

**AUTOMATIC MESSAGE ACCOUNTING RECORDING CENTER DATA LINK
DESCRIPTION OF THEORY AND OPERATION
NO. 3 ELECTRONIC SWITCHING SYSTEM**

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1. GENERAL

INTRODUCTION

1.01 This section describes in physical and functional terms the operation of the No. 3 Electronic Switching System (ESS) interface with a No. 1 Automatic Message Accounting Recording Center (AMARC).

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

PURPOSE

1.03 The addition of an AMARC interface to a No. 3 ESS provides an automatic message accounting (AMA) capability (which is independent of the call talk path). An AMARC uses a dedicated data link path to record billing data at a central location.

CHARACTERISTICS

1.04 The equipment comprising the AMARC interface consists of (see Fig. 1):

- Two type 202T data sets which provide the data interface of 1200 bits per second (bps) full duplex mode
- Two type 130C power units which provide the power for the 202T data sets.

1.05 The AMARC equipment is installed in the No. 3 ESS peripheral system and normally in a miscellaneous frame. The actual frame used, as well as the location in the frame, is optional but subject to maximum lead length constraints for interconnection. (See paragraphs 2.04, 2.05.)

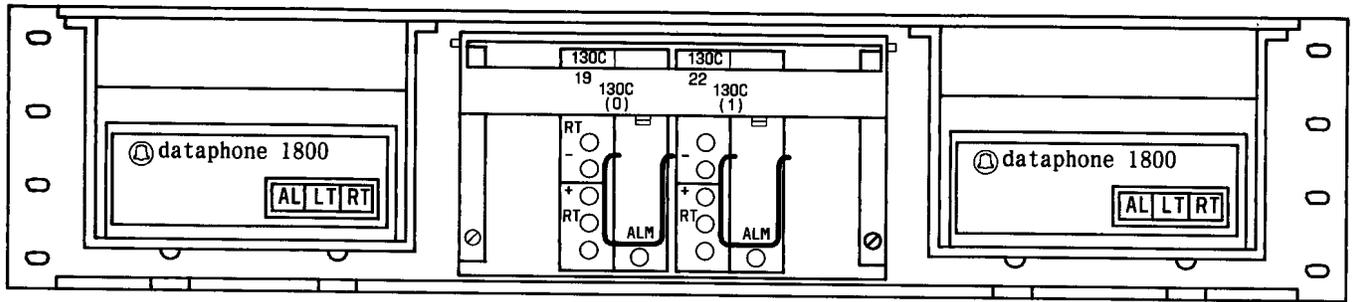


Fig. 1—Data Interface Unit

2. PHYSICAL DESCRIPTION

INTRODUCTION

2.01 The data interface unit, consisting of two type 202T data sets and two type 130C power units, is located in a miscellaneous frame. The data interface unit requires four inches of vertical space.

202T DATA SET

2.02 The 202T data set is enclosed in a 5.8 inch by 2.2 inch by 10.8 inch housing. The front panel contains status lights and test switches. Two connectors for data and a power cable are mounted on the back panel.

130C POWER UNIT

2.03 The 130C power unit is a dc-to-dc voltage converter which converts -48 volts to ± 15 volts. The power unit has provision for a low voltage alarm. The power units are located between the data sets and are mounted on slide-in circuit packs.

INTERFACING

2.04 The data interface unit is connected to a teletypewriter controller (TTYC) via connectorized cable (Fig. 2) with the cable not to exceed 50 feet in length. A separate cable is necessary for each data set.

2.05 The data interface unit is connected to the AMARC via the combined distributing frame (CDF) and this path utilizes a connectorized cable (Fig. 2). This cable should not be in the same

cable run as the cable to the TTYC or TTY without proper shielding.

2.06 Each 202T data set is independently powered by a connection to a 130C power unit.

3. FUNCTIONAL DESCRIPTION

INTRODUCTION

3.01 Communication between the No. 3 ESS and AMARC is via a 4-wire private line (primary link) with a similar backup facility provided in event of failure in the primary link (Fig. 2).

3.02 No. 3 ESS transmits only when polled by the AMARC and in a block format at 1200 bps utilizing a software protocol that operates in a half duplex manner. A data block consists of two or more bytes, with a byte consisting of eight bits of binary information, two stop bits, and a start bit (Fig. 3).

3.03 The AMARC assembles call records from billing data transmitted by No. 3 ESS.

AMARC TO NO. 3 ESS DATA TRANSMISSION

A. Introduction

3.04 Messages transmitted from AMARC to the No. 3 ESS consist of either two-character commands (Fig. 4), or the N-character test commands (Fig. 5), where N is more than two characters.

3.05 Two-character commands consist of two parts (Fig. 4):

- Basic command (one byte)

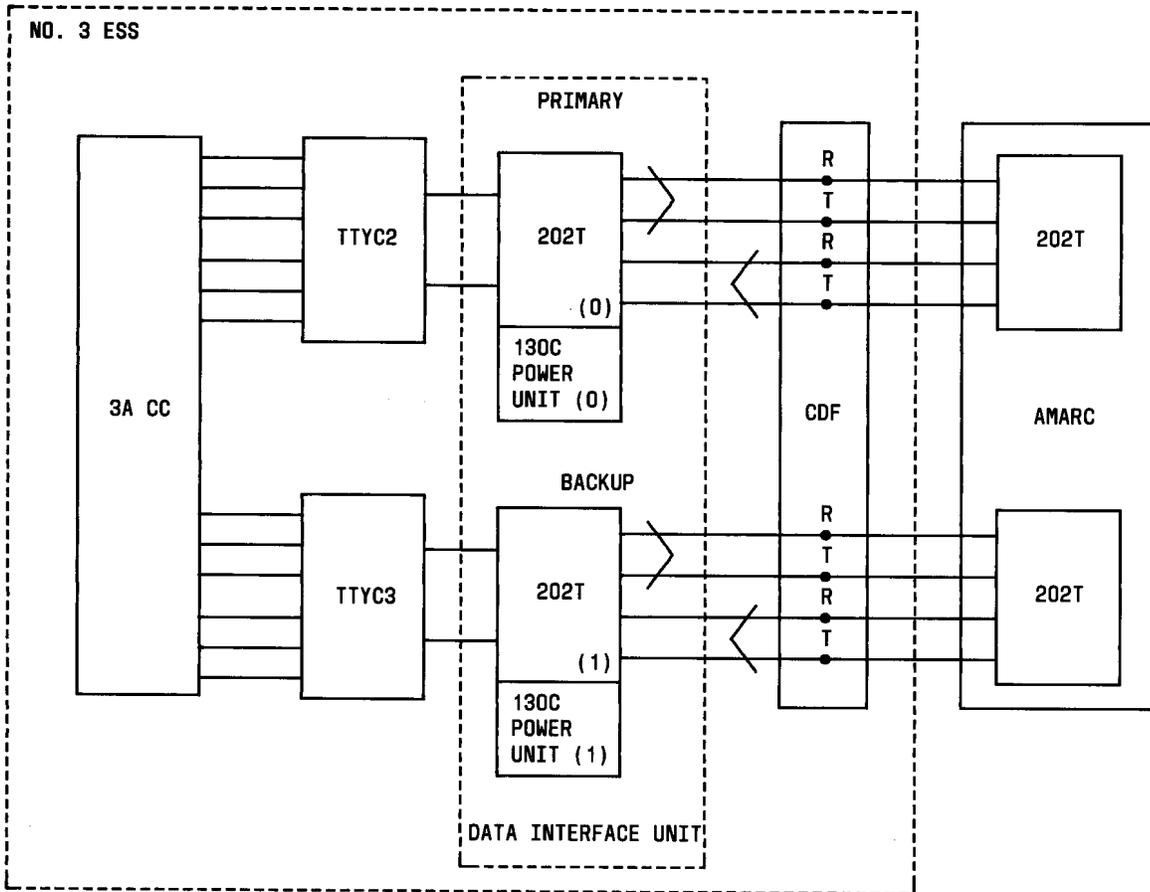


Fig. 2—No. 3 ESS—AMARC Interfacing

- Complement of command (one byte).

