5A002A-1—Front View



LEGEND:

- REQ DMT - REQUEST TO DEMOUNT
- ACK DMT - ACKNOWLEDGE DEMOUNT
- OK DMT - OK-TO DEMOUNT
- SR - SYSTEM REINITIALIZATION MODE
- AMA - AUTOMATIC MESSAGE ACCOUNTING MODE
- UTIL - UTILITY MODE
- UNA - UNASSIGNED MODE
- ACT - ACTIVE
- SBY - STANDBY
- TBL - TROUBLE
- RO - READ ONLY
- RW - READ AND WRITE
- FO - FILE OPEN
- FC - FILE CLOSED

Fig. 3—Tape Unit Controller J5A002AA-1

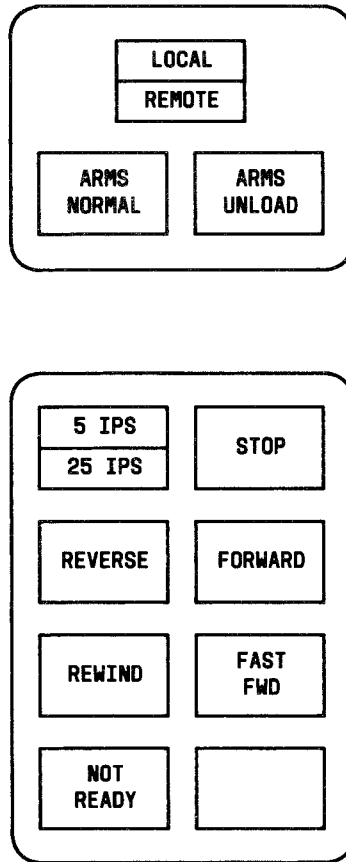


Fig. 4—Tape Transport Local Control Panel

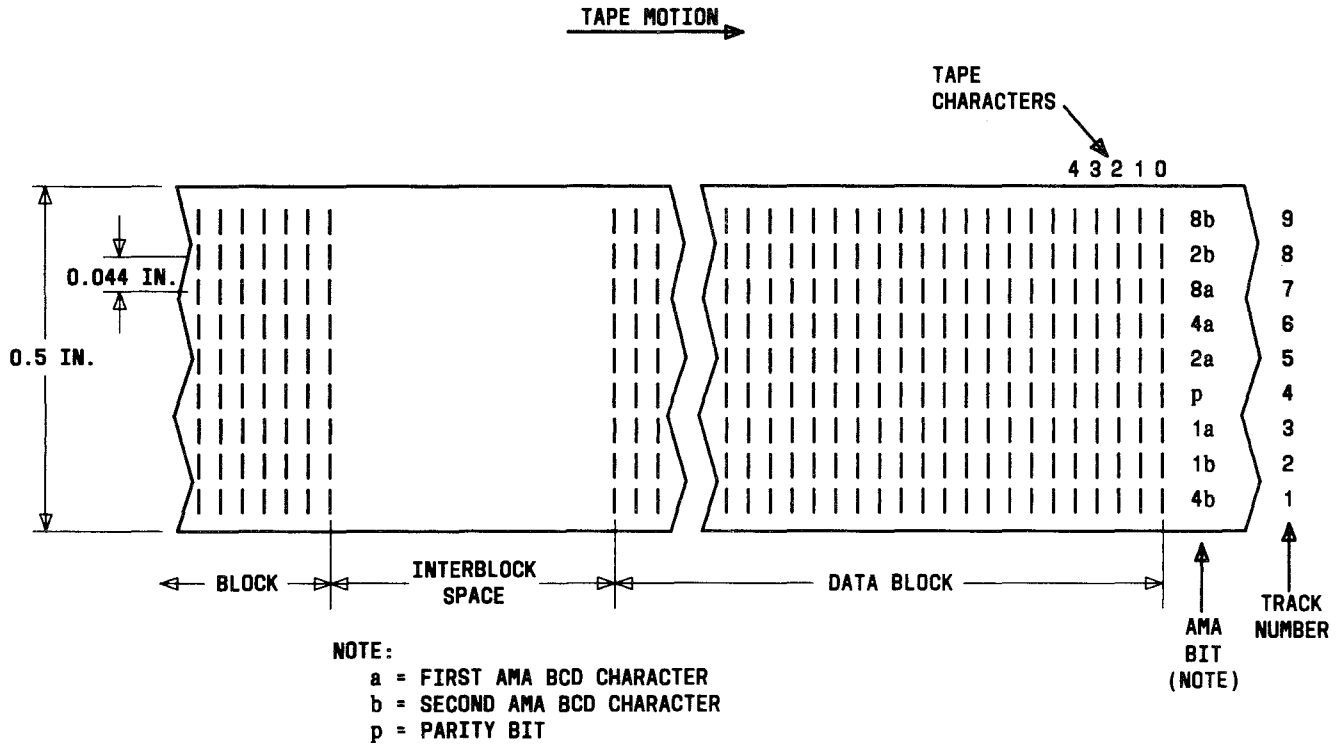


Fig. 5—Tape Format

AMA TAPE CHARACTER (9 BITS)									
P A R I T Y	DATA CHARACTER								
	BCD CHARACTER A				BCD CHARACTER B				
	8A	4A	2A	1A	8B	4B	2B	1B	
TAPE TRACK	4	7	6	5	3	9	1	8	2

