CALL DATA ACCUMULATOR (CDA) TRANSLATIONS FOR NO. 1A AMARC, GENERIC 3 BILLING SYSTEMS SUPPLEMENTAL INFORMATION—CENTRAL OFFICES

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1. GENERAL

1.01 This section describes the translations performed by a No. 1A Automatic Message Accounting Recording Center (AMARC) to billing data transmitted by a CDA. This section also makes note of special considerations for preparation of some of the nongeneric parameter data (NPD) forms used for these translations. This section also outlines NPD form changes that are necessitated by growth and rearrangements affecting CDAs.

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

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

2. GENERAL DESCRIPTION OF CDA

2.01 The CDA scans the tip, ring, and sleeve leads at the input to the first selectors to detect dial pulses, answer supervision, and call disconnect. Each line finder-first selector link is connected to a CDA multiplexer. Two CDA multiplexers are controlled by one scan control unit, another CDA equipment component. Each scan control unit is connected via a data link to a channel of a multiplexer at the AMARC.

2.02 The point of connection to a CDA multiplexer for each line finder-first selector link is identified by a scan port address.

2.03 A CDA transmits billing data to the AMARC in two messages, one at call answer and one at call disconnect. Unanswered calls are discarded by the CDA and are not transmitted to the AMARC. A sensor that transmits billing data for one call in two messages is classed as a double-entry sensor.

2.04 The answer and the disconnect message for a call includes the scan port address of the line finder-first selector used on the call. The

address is used by the AMARC to associate the answer and the disconnect message for a call.

2.05 The answer message includes a flat rate or a message rate classmark. Each completed call with a message rate classmark is formatted and recorded on magnetic tape by the AMARC. A completed call with a flat rate classmark is not formatted or recorded, except under either of the following conditions.

- The channel over which the call was transmitted is marked in the Channel Table as having 1SR (special rate) service and the Message Billing Index (MBI) determined for the call does not equal 9. Paragraph 7.18 describes 1SR service.

- The TTY input message **ALW FR ENT** has been entered at the AMARC for the entity from which the call was transmitted. This input message causes the AMARC to format and record all completed calls with a flat rate classmark from that entity.

2.06 Two-party and multiparty lines are assigned a special classmark. Calls from 2-party and multiparty lines are discarded by the AMARC. These calls must be billed using existing arrangements.

2.07 The CDA transmits billing data for local calls only to AMARC. Toll calls must be billed using other arrangements.

2.08 A detailed description of the CDA is provided in Section 227-584-100.

2.09 A detailed description of the No. 1A AMARC, including operation with a CDA, is provided in Section 201-900-103.

3. CALL RECORD REGISTERS FOR CDA SCAN PORTS

GENERAL

3.01 Each scan port is associated with a specific call record register (CRR) in AMARC memory. A CRR is a temporary storage area. An answer or a disconnect message is loaded into the appropriate CRR when it is received by AMARC.

SPECIAL CONSIDERATIONS FOR PREPARATION OF NPD FORM 0301

3.02 The AMARC assigns CRRs for a CDA entity based on the data specified on NPD Form 0301. On this form, the telephone company specifies for each CDA channel, the highest numbered scan port equipped for CDA multiplexer 0 and for CDA multiplexer 1. The CRR size for a CDA scan port generally is five words of memory. Accordingly, it is important that NPD Form 0301 be prepared accurately to avoid wasting memory and to avoid generation of TTY maintenance messages.

3.03 The data from Form 0301 are entered into the Equipped Scan Port Table. This table also contains data for Billing Data Transmitter (BDT), Call Data Transmitter (CDT), and 3ESS channels.

3.04 The highest equipped scan port for a CDA multiplexer must be specified on Form 0301 as an octal address. The octal address of the highest equipped scan port is obtained from the CDA drawing TXXXX-402, Assignment Chart for Line Finders and First Selectors to Call Data Accumulator Equipment, for each entity. This drawing associates each line finder with a scan point address.