- End-of-block (EOB) characters (two bytes)

Two-character commands are:

1st EOB character = octal 000
2nd EOB character = octal 036

- Transmit (T)
- Retransmit (RT)
- Dial backup test (DBT)
- Initialize (INIT)
- Generate tracer statistics (GTS).

- Cyclic redundancy check (CRC) characters (two bytes).

3.06 The N-character commands consist of four parts (Fig. 5):

- Basic command (one byte)
- Data

B. Two-Character Command

Transmit

3.07 A transmit (T) command requests a No. 3 ESS to transmit a new block of billing data. No. 3 ESS responds by transmitting either a block of data or a no-data block reply message.

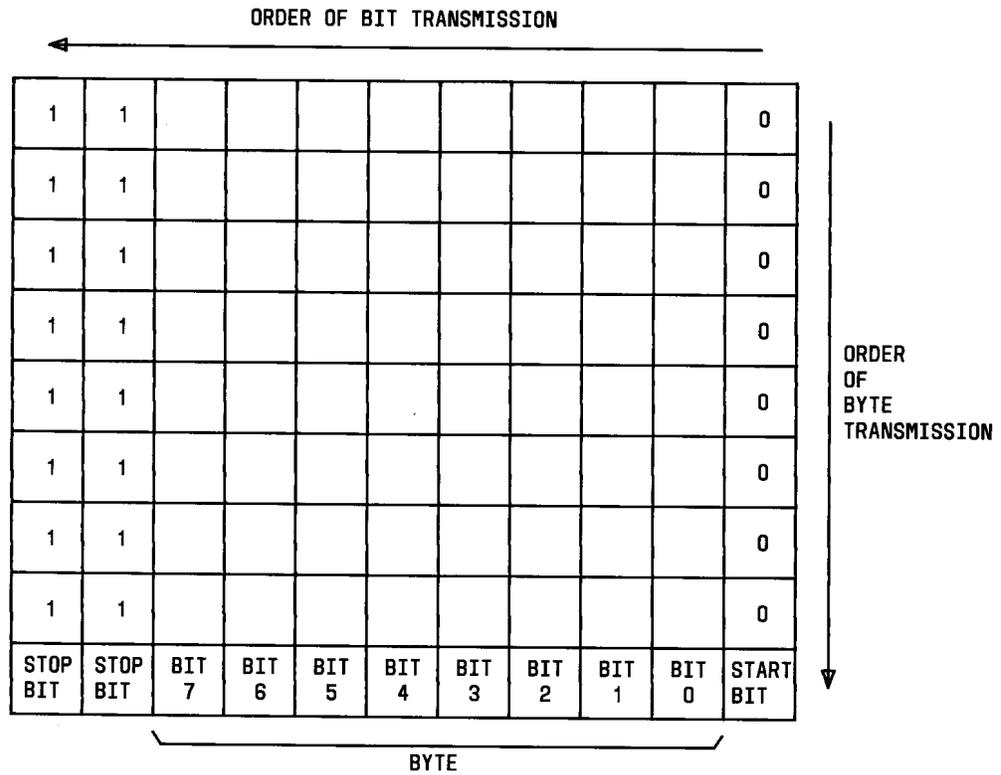


Fig. 3—Transmission Convention

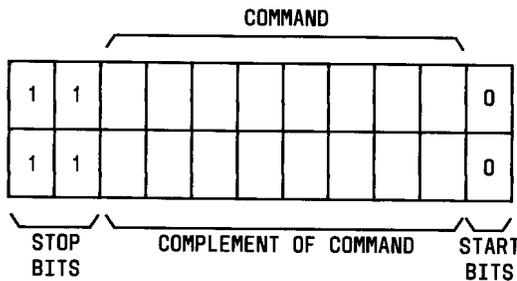


Fig. 4—Two-Character Command Format

Retransmit

3.08 A retransmit (RT) command requests a No. 3 ESS to retransmit the last data block sent. The retransmit command is used when:

- Data received by the AMARC fails an integrity check, or
- The AMARC detects a data link error, or

- When switching from primary-to-backup or backup-to-primary link.

Dial Backup Test

3.09 The backup test (DBT) is used when the AMARC requires an automatic backup link test to be initiated. Actual polling on the primary link is not interrupted during the backup link test. The AMARC will perform the DBT once daily on a scheduled basis. This test can also be performed at any time by maintenance personnel at the AMARC site utilizing a TTY request.

3.10 The No. 3 ESS transmits a positive acknowledgment (ACK) or negative acknowledgment (NACK) whenever the DBT message is received. When the AMARC receives a NACK, it is assumed that the No. 3 ESS backup link is busy; and the AMARC will retry one hour later. If a NACK is received after three consecutive attempts, AMARC will cause an alarm to be generated and a message to be printed on its

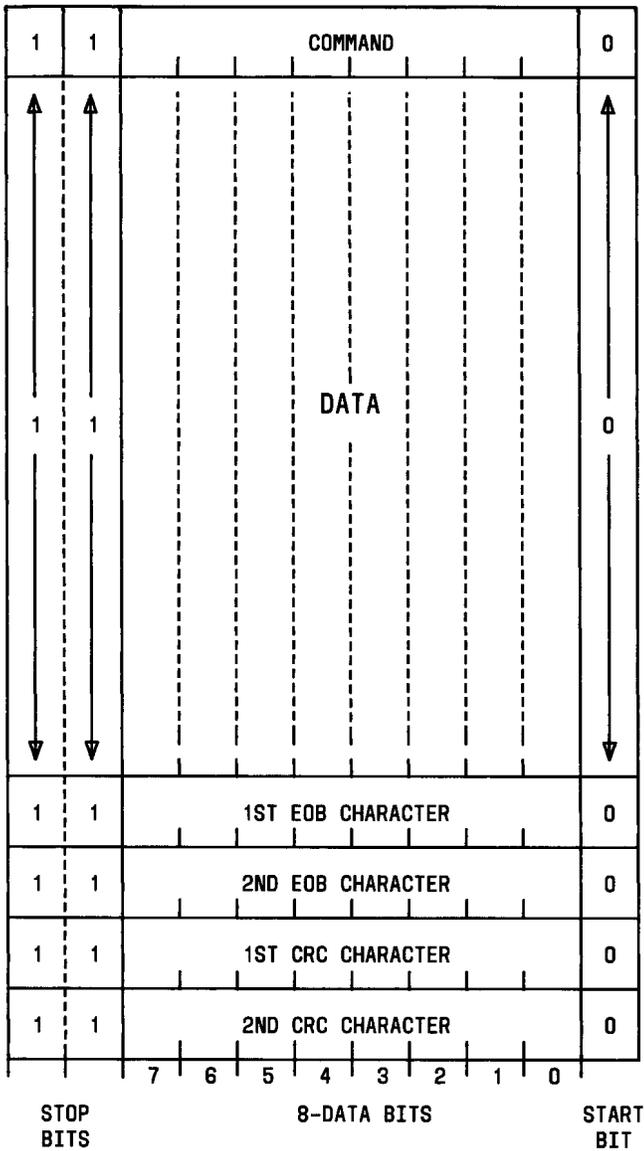


Fig. 5—N-Character Command Format

maintenance TTY. When ACK is received, the AMARC initiates the backup link test.

Initialize

3.11 An initialize command (INIT) is used to request that the No.3 ESS identify itself with a terminal identification (TID) message. When the correct TID is received, AMARC resumes polling. If the TID received is not correct, AMARC will switch links after trying for three seconds.