Fig. 6—AMA Data and Tape Track Association

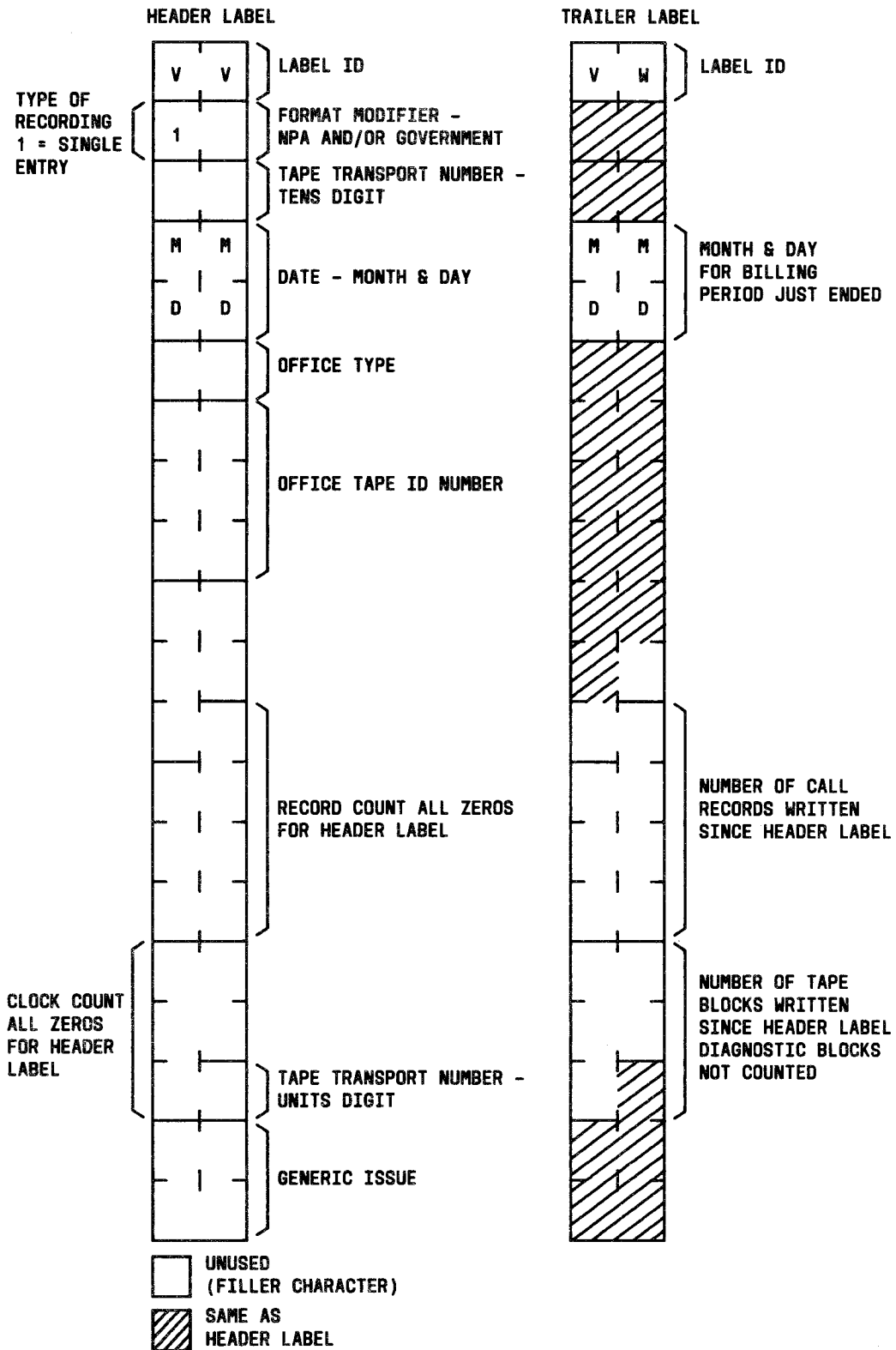
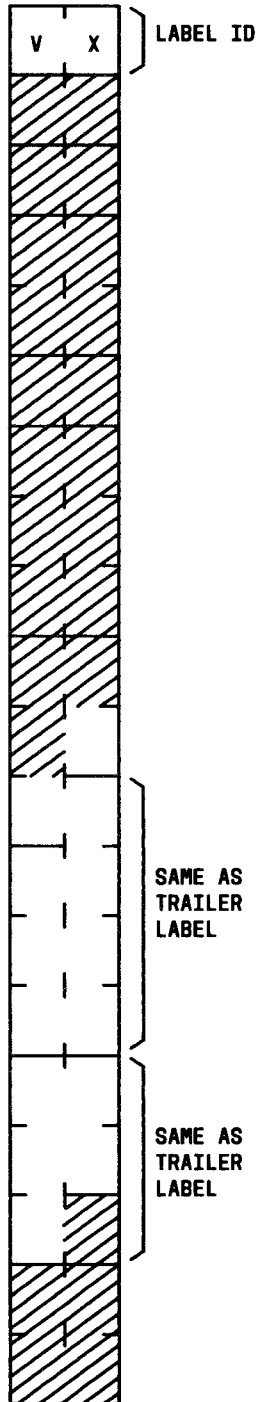
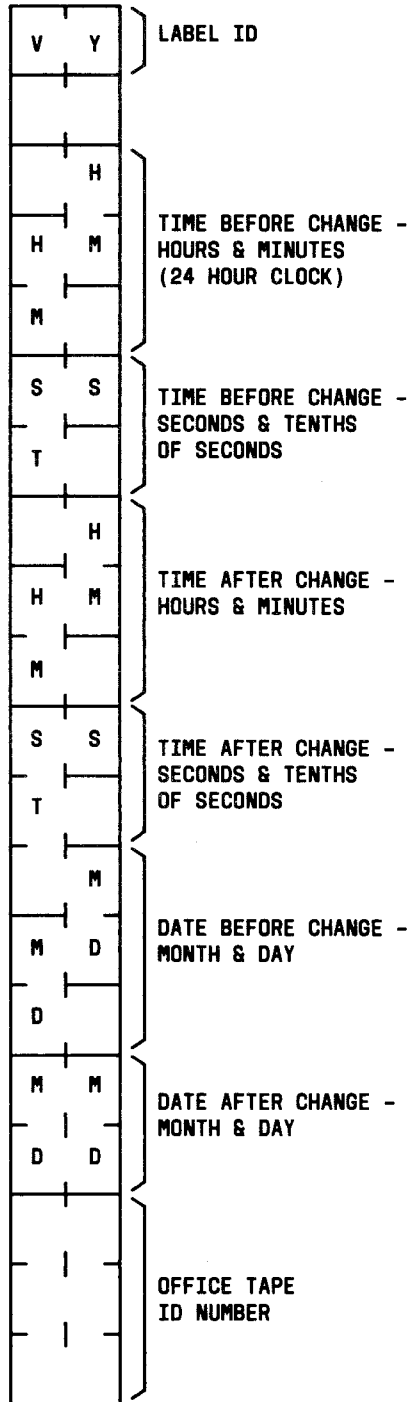