3.05 Figure 1 is a portion of a sample TXXXX-402 drawing. A drawing is issued for each multiplexer of each channel assigned to the entity. The encircled number 1 on Fig. 1 points out the entry on the drawing which indicates the number of the multiplexer. The entry 1L = multiplexer 0 of the first channel assigned to the entity; 1H = multiplexer 1 of the first channel. The encircled number 2 on Fig. 1 points out the octal address of the highest equipped scan port on multiplexer 0.

3.06 Every midnight, the AMARC scans the call record registers to determine the scan port addresses which were not used in the previous 24-hour period. At 30 minutes past midnight every day, any unused scan port addresses are printed at the AMARC with the message **REPT CHL UNUSED SCAN PORTS**. A maximum of eight scan port addresses per CDA multiplexer will be reported.

3.07 The reporting of a scan port address via this message may indicate trouble at the remote office because each address equates to a

line finder which was not used in the previous 24-hour period. AMARC personnel must report this information to the remote office for investigation. CDA personnel must then use the TXXXX-402 drawing to determine the line finder that corresponds to the reported address.

3.08 A multiplexer serves a maximum of 248 line finders. If the multiplexer has less than 248 line finders assigned, there will be unassigned scan port addresses. The unassigned addresses should not be checked for use. From the Equipped Scan Port Table, the AMARC identifies those addresses which are not to be checked for use.

3.09 Form 0301 must be prepared accurately to prevent the reporting of unassigned addresses with the **REPT CHL UNUSED SCAN PORTS** message.

4. AMARC CALL PROCESSING OF CDA BILLING DATA

4.01 The processing or translations that the AMARC performs for CDA billing data are described in the following paragraphs.

4.02 To complete the required translations for CDA billing data, the AMARC must read the various NPD tables contained in AMARC memory. Data from the NPD forms are used to build these tables. Section 201-900-030 provides the following information about NPD:

- General description of NPD
- Instructions for preparation of NPD forms.

4.03 The actual layout of data in each NPD table is provided in Section 201-900-103.

4.04 When the AMARC receives billing data, the data are loaded into the Input Assembly Table (IAT) associated with the transmitting channel. An IAT provides temporary storage for billing data transmitted through a specific channel.

4.05 While the billing data are in the IAT, the input entry format of the entity assigned to the channel through which the data were transmitted is determined.

4.06 The AMARC receives billing data from several different sensors. There are differences in the methods of operations of the various sensors. As a result, the billing data received from the various sensors require different amounts of processing. When billing data are received, the AMARC determines the functions or translations to perform based on the method of operation of the sensor transmitting the data. The method of operation is identified by the input entry format of the entity from which the billing data were received.

4.07 The input entry format of an entity is determined by the following process.

(a) AMARC accesses the Channel Table to determine the entity number assigned to the transmitting channel. The Channel Table specifies data associated with each channel, such as the entity assigned to the channel.

(b) AMARC accesses the Entity Identification Table to determine the input entry format of that entity. The Entity Identification Table contains data that uniquely describe each entity, including the input entry format of the sensor with which the entity is equipped.

4.08 The input entry format for a CDA entity is double entry.

4.09 Once the input entry format is determined to be double entry, the billing data are loaded into the CRR associated with the scan port address transmitted with the data. The AMARC determines the location in memory of the CRR page for the transmitting channel from the Call Record Register Page Descriptor Table.

4.10 When a CDA answer message is received, it is loaded into the CRR and stored until the disconnect message is received and unloaded. Since a line finder-first selector can handle only one call at a time, only one answer or disconnect message for a scan port address can be in the CRR at any time. The answer and disconnect messages of a call are thus associated automatically in the CRR. When the disconnect message is received for the call, the answer message is removed from the CRR and the call record is moved to the Tape Output Register (TOR). The TOR is another temporary storage area in memory. The elapsed time is computed and added to the call record as it is moved to the TOR.

4.11 Call records are stored temporarily in the TOR and then unloaded by order of disconnect

time into the TOBLK, a temporary data storage area.