Generate Tracer Statistics

3.12 The generate tracer statistics (GTS) command requests a current statistical counts message to be generated. This message provides AMARC intersystem integrity checks which are recorded into system tracer records. After the No.3 ESS receives this command, an ACKNOWLEDGE is returned to the AMARC. The statistical and status message (SSM) is formed immediately and is transmitted later to AMARC in response to TRANSMIT command. Two minutes may be required to form and transmit the SSM.

C. N-Character Command

Test

3.13 The test (TST) command is used for tests originated by AMARC (Fig. 6). Test commands can be sent routinely by AMARC or upon request via the AMARC maintenance TTY. The TST is used to check for trouble in the data links.

NO. 3 ESS TO AMARC DATA TRANSMISSION

A. Introduction

3.14 Data transmitted by the No. 3 ESS to AMARC is in block format (Fig. 7) and consists of six basic parts:

- Block type (1 byte)
- Sequence number (1 byte)
- Data area (maximum of 60 bytes)
- Block time stamp (2 bytes)
- End-of-block (EOB) characters (2 bytes)

1st EOB character = octal 000
2nd EOB character = octal 036

- CRC characters (2 bytes).

3.15 Messages that the No. 3 ESS can transmit to AMARC are:

- Positive acknowledgment (ACK)
- Negative acknowledgment (NACK)

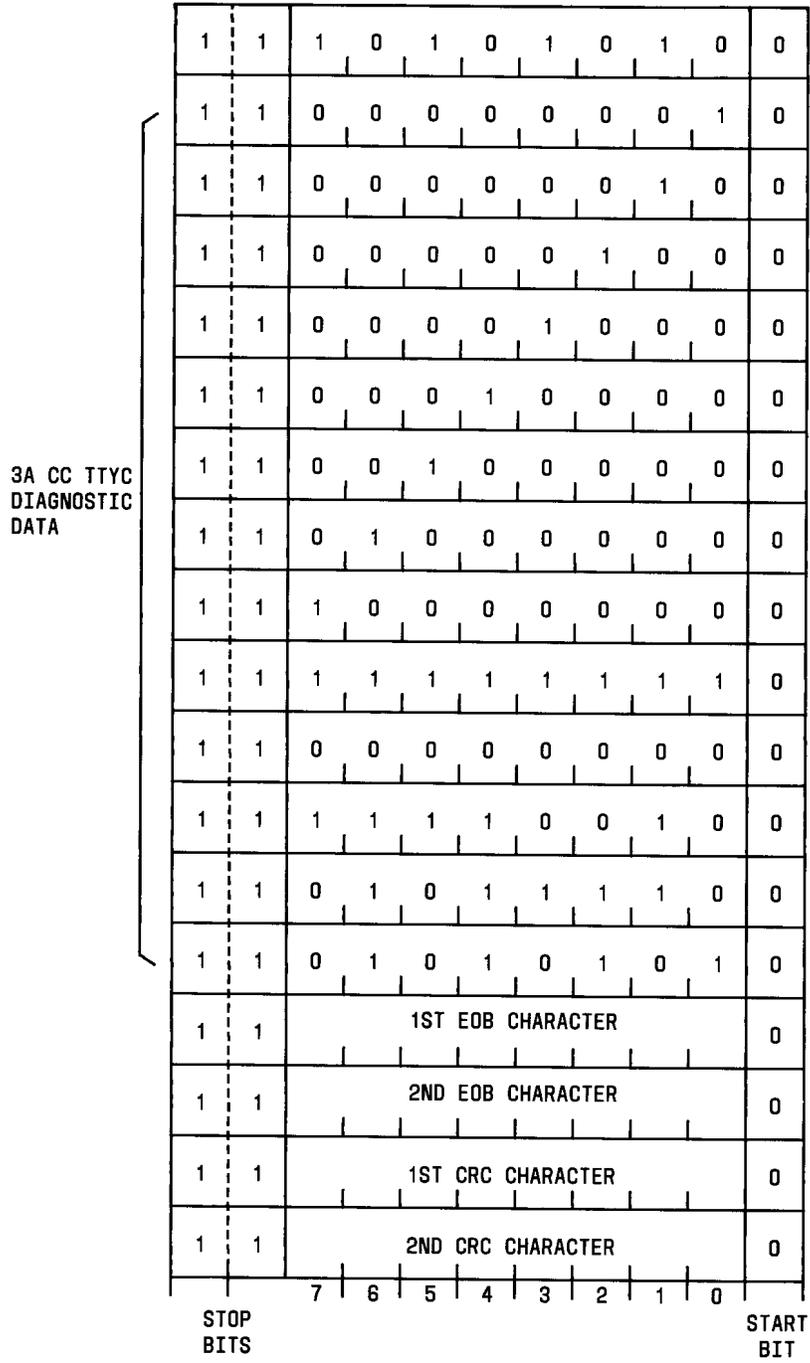


Fig 6—Test Message

- Terminal identification (TID)

- Test (TST).

- No data

Positive Acknowledgment

- Call record data or billing data including statistical and status information

3.16 The positive acknowledgment message (ACK) is transmitted to AMARC when the backup has been initiated (Fig. 8) and in response to GTS.

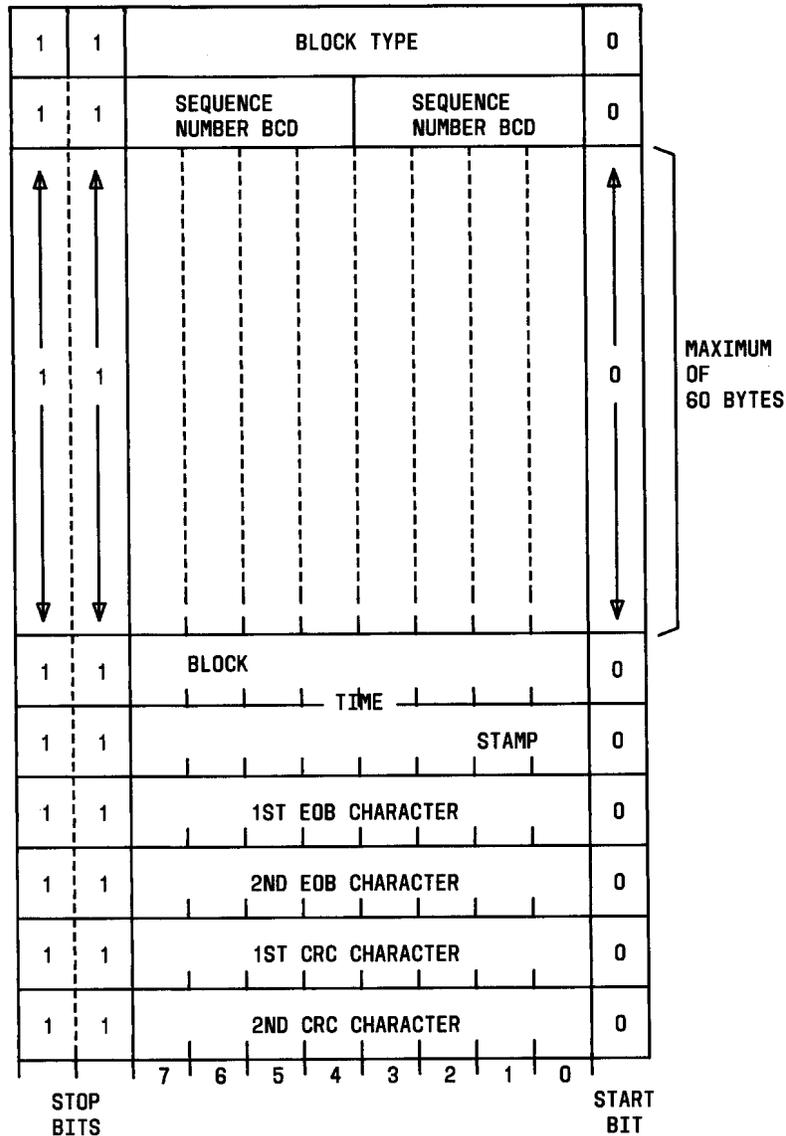


Fig. 7—No. 3 ESS Data Block Format

Negative Acknowledgment

3.17 The negative acknowledgment message (NACK) is transmitted to AMARC if the dial backup port is busy when AMARC initiates DBT (Fig. 9).