Fig. 7—AMA Tape Labels (Sheet 1 of 2)

TRANSFER LABEL



TIME CHANGE LABEL



ALL LABELS
20 TAPE
CHARACTERS -
2 BINARY
CODED DECIMAL
(BCD)
CHARACTERS
PER TAPE
CHARACTER

- UNUSED (FILLER CHARACTER)
- SAME AS HEADER LABEL

Fig. 7—AMA Tape Labels (Sheet 2 of 2)

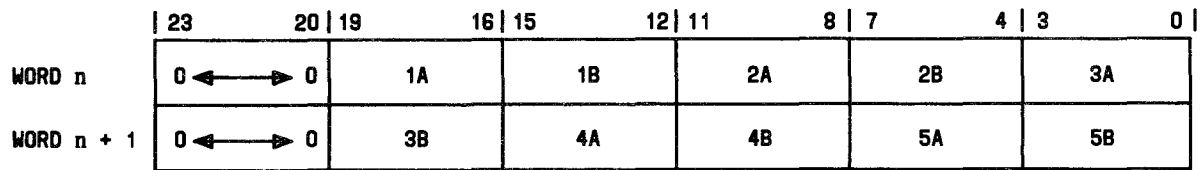


Fig. 8—2-Word AMAC Buffer Data Format

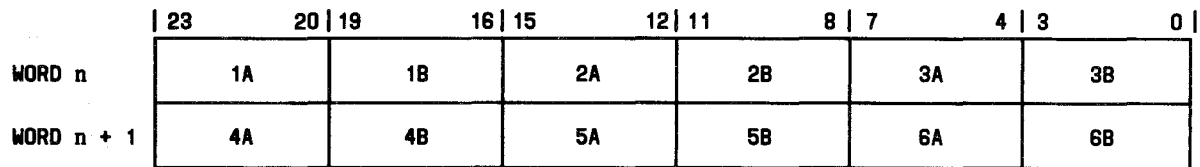


Fig. 9—2-Word AMDX Buffer Data Format

TABLE A	
AMA-RELATED FEATURES AND SERVICES	
FEATURE	PRACTICE
Immediate Call Forwarding	231-290-607
Conditional Call Forwarding	231-290-608
Three-Way Calling	231-290-609
Call Waiting	231-290-610
Roamer I Feature	231-290-615
Roamer II Feature	231-290-616
Cellular Networking AMA	231-290-618
Cellular Networking	231-290-619
Message Desk Service	231-290-622
Project Accounting Service	231-290-623
Limited Service Area	231-290-624
Carrier Interconnect	231-290-628
AMA Dump for Selected Customers	231-290-633

TABLE B
TUC DISPLAY PANEL CONTROLS AND INDICATORS

NAME	TYPE	FUNCTION
REQ DMT	Pushbutton Switch	When depressed, switch is a signal to system that maintenance personnel desire to demount tape reels from tape transport.
ACK DMT	Lamp	When lighted, indicates that request to demount tape reels has been received by system.
OK DMT	Lamp	When lighted, indicates that tape reels may be demounted.
SR	Pushbutton Switch/Lamp	When depressed, selects SR (system reinitialization) as mode of operation in which tape frame is to be operated. Lamp is lighted when tape frame is in SR mode.
AMA	Pushbutton Switch/Lamp	When depressed, requests AMA (automatic message accounting) as mode of operation in which tape frame is to be operated. Lamp is lighted when tape frame is in AMA mode.
UTIL	Lamp	When lighted, indicates that tape frame is in utility mode of operation.
UNA	Lamp	When lighted, indicates mode of operation is unassigned.
ACT	Lamp	When lighted, indicates current state of tape frame is active and is in use by system.
SBY	Lamp	When lighted, indicates current state of tape frame is standby and has been reserved as a backup for another unit.
TBL	Lamp	When lighted, indicates TUC is in trouble state and is unavailable for system use due to a trouble condition.
RO	Lamp	When lighted, indicates only reads from tape shall be allowed. This indicator also depicts (tape) volume status.
RW	Lamp	When lighted, indicates both reads from and writes onto tape shall be allowed.
FO	Lamp	When lighted, indicates tape file is open and is being written into.
FC	Lamp	When lighted, indicates tape file is closed and has been completed and may no longer be written into.

TABLE C		
TAPE TRANSPORT LOCAL CONTROL PANEL CONTROLS AND INDICATORS		
NAME	TYPE	FUNCTION
LOCAL/REMOTE	Pushbutton Switch (Alternate Action)/Lamps	In LOCAL, inhibits all remote control and allows transport to repond to local controls only. In REMOTE, allows normal control only via the TUC. Lighted lamp indicates the mode of control in effect.
ARMS NORMAL	Pushbutton Switch/Lamp	When depressed, results in automatic load controls to position tension arms to provide proper tape tension after threading a reel of tape onto transport. Lighted lamp indicates tension arms are in normal position.
ARMS UNLOAD	Pushbutton Switch/Lamp	When depressed, allows tension arms to be automatically retracted in order to unload transport. Lighted lamp indicates tension arms are retracted in unload position.
BRAKE RELEASE	Pushbutton Switch	When depressed, reels move freely allowing tape to be threaded through guides, over heads, and onto takeup reel. When released, brakes are reapplied.
5 IPS/25 IPS	Pushbutton Switch (Alternate Action)/Lamps	In 5 IPS, tape moves in forward or reverse direction at a speed of 5 inches per second. This speed is used with doors open-maintenance type activities. In 25 IPS, tape moves in forward or reverse direction at 25 inches per second. Tape speed is set at 25 IPS for normal operation. Lighted lamp indicates tape speed in effect.
STOP	Pushbutton Switch/Lamp	When depressed, overrides any other command, stops tape, and lights lamp.
FORWARD	Pushbutton Switch/Lamp	When depressed, tape winds in forward direction at 5 or 25 IPS until tape marker is reached or stop switch is depressed. Lighted lamp indicates tape is moving in forward direction.
REVERSE	Pushbutton Switch/Lamp	When depressed, tape rewinds at 5 or 25 IPS until a marker is reached or stop switch is depressed. Lighted lamp indicates tape is moving in reverse direction.
REWIND	Pushbutton Switch/Lamp	When depressed, rewinds tape at 100 IPS to beginning of tape marker and stops on marker. Lighted lamp indicates rewind is in progress.