4.12 As the call record is moved from the TOR to the TOBLK, the following translations are performed by the AMARC:

(a) Determination of the calling telephone number, ie, the rate center, NPA, and 7-digit telephone number. Part 5 describes these translations.

(b) Reconstruction of the central office code of the called telephone number, when required. Part 6 describes this translation.

(c) Determination of the MBI value of the call, when required. Part 7 describes this translation.

(d) Determination of the call format to be used. Part 8 describes this translation.

4.13 The expanded TOBLK data are placed into the Tape Output Buffer (TOB), another temporary storage area, using a format acceptable for the required call format and for the tape drive input. Parity is then computed. The parity is used by the tape controller to perform data integrity checks when actually recording the data.

4.14 When a TOB becomes full (which may imply processing more than one call), the data from that TOB are written onto the magnetic tape.

5. DETERMINATION OF CALLING TELEPHONE NUMBER

GENERAL

5.01 The calling telephone number is transmitted to the AMARC as a 1-digit Central Office Code Index (COI) and a 4-digit line number. These data are translated into a rate center, NPA, and 7-digit telephone number.

5.02 A rate center is defined as a group of calling and called central office codes, where the rate structure is identical for all calling central office codes in the group.

5.03 Figure 2 illustrates the process by which the AMARC determines the calling number.

NPD TABLES USED FOR THE CALLING TELEPHONE NUMBER TRANSLATION

5.04 The following NPD tables are used for this translation:

- Entity Identification Table

  This table contains the following data which uniquely describe a CDA entity:

  (a) Entity Number

  (b) Input Format

  (c) Theoretical Codes Indication

- COI Translation Table for the entity

  This table translates a COI to the following:

  (a) Calling NXX

  (b) Rate Center

  (c) Physical/Theoretical Indication

- Calling NPA Table for the entity

  This table translates the Calling NPA Index, always 0 for a CDA entity, to the calling NPA.

- Theoretical Code Hundreds Table for the entity

  This table specifies for each COI that has a theoretical translation the line number thousands and hundreds digits that require the theoretical translation. A theoretical office code index is specified for each theoretical translation.

- Theoretical Office Code Table for the entity

  This table translates the theoretical office code index determined from the Theoretical Code Hundreds Table to the following:

  (a) Rate Center

  (b) Theoretical NPA/NXX.

NPD FORMS THAT AFFECT THE CALLING TELEPHONE NUMBER TRANSLATION

5.05 The following specifies the NPD form that affects the data in each of the NPD tables used for this translation:

- Form 0101—Entity Identification Table
- Form 0201—COI Translation Table
- Form 0203—Calling NPA Table
- Form 0206—Theoretical Code Hundreds Table
- Form 0205—Theoretical Office Code Table.

SPECIAL CONSIDERATIONS FOR PREPARATION OF NPD FORM 0201

5.06 This form provides the data required to translate a COI to a calling NXX, rate center, and physical/theoretical indication. A COI is a single digit, 0 through 9, which represents a 3-digit central office code. The COI is part of the billing data transmitted by the CDA, along with the 4-digit line number of the calling telephone number. The index numbers must conform to restrictions related to the type of Automatic Number Identification (ANI) equipment provided in the step-by-step office. The following paragraphs discuss these restrictions.

5.07 For CDA entities with ANI-C or ANI-D, a new COI, to be used only on local calls, must be assigned to each central office code. This assignment must be communicated to Western Electric for implementation when the ANI equipment is modified for CDA operation. Valid COIs for ANI-C and ANI-D entities are 1 through 6, 8 and 9 (decimal). Indexes 0 and 7 cannot be used.

5.08 For CDA entities with ANI-B, the COI must be the same number that presently is wired into the ANI equipment. The present COI representing the central office code can be found on the T-7970 outpulser frame wiring list and equipment drawing for the entity. This information is found in Table A, Assignment of Offices in an Outpulser-Identifier Group. The COI is the number representing an office code. Valid index numbers for ANI-B offices are 0 through 9 (decimal). Figure 3 displays the Table A portion of a sample 7970 drawing.