Terminal Identification

3.18 The terminal identification message (TID) is used by No. 3 ESS to identify itself to AMARC (Fig. 10). This is used as a security "handshaking" procedure which is part of switching

from the primary to the backup link. The six-digit portion of TID is the base and control number assigned to that specific No. 3 ESS office.

Statistical and Status Information

3.19 The statistical and status message (SSM) is generated and later transmitted to AMARC as part of a data block after the GTS message is received. The SSM contains counts such as:

- Total office traffic counts

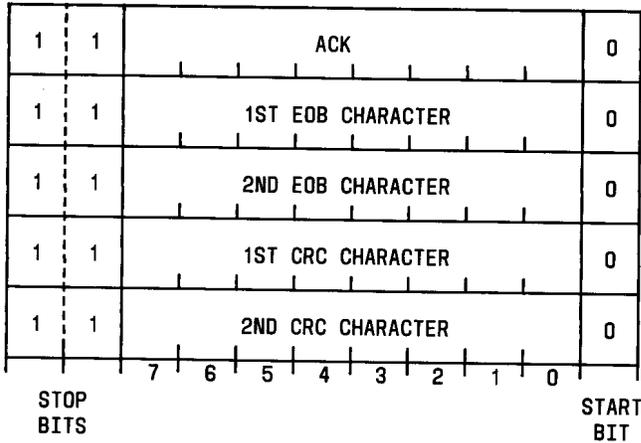


Fig. 8—Positive Acknowledgment

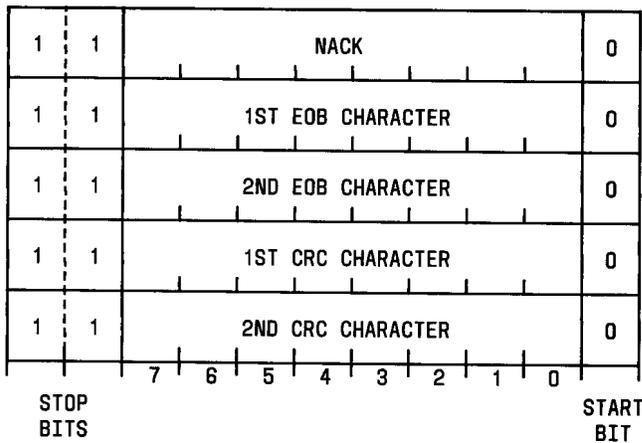


Fig. 9—Negative Acknowledgment

- Total AMA traffic counts
- Number of abnormally terminated calls (lost revenue)
- Number of answered AMA calls
- Number of records inserted into AMA buffer
- Number of data blocks sent to AMARC.

No-Data

3.20 When the No.3 ESS receives a T command and has no new data, the no-data block is transmitted to AMARC. The no-data block consists

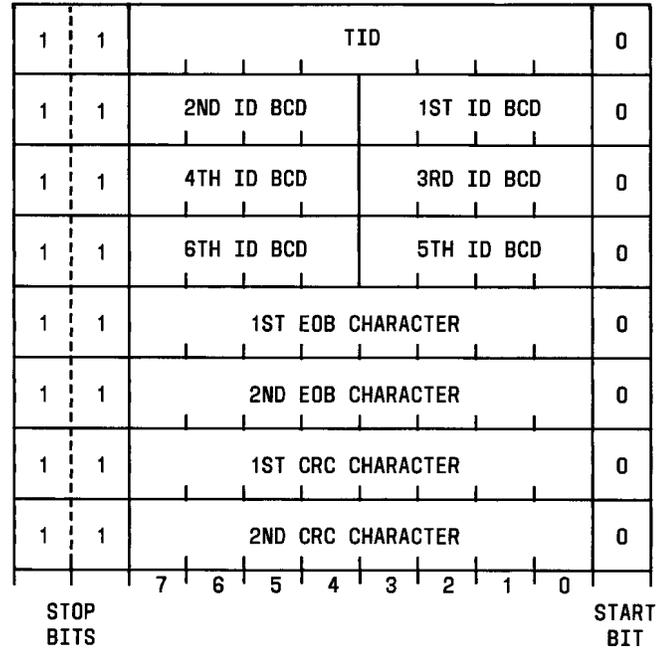


Fig. 10—Terminal Identification Message Format

of two EOB characters followed by an all-zero CRC (Fig. 11).

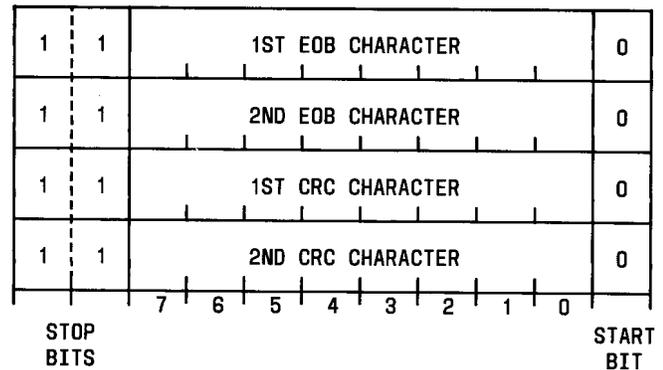


Fig. 11—No-Data Message

Billing Data Block

3.21 The billing data block (DBLK) will be transmitted in response to a T or RT command. It is used for transmitting at least one billing record.

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3.22 All billing data blocks are made up of six basic parts with the data area containing two subparts (Fig. 7):

- Block-type character DBLK (1 byte)
- Block sequence number (1 byte containing two lifted BCD characters, 00-99)
- Data area containing billing data (maximum of 60 bytes)
- Block time stamp (2 bytes)
- End-of-block (EOB) characters (2 bytes)
- Cyclic redundancy check (CRC) characters (2 bytes).

Test

3.23 The test (TST) message is sent to AMARC in response to No. 3 ESS having received the TST message (Fig. 6). The TST is used to test the sanity of the No. 3 ESS/AMARC interfacing and is the only message transmitted by both the No. 3 ESS and AMARC.

Message Coding

3.24 Table A shows the coding for each of the command messages utilized in AMARC-to-ESS and 3 ESS-to-AMARC Transmission.

B. Block Type

3.25 The first byte of any data block is the block type. In billing data records the block-type byte always contains the character DBLK.

C. Sequence Number

3.26 The second byte of the data block is the block sequence number. The sequence number is used as a data integrity test. The number is in packed BCD format and is incremented by one each time a billing data block is transmitted. The number does not change on a retransmission. The range of the sequence number is 00-99. After a retransmission, if the number is not the number expected, AMARC will terminate billing on all calls in progress for that No. 3 ESS office and produce a minimum billable call record.

D. Data Area

Introduction

3.27 The billing data area contains the billing data record and the block time stamp. The billing data record consists of a status byte followed by the data contained in the record. The block time stamp is used by AMARC in computing the time of calls.

Billing Data Record

3.28 There are five categories of data records:

- Initial entry
- Answer entry
- Abandon entry
- Disconnect entry
- Miscellaneous and statistical entry.