TABLE C (Contd)		
TAPE TRANSPORT LOCAL CONTROL PANEL CONTROLS AND INDICATORS		
NAME	TYPE	FUNCTION
FAST FWD	Pushbutton Switch/Lamp	When depressed, tape winds in forward direction at 100 IPS until end of tape marker is reached or another pushbutton is depressed. Lighted lamp indicates fast forward motion of tape.
NOT READY	Lamp	When lighted, indicates any diagnosed failure of tape unit that could lead to tape damage. This indication is also given when Park Mode is selected by remote control, door is open, or tape arms abnormal.

TABLE D				
MEANING ASSIGNED TO BCD CHARACTERS				
BCD CHARACTER A OR B				ASSIGNED MEANING
BCD BITS				
8	4	2	1	
1	0	1	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	1	NCD
1	1	0	0	V
1	1	0	1	W
1	1	1	0	X
1	1	1	1	Y
0	0	0	0	Z

TABLE E	
BCD CHARACTER PAIRS	
CHARACTER PAIRS	DEFINITION
VV	Header Label
VW	Trailer Label
VX	Transfer Label
VY	Time Change Label
VZ	Statistics Identifier
V*	Start of Entry
†V	Start of Entry
YY	Head-Check Code
Y‡	Entry Extender
†Y	Entry Extender
ZY	Error Designation Code
ZZ	Check Dummy Code
13	End-of-File Mark

* First digit of type-of-entry code.
† Last digit (0 through 9) of preceding data.
‡ First digit of data group M.

TABLE F
HEADER LABEL

NO. OF BCD CHARACTERS	USE	DEFINITION
2	Label Identifier	"VV" indicates header label.
1	Type of Recording	"1" indicates single entry.
1	Format Modifier	Indicates entry formatting to be expected (NPA and/or government).
1	Unused	"NCD".
1	Tape Transport Number	Tens digit.
4	Date	"MMDD" M=Month, D=Day.
2	Office Type	"NN" N=BCD digit. Indicates type of office.
6	Office Tape Identification Number	"NNNNNN" N=BCD digit. Number of office in which the recorder is located.
5	Unused	"NCD".
7	Record Count	"0000000".
5	Block Count	"00000".
1	Tape Transport Number	Units digit.
4	Generic Issue	"NNNN" N=BCD digit.

TABLE G
TRAILER LABEL

NO. OF BCD CHARACTERS	USE	DEFINITION
2	Label Identifier	"VW" indicates trailer label.
1	Type of Recording	"1" indicates single entry.
1	Format Modifier	Indicates entry formatting to be expected (NPA and/or government).
1	Unused	"NCD".
1	Tape Transport Number	Tens digit.
4	Date	"MMDD" M=Month, D=Day.
2	Office Type	"NN" N=BCD digit. Indicates type of office.
6	Office Tape Identification Number	"NNNNNN" N=BCD digit. Number of office in which the recorder is located.
5	Unused	"NCD".
7	Record Count	Number of call records recorded since header label.
5	Block Count	Number of 500-character groups written since header label. Diagnostic blocks are not counted.
1	Tape Transport Number	Units digit.
4	Generic Issue	"NNNN" N=BCD digit.

TABLE H
TRANSFER LABEL

NO. OF BCD CHARACTERS	USE	DEFINITION
2	Label Identifier	"VX" indicates transfer label.
1	Type of Recording	"1" indicates single entry.
1	Format Modifier	Indicates entry formatting to be expected (NPA and/or govern- ment).
1	Unused	"NCD".
1	Tape Transport Number	Tens digit.
4	Date	"MMDD" M=Month, D=Day.
2	Office Type	"NN" N=BCD digit. Indicates type of office.
6	Office Tape Identification Number	"NNNNNN" N=BCD digit. Number of office in which the re- corder is located.
5	Unused	"NCD".
7	Record Count	Number of call records recorded since header label.
5	Block Count	Number of 500-character groups written since header label. Diagnostic blocks are not counted.
1	Tape Transport Number	Units digit.
4	Generic Issue	"NNNN" N=BCD digit.

TABLE I
TIME CHANGE LABEL

NO. OF BCD CHARACTERS	USE	DEFINITION
2	Label Identifier	"VY" indicates time change label.
1	Type of Recording	"1" indicates single entry.
1	Format Modifier	Indicates entry formatting to be expected (NPA and/or government).
1	Unused	"NCD".
4	Time before change	"HHMM" H=Hours, M=Minutes. (24-hour clock).
1	Unused	
3	Time before change	"SST" S=Seconds, T=Tenths of Seconds.
2	Unused	"NCD".
4	Time after change	"HHMM".
1	Unused	"NCD".
3	Time after change	"SST".
2	Unused	"NCD".
4	Date before change	"MMDD" M=Month, D=Day.
1	Unused	"NCD".
4	Date after change	"MMDD".
6	Office Tape Identification Number	"NNNNNN".