TRANSLATION OF CALLING TELEPHONE NUMBER DATA

5.09 To determine the calling telephone number, AMARC first accesses the Entity Identification Table to find out whether the entity has any theoretical office codes. When an entity has a theoretical office code, a particular COI is used to represent both a physical and a superimposed theoretical central office code.

A. No Theoretical Office Codes

5.10 The AMARC accesses the COI Translation Table, using the COI transmitted on the call as a pointer.

5.11 The AMARC translates the COI to the rate center and calling NXX specified in the COI Translation Table.

5.12 The AMARC next accesses the Calling NPA Table and looks at index 0. Index 0 is the only index which can be used for a CDA entity and this must represent the home NPA. The calling NPA is thus learned and translation of the calling number is complete.

B. Theoretical Office Codes Present

5.13 When the AMARC looks at the COI Translation Table, it first reads the physical/theoretical entry for the transmitted COI to determine whether that COI has any theoretical translations.

No Theoretical Translation Associated with Transmitted COI

5.14 The AMARC translates the COI to the rate center and calling NXX specified in the COI Translation Table. The AMARC then accesses the Calling NPA Table and learns the calling NPA. Determination of the calling telephone number is complete.

Theoretical Translation Possible for Transmitted COI

5.15 A physical central office code and a superimposed central office code share a maximum of 10,000 line numbers. Specific line numbers must be designated to each of the codes, with no overlapping of numbers. For example, COI 9 may represent physical code 323 and theoretical code 542. The line numbers could be divided such

that line numbers 0000 through 9799 are to be translated to the 323 code and line numbers 9800 through 9999 are to be translated to the 542 code. The Theoretical Code Hundreds Table specifies, for each COI that has a theoretical translation, the thousands and hundreds digits that require translation to the theoretical code.

5.16 When the AMARC determines that the COI transmitted on a particular call has a theoretical translation, the AMARC searches the Theoretical Code Hundreds Table entry for that COI to learn whether the line number is associated with the theoretical code.

5.17 If that calling line number does not require a theoretical office code, the AMARC returns to the COI Translation Table and translates the COI to the rate center and calling NXX specified. The AMARC then accesses the Calling NPA Table and determines the calling NPA. Determination of the calling telephone number is complete.

5.18 If the calling line number does require a theoretical office code, the AMARC obtains the Theoretical Office Code Index specified in the Theoretical Code Hundreds Table for the thousands and hundreds digits. Using this index as a pointer, the AMARC accesses the Theoretical Office Code Table for the entity and translates the index into a rate center, calling NPA, and calling NXX. Translation of the calling telephone number is complete.

6. DIGIT RECONSTRUCTION

GENERAL

6.01 A step-by-step entity may be equipped with digit absorbing selectors. With these selectors, certain digits are absorbed without advancing the call to the next stage. The call remains on the selector until the next digit is dialed. With the next digit dialed, the selector may absorb again, cut through to the next selector or other equipment in the switching train, or block the call. For example, if the called number desired was 332-7689, digit absorbing selectors could be arranged so that the digits "33" would be absorbed by the first selector, then the digit "2" would cut through on the second level to an idle terminal to operate the first selector. The "7" would operate a fourth selector, the "6" would operate a fifth selector and the digits "8" and "9" would operate the connector. The selectors perform in accordance with a prearranged scheme illustrated by the traffic schematic for the entity.

6.02 In come cases, it is unnecessary for a customer to dial any digit which is absorbed by a selector, since it does not advance the call. When less than seven digits have been dialed on a call, except when a telephone company service code is dialed, the AMARC must reconstruct the shortened central office code to the complete central office code.

NPD TABLES USED FOR DIGIT RECONSTRUCTION

6.03 The following NPD tables are used for this translation:

- AMARC Identification Table

  This table contains the following information which uniquely identifies a particular AMARC and describes the types of billing data which will be transmitted by the sensors:

  (a) 6-Digit AMARC Identification Number

  (b) Input Format

  (c) Detailed Billing Option.