Initial Entry

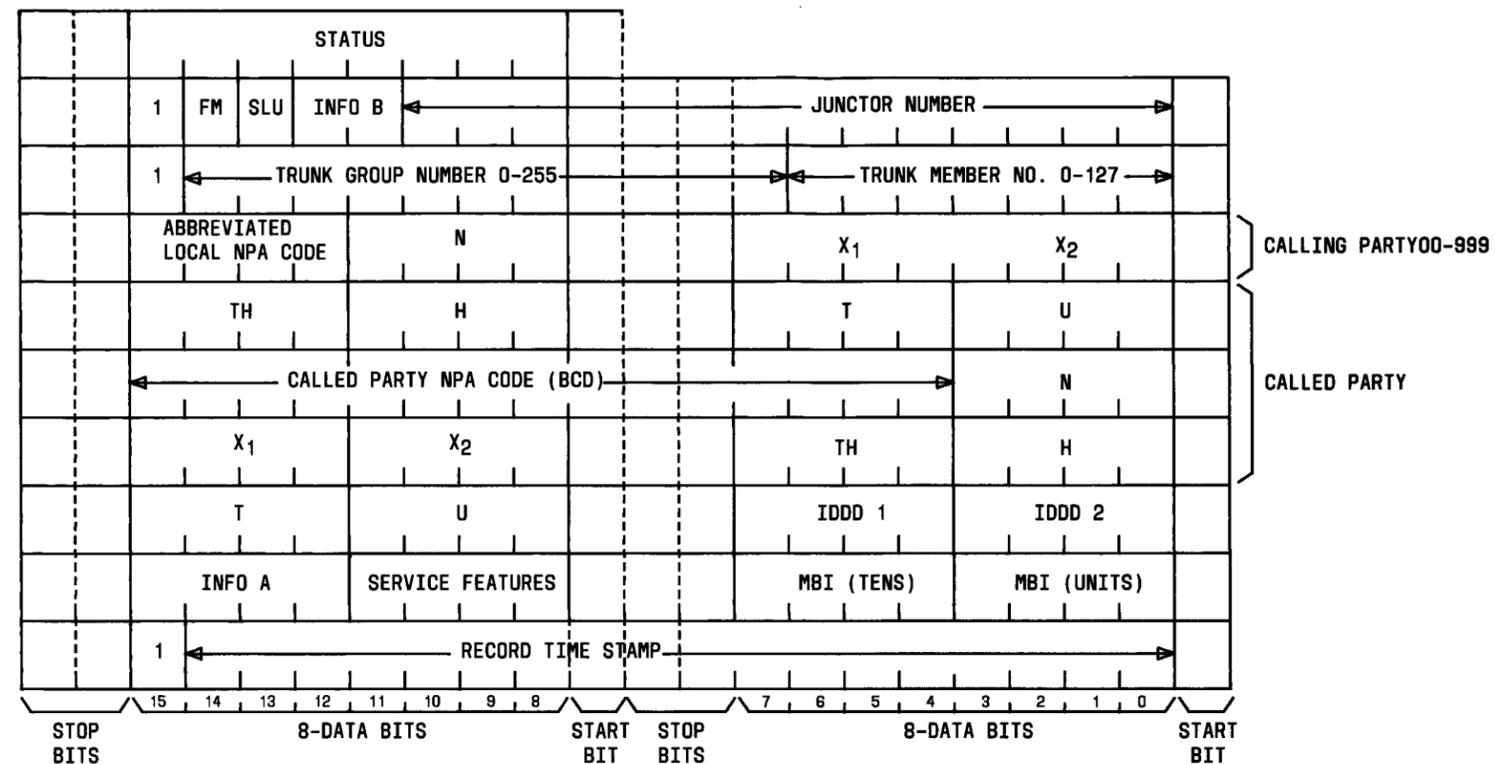
3.29 The initial entry data record consists of 18 bytes plus the status byte (Fig. 12, Table B). The IDDD, FM, SLU INFO B, JUNCTOR NUMBER, TRUNK GROUP, MEMBER NUMBER, and RECORD TIME STAMP are in protected pure binary format. (Bit 15 is a 1.) All other fields are in lifted BCD format.

3.30 If a call is international direct distance dialed (IDDD), the digits dialed will be left justified. If a call is domestic (DDD), IDDD1 and IDDD2 will be filled with noncheck dummy characters (NCD). An NCD is binary 1011. If digits are lost, NCD characters are used as fillers.

Answer, Disconnect, and Abandon Entry

3.31 The answer, disconnect, and abandon entry consists of four bytes plus the status byte (Fig. 13, Table C). There are three types of disconnects:

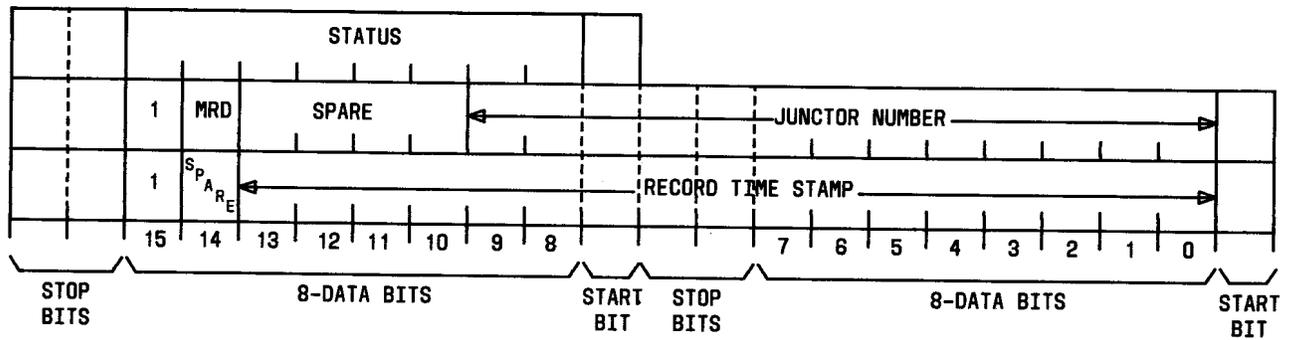
- Calling party on-hook
- Called party on-hook, calling party off-hook (time release disconnect)
- Calling party abandoned disconnect.



LEGEND:

- IDDD - 1 = IDDD, D = DOMESTIC
- FM - 1 = FLAT RATE (WATS FULL BUSINESS DAY)
- 0 = MEASURED RATE
- SLU - 1 = SUBSCRIBER LINE USAGE
- INFO BITS B - 00 = REGULAR CALL
- 01 = TEST CALL
- 10 = ONI
- 11 = COMPLAINT OBSERVED
- CALLING NO. - 1 BCD ABBREVIATED NPA CODE.
- 7 BCD NXX - TH, H, T, U
- CALLED NO. - 12 BCD DIGITS REPRESENTING NPA - NXX - TH, H, T, U
- MBI - MESSAGE BILLING INDEX - 2 BCD DIGITS REPRESENTING TENS AND UNITS
- INFO BITS A - 1010 = NOT SERVICE OBSERVED NOR TRAFFIC SAMPLED
- 0001 = SERVICE OBSERVED
- 0010 = TRAFFIC SAMPLED - CHARGE
- 0011 = SERVICE OBSERVED AND TRAFFIC SAMPLED - CHARGE
- 0100 = TRAFFIC SAMPLED - NO CHARGE
- 0101 = SERVICE OBSERVED AND TRAFFIC SAMPLED - NO CHARGE
- 0110 = SERVICE OBSERVED NOT TRAFFIC SAMPLED - NO CHARGE
- 0111 = NOT SERVICE OBSERVED NOT TRAFFIC SAMPLED - NO CHARGE
- SERVICE FEATURES - 0001 = PREPAY COIN, 001- = HOTEL/MOTEL
- 0011 = PICTUREPHONE, 0100 = DTF COIN

Fig. 12—Initial Entry Format



LEGEND:

STATUS - 00101000 (OCTAL 50) = DISCONNECT
 00111000 (OCTAL 70) = ANSWER
 01011100 (OCTAL 134) = DISCONNECT-ABANDON/ATTEMPT
 01100111 (OCTAL 147) = DISCONNECT-TIMED RELEASE DISCONNECT
 MRD - 1 = LESS THAN MINIMUM RECORDABLE DURATION
 START BIT = 0
 STOP BIT = 1

Fig. 13—Answer and Disconnect Entry Format

Miscellaneous and Statistical Entry

3.32 The miscellaneous and statistical entry is used to transmit the following (Table D):

- Call forwarding activation and deactivation
- Initialization of stable or transient memory
- Cancel due to out-of-synchronization or buffer overflow
- SSM
- Junctor change
- Time-released disconnect.