TABLE J	
STATISTICAL DATA FORMAT	
HEADING ENTRIES	AMA TAPE CHARACTER POSITION
Statistics identifier—first digit (V)	1
Statistics identifier—second digit (Z)	2
Type of statistical data	3-4
Noncheck dummy character (1011)	5
Hours tens	6
Hours units	7
Minutes tens	8
Minutes units	9
Noncheck dummy character	10

TABLE K	
AMA DATA GROUPS	
DATA GROUP	AMA INFORMATION
A2	Call type information
A3	Connect time
B2	Calling or billing number
C	Disconnect time
D	Called number
J	Calling or billing NPA (optional data group)
L	Entry extender (letter "Y" indicates additional data groups)
M	Indicator for optional data groups N, P, Q, R, S, and T
N	IDDD digits 11 and 12
P	Indicator for optional U data groups (sum of U data groups)
Q	Trunk network number
S	Indicator for optional W data groups (sum of W data groups)
T	Carrier interconnection information
U2	Customer dialed PAS number
U10	Call class (answer status)
U100	Indicator for MRD (minimum recordable duration)
U400	Mobile information
U1000	Host SID
U2000	Voice channel usage
U4000	Mobile identification
U10000	Home SID (optional)
W2	LSA (limited service area) indicator

TABLE K (Contd)	
AMA DATA GROUPS	
DATA GROUP	AMA INFORMATION
W4	Transaction Code I (transaction number)
W10	Transaction Code II (ESID number)
W40	Total voice channel timing
W200	Switch timing

TABLE L (Contd)			
DATA GROUP FORMATS			
DATA GROUP	INFORMATION	DIGITS PER ITEM	TOTAL DIGITS PER GROUP
C	Disconnect Time: midnights passed hours minutes seconds tenths of seconds	1 2 2 2 1	8
D	Called Number: NPA (if dialed or noncheck dummy characters) directory number	3 7	10
J	Calling NPA	3	3
L	Entry Extender	1	1
M	Data Group Indicator: First Digit (N, P, Q Indicator): 0 = Neither N, P, nor Q data group included 1 = Q data group included 2 = P data group included 3 = P and Q data groups included 4 = N data group included 5 = N and Q data groups included 6 = N and P data groups included 7 = N, P, and Q data groups included Second Digit (R, S, and T Indicator): 0 = Neither R, S, nor T data group included 1 = T data group included 2 = S data group included 3 = S and T data groups included 4 = R data group included 5 = R and T data groups included 6 = R and S data groups included 7 = R, S, and T data groups included	2	2
N	Overseas Number Expander (for IDDD calls)	2	2
P	Data Group Indicator for "U" Data Groups: 00002 = Data group U2 (PAS number) 00010 = Data group U10 (call class)	5	5

TABLE L (Contd)			
DATA GROUP FORMATS			
DATA GROUP	INFORMATION	DIGITS PER ITEM	TOTAL DIGITS PER GROUP
P (Contd)	00100 = Data group U100 (MRD indicator) 00400 = Data group U400 (mobile information) 01000 = Data group U1000 (host SID) 02000 = Data group U2000 (voice channel usage) 04000 = Data group U4000 (mobile identification) 10000 = Data group U10000 (home SID) (The value of the P data group is the sum of the value of the U data groups included in the entry.)		
Q	Trunk Network Number	6	6
S	Data Group Indicator for "W" Data Groups: 00002 = Data group W2 (LSA indicator) 00004 = Data group W4 (Transaction Code I) 00010 = Data group W10 (Transaction Code II) 00040 = Data group W40 (total voice channel timing) 00200 = Data group W200 (switch timing) (The value in data group S is the sum of the values of the W data groups in the record.)	5	5
T	Carrier Interconnection (IC/INC) Information: Carrier Identification field: <ul style="list-style-type: none"> • Digits 1 through 3 (carrier ID code) • Digit 4 (operator information) <ul style="list-style-type: none"> 0 = operator assisted 1 = not operator assisted 2 = operator assistance not determined Carrier Connect Time (CCT) field: <ul style="list-style-type: none"> • Digit 1 (time change indicator): <ul style="list-style-type: none"> NCD = no time change 0 = time change between answer and disconnect, not a test call 1 = time change between CCT and answer, not a test call 2 = time change between answer and disconnect, test call 3 = time change between CCT and answer, test call • Digits 2 through 8 (hours, minutes, seconds, and tenths of seconds—HHMMSST) 	4	25
		8	

TABLE L (Contd)			
DATA GROUP FORMATS			
DATA GROUP	INFORMATION	DIGITS PER ITEM	TOTAL DIGITS PER GROUP
T (Contd)	<p>Carrier Connect Date field:</p> <ul style="list-style-type: none"> • Digits 1 through 4 (month and day—MMDD) <p>Carrier Call Event Status Field:</p> <ul style="list-style-type: none"> • Digits 1 and 2 (event indicator) <p>00 = This may occur if attempt recording is in effect and the first wink is not received (originating LATA)</p> <p>01 = First wink from IC/INC (originating LATA); incoming trunk seized or MCR record put on call (terminating LATA).</p> <p>(A value of 01 is formatted for call attempts.)</p> <p>02 = Abandon or time-out before dialing is complete originating LATA).</p> <p>03 = Second start dial wink from IC/INC (originating LATA).</p> <p>04 = Time-out waiting for acknowledgement wink (originating LATA).</p> <p>05 = Operator services or CAMA signaling—off-hook from IC/INC after receipt of called number (originating LATA).</p> <p>06 = Call terminated due to network management feature (terminating LATA).</p> <p>07 = Acknowledgement wink received.</p> <p>08 = Invalid called number (terminating LATA).</p> <p>09 = All features (except invalid called number) for which the call cannot be set up to the terminating office (e.g., all trunks busy to the terminating office, incomplete called number, or time-out waiting for wink from the terminating end office) (terminating LATA).</p> <p>10 = Answer (originating and terminating LATA).</p> <p>11 = Time-out waiting for second start dial wink for calls using INC signaling wink (originating LATA).</p>	4	
		2	