- Digit Reconstruction Table for the entity

  This table translates a one or two-digit shortened central office code to a 3-digit central office code. A translation may also be made if no digits are dialed for a central office code.

NPD FORMS THAT AFFECT DIGIT RECONSTRUCTION

6.04 The following specifies the NPD form that affects the data in each of the NPD tables used for this translation:

- Form 0100—AMARC Identification Table
- Form 0207—Digit Reconstruction Table.

SPECIAL CONSIDERATIONS FOR PREPARATION OF NPD FORM 0207

6.05 The AMARC reconstructs a central office code by looking up the actual dialed digits

of the code in the Digit Reconstruction Table for the entity. This table lists each acceptable (to the step-by-step equipment) shortened code for an entity and specifies the 3-digit central office code to which each should be reconstructed.

6.06 If a translation for a shortened central office code is not found in the Digit Reconstruction Table for a CDA entity, a **REPT CHL TBL DRC ERR** message will be printed at the AMARC terminal. The call will be recorded by the AMARC, regardless of the error, and will therefore be billed. In order to prevent unnecessary **REPT CHL TBL DRC ERR** messages, it is imperative that the Digit Reconstruction Table, ie, NPD Form 0207, list all possible shortened codes.

6.07 Acceptable shortened codes must be determined from the master record or customer telephone directory and the traffic schematic for the entity. The master record or customer telephone directory lists the codes which can be dialed locally by customers in the entity. Each of these codes must be checked carefully through the traffic schematic to determine whether or not the customer can dial less than three digits. Each digit that is absorbed may not need to be dialed.

6.08 In some common control step-by-step entities using dial pulse sending with either by-link or wink start operation, routing codes must be dialed by the customer on some calls. With CDA operation, the routing codes are detected by the first digit, deleted by the CDA scan control unit, and the remaining digits transmitted to the AMARC. Since routing codes are deleted by the CDA, these codes do not affect entries in the Digit Reconstruction Table.

TRANSLATION OF SHORTENED CENTRAL OFFICE CODE

6.09 To reconstruct a shortened central office code, the AMARC accesses the Digit Reconstruction Table for the entity, using the dialed central office code as a pointer. Digit Reconstruction is not attempted when the dialed digits are a telephone company service code.

7. DETERMINATION OF MBI VALUE

GENERAL

7.01 An MBI value must be determined for every CDA call, except a call to 411. The MBI value, which is based on the calling rate center and the called central office code, is a key to the charge to be applied to a call.

NPD TABLES USED FOR MBI DETERMINATION

7.02 The following NPD tables are used for this translation:

- AMARC Identification Table
- MBI Table for the appropriate rate center for the entity

  This table translates a 3-digit central office code to an MBI
- Channel Table

  This table specifies the following for each CDA channel:

  (a) Entity Number

  (b) Local Channel Number

  (c) Dialup Data Set Type

  (d) Dial Sequence Required to Reach Dialup Data Set

  (e) 1SR Indication.

NPD FORMS THAT AFFECT MBI DETERMINATION

7.03 The following specifies the NPD form that affects the data in each of the NPD tables used for this translation:

- Form 0100—AMARC Identification Table
- Form 0208—MBI Table
- Form 0300—Channel Table.

7.04 The calling rate center determined from the calling number translation is used in determining the MBI for a call; therefore, the NPD forms that affect that translation also affect the MBI translation.

7.05 The called central office code used in determining the MBI for a call may have been reconstructed from a shortened dialed central

office code. The NPD forms that affect digit reconstruction therefore may also affect the MBI translation.

SPECIAL CONSIDERATIONS FOR PREPARATION OF NPD FORM 0208

7.06 The AMARC determines the MBI value for a call by looking up the called central office code in the MBI Table for the rate center of the calling telephone number.

7.07 If an MBI is not found for a called central office code in the MBI Table for the calling rate center, a **REPT CHL TBL MBI ERR** message will be printed at the AMARC terminal. The call will be recorded by the AMARC, regardless of the error, and will therefore be billed. In order to prevent unnecessary **REPT CHL TBL MBI ERR** messages, it is imperative that the MBI Table for the calling rate center, ie, the entries on NPD Form 0208 for that table, list all possible called central office codes.