3.33 A call forwarding activation or deactivation entry (Fig. 14) is sent to AMARC when a customer either activates or deactivates the call forwarding feature.

3.34 The initialization message (Fig. 15) notifies AMARC that an initialization affecting transient or stable memory area has occurred at a No. 3

ESS office. The AMARC marks all toll calls in progress with an indication that an initialization has occurred. A call that completes normally is billed in normal fashion. If the sequence of a call in progress is destroyed AMARC will minimum-bill the customer.

3.35 The AMARC uses the junctor number as a key to the call record register (CRR) holding billing data of a call in progress. When a junctor is changed by a No. 3 ESS, this information must be sent so AMARC can adjust its CRRs (Fig. 16).

Record Time Stamp and Block Time Stamp

3.36 The time stamp is required for the following entries:

- Initial
- Answer
- Abandon
- Disconnect
- Junctor change

- Call forwarding.

The No. 3 ESS has a 14-bit clock that is the source of the time stamp. When the No. 3 ESS detects an off-hook, answer, or disconnect, it places the current value of the clock on the entry. When the No. 3 ESS is ready to transmit the entry as part of a data block to AMARC, the block time stamp is set to the current value of the clock. The transmission of the entry time and the block time stamp makes it possible for AMARC to account for No. 3 ESS processing delays.

E. End of Block

3.37 The No. 3 ESS signals AMARC that all of the data of a block has been sent by transmitting the end-of-block (EOB) message. The two EOB characters, located after the data and before the CRC bytes, are defined as binary 00000000 and 00011110.

F. Cyclic Redundancy Check

3.38 The validity of transmitted data is checked by the generation of a cyclic redundancy check (CRC). The last two bytes transmitted contain the CRC. The AMARC generates its own CRC on data received and if the CRCs are not the same, there is a transmission error.

4. THEORY OF OPERATION

DATA TRANSMISSION

4.01 Data is transmitted and received in serial format. Data is transmitted in bytes consisting of eight bits of data, a start bit of 0 at the low order end and two stop bits of 1 at the high order end. The bytes are formed into data blocks. The end of the data block is signified by the EOB characters. The last two bytes of data (with the exception of the 2-character AMARC transmitted commands) are the CRC bytes.

4.02 While AMARC or the No. 3 ESS is receiving data, each checks for the EOB characters. After the EOB characters are received the CRC characters are received. The receiving facility computes its own CRC based on the data received. When the CRCs match, the data received is assumed to be the same as the transmitted data.

4.03 To prevent data from being misinterpreted as the EOB characters, two forms of protection are used:

- Packed lifted BCD
- Protected pure binary.

Packed lifted BCD is the same as normal BCD except that a zero is represented as binary 1010 and not as 0000. Where pure binary data is transmitted, the data will be protected from being confused with the EOB characters by the assignment of fixed bit definitions (bit 15 is set to 1); also, data in pure binary format requires two (16 bits) bytes.

4.04 The normal cycle time for AMARC to receive data after it has polled a No. 3 ESS is less than one second (Fig. 17). However, heavy loads at AMARC may cause the cycle time to go to four seconds. When a data link failure occurs and causes the backup to be used, the cycle time could be extended to 80 seconds (4 attempts at 20 seconds per attempt).

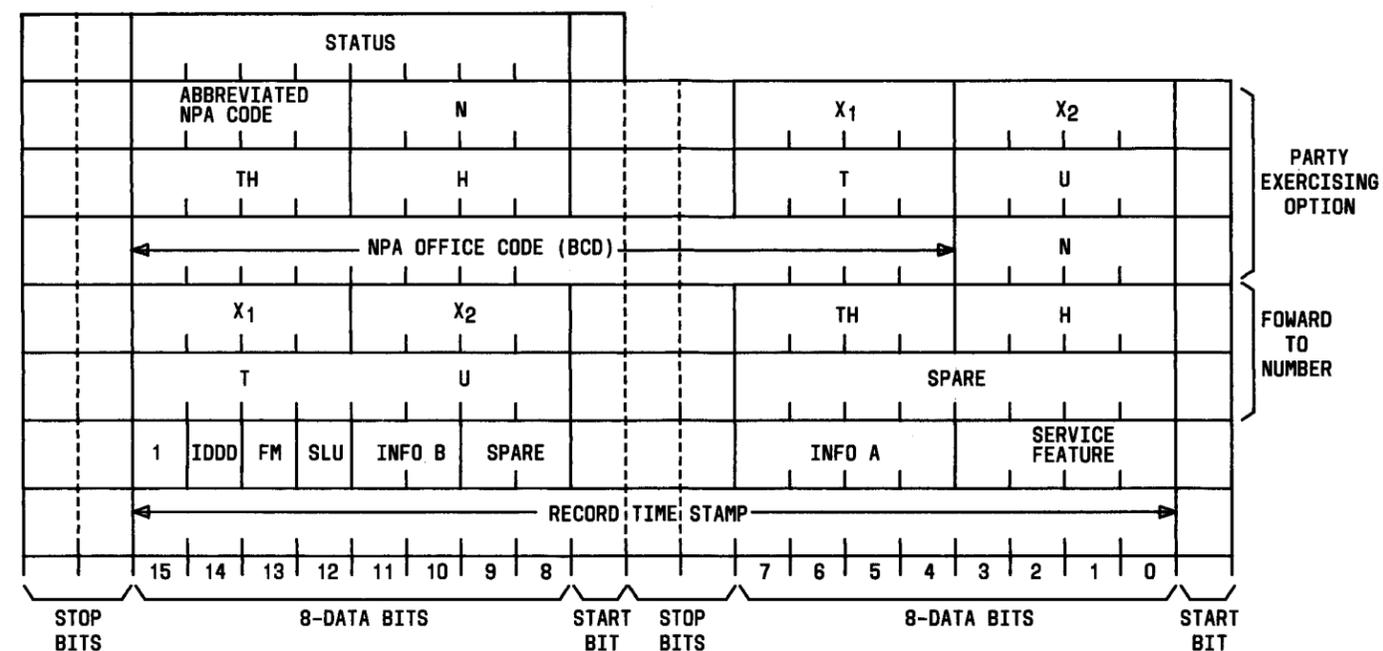
CALL PROCESSING

A. Data Request Made By AMARC

4.05 AMARC initiates requests for data from the No. 3 ESS. After transmitting the T command, AMARC waits for the No. 3 ESS to respond. The No. 3 ESS should not take more than 0.5 seconds to respond. If the No. 3 ESS takes too long to respond, a remote location response (RLR) error exists. After the No. 3 ESS transmits the CRC characters, it waits for another command. After AMARC receives the CRC characters, it generates its own CRC and compares it with the CRC received. If the CRCs match, a T command is transmitted; if not, a CRC error exists and the RT command is transmitted. If any error is not cleared in three seconds, AMARC will start the call-back procedure.