TABLE L (Contd)			
DATA GROUP FORMATS			
DATA GROUP	INFORMATION	DIGITS PER ITEM	TOTAL DIGITS PER GROUP
T (Contd)	<p>12 = Operator services or CAMA signaling—time-out waiting for off-hook signal (originating LATA).</p> <p>13 = Off-hook rather than second start dial wink for calls using INC signaling (originating LATA).</p> <p>Routing Indicator field:</p> <p>0 = Direct connection 1 = Access tandem routing 2 = Neither direct connection nor access tandem routing (e.g., zone trunk used).</p> <p>(For terminating LATA records, this field contains a value of 0.)</p> <p>Dialing Indicator field:</p> <p>1 = 10XXX or 950-WXXX not dialed (W = 0 or 1) 2 = 10XXX dialed 3 = 950-WXXX dialed</p> <p>ANI Indicator field:</p> <p>0 = No ANI provided 1 = ANI provided</p> <p>Trunk Group Number field:</p> <ul style="list-style-type: none"> • Digits 1 through 4 (TGN = XXXX) 	<p>1</p> <p>1</p> <p>1</p> <p>4</p>	
U2	Customer dialed PAS number	8	8
U10	Call Class Indicator	2	2
U100	MRD (Minimum Recordable Duration) Indicator	1	1
U400	<p>Mobile Information:</p> <p>First Digit:</p> <p>0 = no fade 1 = fade occurred</p> <p>Digits 2 through 4—(Initial cell site number) Digits 5 through 7—(Initial radio number)</p>	7	7

TABLE L (Contd)			
DATA GROUP FORMATS			
DATA GROUP	INFORMATION	DIGITS PER ITEM	TOTAL DIGITS PER GROUP
U1000	Host SID for Roamer Calls Only (decimal representation of 15-bit system identification)	5	5
U2000	Voice Channel Usage: Time Change Indicator: 0 = no time change 1 = time change Channel Seize time: hours minutes seconds tenths of seconds Channel Answer time: hours minutes seconds tenths of seconds Midnights Passed Channel Release Time: hours minutes seconds tenths of seconds	1 2 2 2 1 2 2 2 1 1 2 2 2 1	23
U4000	Mobile Identification: Calling NPA Mobile Serial Number Security Type: 0 = not a security entry 1 = roamer service denied 2 = invalid serial number 3 = unassigned home mobile unit number	3 11 1	15
U10000	Home SID for Roamer Calls Only (decimal representation of 15-bit system identification)	5	5
W2	LSA Indicator: 1 = Mobile LSA subscriber—call within subscriber's LSA. 2 = Mobile LSA subscriber—call outside subscriber's LSA.	1	1

TABLE L (Contd)			
DATA GROUP FORMATS			
DATA GROUP	INFORMATION	DIGITS PER ITEM	TOTAL DIGITS PER GROUP
W2 (Contd)	3 = Mobile LSA subscriber—call outside subscriber's LSA but subscriber hung-up during LSA warning tone timing period. 4 = Mobile LSA subscriber—handoff outside subscriber's LSA.		
W4	Transaction Code I (8-digit transaction number)	8	8
W10	Transaction Code II (ESID number): Control Point DCSID (System 10 switch identifier) Control Point MTSOID (identifies MTSO) Control Point SID (identifies CGSA) Airtime Segment for Continuing Switch Connection: 0 = No airtime segment 1 = First airtime segment 2 = Another airtime segment 3 = Last airtime segment 4 = Only airtime segment Switch Indicator: 0 = Control point switch 1 = Slave switch	2 2 5 1 1	11
W40	Total Voice Channel Timing Midnights Passed First Channel Seizure Time: hours minutes seconds tenths of seconds Final Channel Release Time: hours minutes seconds tenths of seconds	1 2 2 2 1 2 2 2 1	15
W200	Switch Timing: Midnights Passed Called Party Answer Time: hours minutes seconds tenths of seconds Called Party Disconnect Time: hours minutes seconds tenths of seconds	1 2 2 2 1 2 2 2 1	15

TABLE M
TYPE ENTRY CODES AND DATA GROUPS

DESCRIPTION	TYPE ENTRY CODE	DATA GROUPS (NOTE 1)																								MINIMUM BCD DIGITS PER CALL ENTRY (NOTE 2)	
		STANDARD								OPTIONAL																	
		A2	A3	B2	C	D	J	L	M	N	P	Q	S	T	U2	U10	U100	U400	U1000	U2000	U4000	U10000	W2	W4	W10		W40
Mobile Originated Call (Toll Wireline)	01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	80
Mobile Originated Call (Local Wireline/Mobile)	15	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	80
Mobile-to-Mobile or Free Wireline Call	32	✓	—	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	65
Mobile Terminated Call	33	✓	—	—	—	✓	✓	✓	✓	—	✓	—	✓	—	✓	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	65
Mobile Security Entry	34	✓	✓	✓	—	✓	✓	✓	✓	✓	✓	—	—	—	—	—	✓	✓	—	✓	✓	—	—	—	—	—	70
Operator Assisted Call	36	✓	—	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	65
Terminating LATA Record	64	✓	✓	✓	✓	✓	—	✓	✓	—	✓	✓	—	✓	—	—	—	—	—	—	—	—	—	—	—	—	80

Notes:

1. ✓ Indicates data group may be used for type entry code listed.
— Indicates data group is not used for type entry code listed.
2. The minimum BCD digits include the noncheck dummy characters required to pad the entry to a multiple of five BCD digits.