B. Dial Backup Test Initiation

4.06 The backup test (DBT) checks the status of the backup link between AMARC and a No. 3 ESS without affecting billing. To run the test, AMARC substitutes DBT in place of T. When the No. 3 ESS interprets this command, a positive (ACK) or negative (NACK) acknowledgment is



LEGEND:

- IDDD - 1 = IDDD, 0 = DOMESTIC
- FM - 1 = FLAT RATE, 0 = MEASURED RATE
- SLU - 1 = SUBSCRIBER LINE USAGE
- INFO B - 00 = REGULAR CALL
 - 01 = TEST CALL
 - 10 = ONI
 - 11 = COMPLAINT OBSERVED
- INFO A - 0001 = SERVICE OBSERVED
 - 0010 = TRAFFIC SAMPLED-CHARGE
 - 0011 = SERVICE OBSERVED AND TRAFFIC SAMPLED - CHARGED
 - 0100 = TRAFFIC SAMPLED - NO CHARGE
 - 0101 = SERVICE OBSERVED AND TRAFFIC SAMPLED - NO CHARGE
 - 0110 = SERVICE OBSERVED NOT TRAFFIC SAMPLED - NO CHARGE
 - 0111 = NOT SERVICE OBSERVED NOT TRAFFIC SAMPLED - NO CHARGE
 - 1010 = NOT SERVICE OBSERVED NOT TRAFFIC SAMPLED
- SERVICE FEATURES 0001 = PREPAY COIN
 - 0010 = HOTEL/MOTEL
 - 0011 = PICTUREPHONE
 - 0100 = DIAL TONE FIRST COIN
- STATUS - 010111110 (OCTAL 136) = ACTIVATION
 - 01011111 (OCTAL 137) = DEACTIVATION
- START BIT = 0
- STOP BIT = 1

Fig. 14—Call Forwarding Activation—Deactivation Entry Format

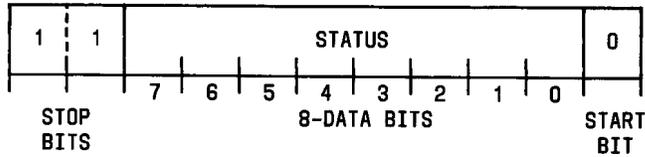
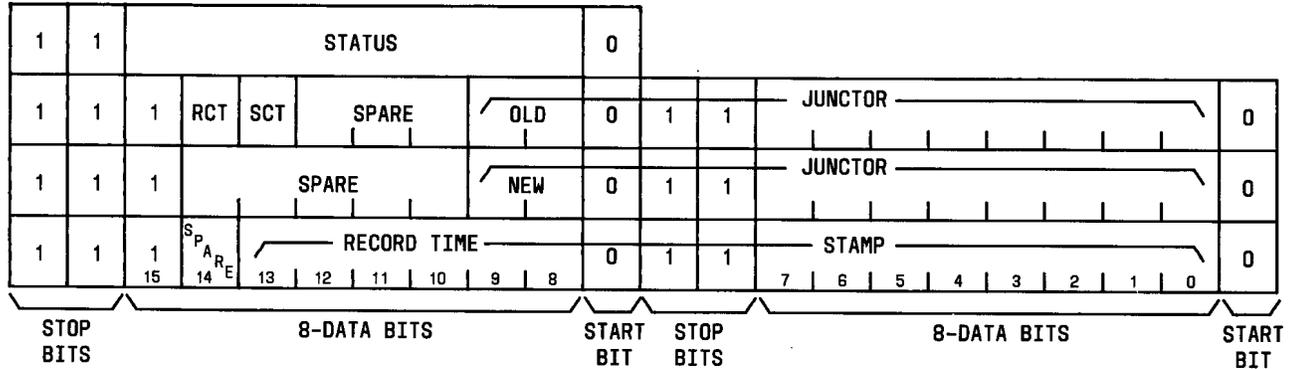


Fig. 15—Initialization Entry Format

transmitted to AMARC, depending on the status of the port.

C. Initialization of Transmission

4.07 The AMARC transmits the transmit (T) command until data is received. AMARC performs normal remote location response (RLR)



RCT = 1-CONFERENCE TRUNK RELEASE
SCT = 1-CONFERENCE TRUNK SET

Fig. 16—Juncture Change Entry Format

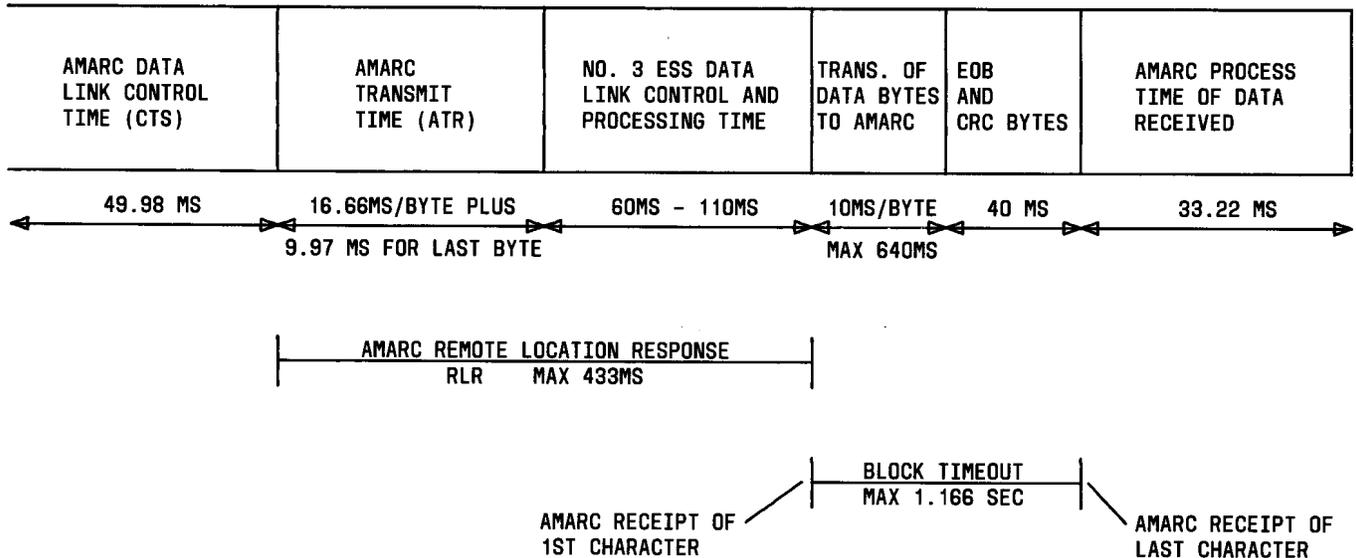


Fig. 17—AMARC—No. 3 ESS Cycle Times

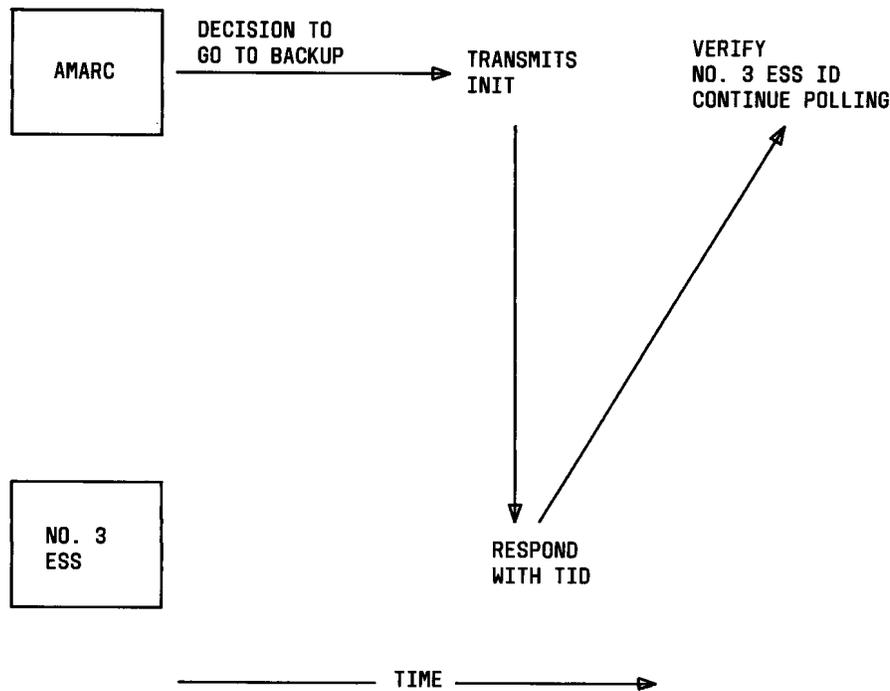


Fig. 18—Switch To Backup Link Procedure

timing and will switch to the backup link if no response is received from a No. 3 ESS within three seconds.