TABLE N		
MOBILE ORIGINATED TOLL WIRELINE CALL ENTRY CODE 01		
DATA GROUP	NO. OF DIGITS	INFORMATION
	1	Start of entry character (V)
	2	Type of entry code (01)
A2	4	Call type information
A3	8	Connect time
B2	7	Calling or billing number (NXX-XXXX)
C	8	Disconnect time
D	10	Called number (NPA-NXX-XXXX)
J	3	Calling or billing NPA (optional group)
L	1	Letter Y entered to indicate additional groups
M	2	Indicates which N, P, Q, R, S, and T data groups are included
N	2	Digits 11 and 12 of called number if IDDD calls (may contain NCDs, if less than 12 digits are dialed)
P	5	Indicates which U groups are included
Q	6	Trunk network number
S	5	Indicates which W groups are included
T	25	Inter-LATA Carrier/International Carrier information
U2	8	Customer dialed PAS number
U10	2	Call class (answer status) indicator
U100	1	Indicates minimum recordable duration
U400	7	Mobile information
U1000	5	Host SID (for roamer calls only)
U2000	23	Voice channel usage
U4000	15	Mobile identification (for roamer calls only)
U10000	5	Home SID (for roamer calls only)

TABLE N (Contd)		
MOBILE ORIGINATED TOLL WIRELINE CALL ENTRY CODE 01		
DATA GROUP	NO. OF DIGITS	INFORMATION
W2	1	Local service area indicator
W4	8	Transaction Code I (for CNAMA records)
W10	11	Transaction Code II (for CNAMA records)
W40	15	Total voice channel timing.

TABLE O		
MOBILE ORIGINATED LOCAL WIRELINE CALL ENTRY CODE 15		
DATA GROUP	NO. OF DIGITS	INFORMATION
	1	Start of entry character (V)
	2	Type of entry code (15)
A2	4	Call type information
A3	8	Connect time
B2	7	Calling or billing number (NXX-XXXX)
C	8	Disconnect time
D	10	Called number (NPA-NXX-XXXX)
J	3	Calling or billing NPA (optional group)
L	1	Letter Y entered to indicate additional groups
M	2	Indicates which N, P, Q, R, S, and T data groups are included
N	2	Digits 11 and 12 of called number if IDDD calls (may contain NCDs, if less than 12 digits are dialed)
P	5	Indicates which U groups are included
Q	6	Trunk network number
S	5	Indicates which W groups are included
U2	8	Customer dialed PAS number
U10	2	Call class (answer status) indicator
U100	1	Indicates minimum recordable duration
U400	7	Mobile information
U1000	5	Host SID (for roamer calls only)
U2000	23	Voice channel usage
U4000	15	Mobile identification (for roamer calls only)
U10000	5	Home SID (for roamer calls only)
W2	1	Local service area indicator

TABLE O (Contd)		
MOBILE ORIGINATED LOCAL WIRELINE CALL ENTRY CODE 15		
DATA GROUP	NO. OF DIGITS	INFORMATION
W4	8	Transaction Code I (for CNAMA records)
W10	11	Transaction Code II (for CNAMA records)
W40	15	Total voice channel timing.

TABLE P		
MOBILE-TO-MOBILE CALL OR UNRATED WIRELINE CALL ENTRY CODE 32		
DATA GROUP	NO. OF DIGITS	INFORMATION
	1	Start of entry character (V)
	2	Type of entry code (32)
A2	4	Call type information
B2	7	Calling or billing number (NXX-XXXX)
D	10	Called number (NPA-NXX-XXXX)
J	3	Calling or billing NPA (optional group)
L	1	Letter Y entered to indicate additional groups
M	2	Indicates which data groups of N, P, Q, and T are present
N	2	Digits 11 and 12 of called number if IDDD calls (may contain NCDs, if less than 12 digits are dialed)
P	5	Indicates which U data groups are included
Q	6	Trunk network number
S	5	Indicates which W data groups are included
U2	8	Customer dialed PAS number
U10	2	Call class (answer status) indicator
U100	1	Indicates minimum recordable duration
U400	7	Mobile information
U1000	5	Host SID (for roamer calls only)
U2000	23	Voice channel usage
U4000	15	Mobile identification (for roamer calls only)
U10000	5	Home SID (for roamer calls only)
W2	1	Local service area indicator
W4	8	Transaction Code I (for CNAMA records)

TABLE P (Contd)		
MOBILE-TO-MOBILE CALL OR UNRATED WIRELINE CALL ENTRY CODE 32		
DATA GROUP	NO. OF DIGITS	INFORMATION
W10	11	Transaction Code II (for CNAMA records)
W40	15	Total voice channel timing
W200	15	Switch timing.

TABLE Q		
MOBILE TERMINATED CALL ENTRY CODE 33		
DATA GROUP	NO. OF DIGITS	INFORMATION
	1	Start of entry character (V)
	2	Type of entry code (33)
A2	4	Call type information
D	10	Called number (NPA-NXX-XXXX)
J	3	Calling or billing NPA (optional group)
L	1	Letter Y entered to indicate additional groups
M	2	Indicates which data groups of N, P, Q, and T are present
P	5	Indicates which U groups are included
S	5	Indicates which W groups are included
U2	8	Customer dialed PAS number
U10	2	Call class (answer status) indicator
U400	7	Mobile information
U1000	5	Host SID (for roamer calls only)
U2000	23	Voice channel usage
U4000	15	Mobile identification (for roamer calls only)
U10000	5	Home SID (for roamer calls only)
W2	1	Local service area indicator
W4	8	Transaction Code I (for CNAMA records)
W10	11	Transaction Code II (for CNAMA records)
W40	15	Total voice channel timing
W200	15	Switch timing.

TABLE R
MOBILE SECURITY ENTRY ENTRY CODE 34

DATA GROUP	NO. OF DIGITS	INFORMATION
	1	Start of entry character (V)
	2	Type of entry code (34)
A2	4	Call type information
	1	NCD (noncheck dummy character)
A3	8	Connect time
B2	7	Calling or billing number (NXX-XXXX)
D	10	Called number (NPA-NXX-XXXX)
J	3	Calling or billing NPA (optional group)
L	1	Letter Y entered to indicate additional groups
M	2	Indicates which data groups of N, P, Q, and T are present
N	2	Digits 11 and 12 of called number for IDDD calls (may contain NCDs, if less than 12 digits are dialed)
P	5	Indicates which U groups are included
U400	7	Mobile information
U1000	5	Host MSA (for roamer calls only)
U4000	15	Mobile identification (for roamer calls only)
U10000	5	Home MSA (for roamer calls only)

TABLE S
OPERATOR ASSISTED CALL ENTRY CODE 36

DATA GROUP	NO. OF DIGITS	INFORMATION
	1	Start of entry character (V)
	2	Type of entry code (36)
A2	4	Call type information
B2	7	Calling or billing number (NXX-XXXX)
D	10	Called number (NPA-NXX-XXXX)
J	3	Calling or billing NPA (optional group)
L	1	Letter Y entered to indicate additional groups
M	2	Indicates which data groups of N, P, Q, and T are present
N	2	Digits 11 and 12 of called number for IDDD calls (may contain NCDs, if less than 12 digits are dialed)
P	5	Indicates which U groups are included
Q	6	Trunk network number
S	5	Indicates which W groups are included
U2	8	Customer dialed PAS number
U10	2	Call class (answer status) indicator
U100	1	Indicates minimum recordable duration
U400	7	Mobile information
U1000	5	Host SID (for roamer calls only)
U2000	23	Voice channel usage
U4000	15	Mobile identification (for roamer calls only)
U10000	5	Home SID (for roamer calls only)
W2	1	Local service area indicator
W4	8	Transaction Code I (for CNAMA records)

TABLE S (Contd)		
OPERATOR ASSISTED CALL ENTRY CODE 36		
DATA GROUP	NO. OF DIGITS	INFORMATION
W10	11	Transaction Code II (for CNAMA records)
W40	15	Total voice channel timing
W200	15	Switch timing.

TABLE T	
ORIGINATING EXCHANGE OVERFLOW RECORD (ENTRY CODE 63) AMA FORMAT	
INFORMATION	NUMBER OF DIGITS
Start of Entry Code (V)	1
Type of Entry Code (63)	2
Time	8
IC/INC Prefix	4
Overflow Peg Count	5
IC/INC Prefix	4
Overflow Peg Count	5
IC/INC Prefix	4
Overflow Peg Count	5
IC/INC Prefix	4
Overflow Peg Count	5

TABLE U		
TERMINATING LATA RECORD (ENTRY CODE 64) AMA FORMAT		
INFORMATION	DATA GROUP	NUMBER OF DIGITS
Start of Entry Character (V)	—	1
Type of Entry Code (64)	—	2
Information Digits	A2	2
Service Feature	A2	2
Connect Time (Answer Time)	A3	8
Calling Number	B2	7
Disconnect Time	C	8
Called Number	D	10
Entry Extender Character (Y)	L	1
Optional Information	M	2
U Data Groups Indicator	P	5
Trunk Network Number	Q	6
IC/INC Prefix	T	4
Carrier Connect Time	T	8
Carrier Connect Date	T	4
IC/INC Call Event Status	T	2
Routing Indicator	T	1
Dialing Indicator	T	1
ANI Indicator	T	1
Trunk Group Number	T	4

TABLE V
DIRECT CONNECT TO IC/INC AMA RECORDS (NOTES)

V01	V33	V34	V63	V64	BCD CHARS	DATA GROUPS
X	X	X	X	X	1	(V) — Start of Entry Character
X	X	X	X	X	2	(xx) — Entry Code
X	X	X	—	X	4	A2 — Call Type Information
X	—	X	—	X	8	A3 — Connect Time (Answer Time)
X	—	X	—	X	7	B2 — Calling/Billing Number
X	—	—	—	X	8	C — Disconnect Time
X	X	X	—	X	10	D — Called Number
X	X	X	—	—	3	J — Calling/Billing NPA
X	X	X	—	X	1	L — Entry Extender (Y)
X	X	X	—	X	2	M — NPQRST Indicator
C	—	C	—	—	2	N — IDDD Digits 11 & 12
X	X	X	—	X	5	P — Sum of U Groups
X	—	—	—	X	6	Q — Trunk Network Number
C	C	—	—	—	5	S — Sum of W Groups
C	—	—	—	X	25	T — Carrier Interconnection
C	C	—	—	—	8	U2 — PAS Account Number
C	C	—	—	—	2	U10 — Call Class (answer status)
C	—	—	—	—	1	U100 — MRD Indicator (origination)
X	X	X	—	—	7	U400 — Mobile Information
C	C	C	—	—	5	U1000 — Host SID (Roamer I and II)
X	X	—	—	—	23	U2000 — Voice Channel Usage
C	C	C	—	—	15	U4000 — Mobile ID (Roamer I and II)
C	C	C	—	—	5	U10000 — Home SID (Roamer II)
C	C	—	—	—	1	W2 — Local Service Area
C	C	—	—	—	8	W4 — Transaction Code I
C	C	—	—	—	11	W10 — Transaction Code II
C	C	—	—	—	15	W40 — Total Voice Channel Timing
—	C	—	—	—	15	W200 — Switch Timing
87	58	50	47	78	—	Min. No. of BCD Chars
200	148	78	47	78	205	Max. No. of BCD Chars*

See notes and footnote on next page.

TABLE V (Contd)

DIRECT CONNECT TO IC/INC AMA RECORDS (NOTES)

Note 1: The entry codes are as follows:

- V01 — Mobile Originated Call (Toll Wireline)
- V33 — Mobile Terminated Call
- V34 — Mobile Security Entry
- V63 — Overflow Record
- V64 — Terminating LATA Record.

Note 2: Only those data groups marked with an X or a C are relevant from a billing standpoint. The appearance of other data groups may be ignored.

"X" —indicates that the data group appears in the record for the entry code.

"—" —indicates that the data group does not appear in the record for the entry code, i.e., it is suppressed.

"C" —means that the field is conditionally filled based on the information being available and/or the feature being used; otherwise, the field is suppressed.

* indicates the maximum and minimum BCD digits must be adjusted to include the NCDs required to pad the entry to a multiple of five BCD characters.