D. Switching From Primary to Backup Link

4.08 There are two conditions that will cause AMARC to switch from the primary to the backup link:

- Manual request from the AMARC TTY
- Emergency request due to data link error.

When the switch is made by a TTY request, polling continues on the primary during the link switching procedure.

Security Handshaking

4.10 The AMARC transmits an INIT message to No. 3 ESS which responds with its TID. When AMARC receives the expected TID it transmits RT over the backup link. If AMARC does not receive the expected TID, it drops the backup link and restarts the switch to the backup link (Fig. 18).

4.11 The No. 3 ESS responds to the RT by transmitting a no-data block over the backup link. After polling has stopped for four seconds over the primary link, the No. 3 ESS transmits (over the backup link) the last data block that was transmitted over the primary before the switch.

E. Switching From Backup To Primary Link

4.12 A message received over the primary link has priority over the backup link polling. When AMARC requests a switch to the primary link, an RT command is transmitted over the primary link and the No. 3 ESS transmits the last data block sent over the backup link, over the primary link. AMARC resumes polling over the primary link. In switching from the backup to the primary link, there is no security handshaking involved.

F. Generate Tracer Statistics Sequence

4.13 When AMARC requires statistical information from a No. 3 ESS, the GTS command is transmitted. After receiving the command, the No. 3 ESS forms the statistical and status message (SSM), places it in the AMA buffer, and sends the

TABLE A
MESSAGE CODING

MESSAGE	TITLE	BINARY*	OCTAL*
ST	Start	00101001	051
T	Transmit	10100010	242
RT	Retransmit	11000100	304
DBT	Dial Back Test	10010111	227
INIT	Initialize	10010001	221
GTS	Generate Tracer Statistics	10111001	271
TST	Test	10101010	252
ACK	Positive Acknowledgment	01001000	110
NACK	Negative Acknowledgment	01010101	125
TID	Terminal Identification	10001100	214
SSM	Statistical and Status Message	10000111	207
EOB ₁	End of Block	00000000	000
EOB ₂		00011110	036
DBLK	Data Block	01100110	146

*Start and Stop Bits Not Included

acknowledgment (ACK) message. The SSM data is transmitted later in response to a T command and is imbedded in a data block.

5. MAINTENANCE

TROUBLE PROCESSING

A. Introduction

5.01 During normal transmission and reception of data, the AMARC performs the following checks on the validity of the data and data links:

- CRC error
- RLR timeout

- Block overflow.

When an error is detected over the primary link, AMARC transmits the RT command until a valid data block is received. If a valid data block is not received within three seconds, AMARC will start to switch to the backup link.

B. Cyclic Redundancy Check Error

5.02 When AMARC or a No. 3 ESS transmits a data block consisting of more than 2 bytes, a 16-bit (2 bytes) CRC is sent with the data. When either AMARC or a No. 3 ESS receives data containing a CRC, it generates its own CRC and compares it with the CRC received. If the CRCs do not match, there is an error in the data link.

TABLE B
INITIAL ENTRY STATUS

STATUS	OCTAL CHARACTER	BINARY CHARACTER
Station Paid	105	01000101
Local (Bulk or Detail)	106	01000110
WATS Billing Measured	107	01000111
WATS Billing Full Day	110	01001000
AFR WATS Originating Station ID Measured	111	01001001
AFR WATS Originating Station ID Full Day	112	01001010
Directory Assistance 411	113	01001011
Fraud	126	01010110
Three-Way Calling	127	01010111
Call Forwarding	130	01011000
Three-Way Toll Calling	131	01011001

TABLE C
ANSWER AND DISCONNECT STATUS

STATUS	OCTAL CHARACTER	BINARY CHARACTER
Answer	070	00111000
Disconnect	050	00101000
Abandon (ATTEMP)	134	01011100
Disconnect (TRD)	147	01100111

C. Remote Location Response Timeout

5.03 After a T or RT command is transmitted, AMARC begins a timing interval. If a No. 3 ESS does not respond within 433 ms, a remote location response (RLR) time-out error exists.

D. Block Overflow Error

5.04 Data block transmitted to AMARC by a No. 3 ESS cannot be longer than 68 bytes including the CRC bytes. If a block is longer than 68 bytes, a block overflow error exists.

TABLE D

MISCELLANEOUS AND STATISTICAL STATUS

STATUS	OCTAL CHARACTER	BINARY CHARACTER
Call Forwarding Activation	137	01011111
Call Forwarding Deactivation	140	01100000
INIT (Transient and Stable) SC	141	01100001
INIT NSC	142	01100010
Cancel - Out of Sync or Buffer Overflow	143	01100011
Statistical and Status Message	144	01100100
Junctor Change	146	01100110
Time Delayed Disconnect	147	01100111

E. Block Timeout Error

5.05 Transmission time required for a No. 3 ESS to transmit a data block cannot be more than 1.166 seconds. If the time interval between the first byte of a block and the last byte received is more than 1.166 seconds, a block time out error exists.

F. Handling of Unusual Data

5.06 When a No. 3 ESS receives data that it cannot interpret, the block is ignored. The AMARC call processing routines will lead to a retransmission. When AMARC receives unknown data and, if after a retransmission, the data is still unknown, all calls in progress will be charged minimum billing.

TEST SEQUENCE

5.07 The test (TST) command is transmitted by AMARC once each hour to check:

- That the No. 3 ESS and the AMARC are not locked in any mode
- Data link problems
- The No. 3 ESS interface TTYC.

The AMARC transmits the TST data block to a No. 3 ESS. The No. 3 ESS uses the data in the TST data block to diagnose its controller. The No. 3 ESS compares the data received with that expected to be received. When the data is correct, the No. 3 ESS transmits the data back to AMARC. If the data is not correct, a CRC is generated on the data received and transmitted to AMARC along with the data. By checking the CRC and data received, AMARC determines in which direction the link fault exists.

6. REFERENCES

6.01 The following sources contain information relevant to this section.

SECTION	TITLE
233-151-120	Call Charging Software Subsystem Description, No. 3 Electronic Switching System
592-031-100	Data Set 202T Transmitter—Receiver Description and Operation
592-032-200	Data Set 202T Transmitter—Receiver Installation and Connections

SECTION 233-122-100

PR-3H187-02 Automatic Message Accounting Program (AMA)

GTS

Generate Tracer Statistics

IDDD

International Direct Distance Dialed

7. GLOSSARY

7.01 The following acronyms are used in this section.

INIT

Initialize

NACK

Negative Acknowledgment

ACK Positive Acknowledgment

NCD

Noncheck Dummy Character

AMARC Automatic Message Accounting Recording Center

RLR

Remote Location Response

BCD Binary Coded Decimal

RT

Retransmit

CRC Cyclic Redundancy Check

SSM

Statistical and Status Message

DBLK Billing Data Block

T

Transmit

DBT Dial Backup Test

TID

Terminal Identification

DDD Direct Distance Dialed

TST

Test

EOB End-of-Block

TTY

Teletypewriter

ESS Electronic Switching System

TTYC

Teletypewriter Controller