7.08 The master record for an entity lists all central office codes which can be dialed as a local call. The customer telephone directory also contains this information. These records and the traffic schematic must be analyzed to determine all entries for Form 0208.

7.09 MBI values must be determined according to the telephone company's tariffs for message rate calls. The rate department is the source of information for determining MBI values. MBI values must be communicated to the accounting center. MBI 0 generally represents a no-charge call. The central office code for the telephone company PBX would usually be a no-charge call. In an entity that has 1SR service, MBI 9 must be assigned ***only*** to called central office codes that represent a flat rate call for a 1SR customer in that rate center. Paragraph 7.18 describes 1SR service.

7.10 The master record for an entity will make note if the 1SR class of service is offered, though it may be called by another name.

7.11 In some cases, because of the digit absorption characteristics of a particular step-by-step office, a customer can dial alternative digits for a called central office code. For example, a customer may dial 365 and reach 395.

7.12 If such a call is completed, the No. 1A AMARC will receive the actual dialed code and attempt to determine an MBI value for the call. If alternative codes are not listed in the Message Billing Index Table for the calling entity and the called central office code is not found, a **REPT CHL TBL MBI ERR** message will be printed at the AMARC terminal.

7.13 To prevent error messages where no equipment failure is involved, the Message Billing Index Table should be as complete as possible. Form 0208 should list all alternative listed codes, and show the same MBI value as the intended called central office code.

7.14 An MBI Table must be provided for each rate center in an entity. If 1SR service is not offered, a maximum of two MBI Tables may be provided. If 1SR service is offered, a maximum of four MBI Tables may be provided, two for non-1SR customers and two for 1SR customers. Entries for all MBI Tables may be recorded on the same copy of Form 0208.

7.15 All 3-digit telephone company service codes, except 411, that return answer supervision also must be listed on Form 0208.

TRANSLATION OF CALLED CENTRAL OFFICE CODE OR 3-DIGIT CODE TO AN MBI

7.16 To translate a called central office code (or 3-digit telephone company service code) to an MBI, the AMARC accesses the MBI Table for the appropriate rate center for the entity, using the called central office code or code as a pointer.

7.17 The AMARC determines which of the possible four MBI tables to use, based on the following:

(a) The 1SR indication for the transmitting channel, as specified in the Channel Table.

(b) The rate center specified for the COI in the COI Translation Table or in the Theoretical Office Code Table. The rate center for the call is obtained during the calling number determination, as explained in Part 5.

A. Description of 1SR Service

7.18 Some telephone companies are offering a new class of service which allows a customer to call nearby parts of his ***local*** area at a flat rate and more distant parts of his ***local*** area at a message rate. This class of service is known to the AMARC as 1SR. In some documentation, this class is designated as 1FRC (Flat Rate Community Calling).

7.19 In a CDA entity that has 1SR service, each 1SR customer must be arranged to appear to the CDA as a flat rate customer. The CDA will transmit a 1SR call then with a flat rate classmark. If the AMARC determines that an entity has 1SR service, it will record calls with a flat rate classmark except those calls for which an MBI of 9 is determined. An MBI of 9 is defined generically to represent a nonrecord condition on a call with flat rate classmark in an entity with 1SR service.

7.20 Flat rate customers in a 1SR entity must be arranged to appear to the CDA as multiparty customers. Calls from these customers will be transmitted with a special classmark and will not be recorded by the AMARC.

7.21 1SR and regular measured customers in an entity will have the same central office code and therefore the same COI. The 1SR customers must be charged for their local calls using different rates from those used for regular measured customers. The AMARC accommodates this need by designating a separate set of MBI Tables for 1SR customers in an entity. MBI Tables 0 and 1 are used for non-1SR customers; MBI Tables 2 and 3 are used for 1SR customers. MBI Tables 1 and 3 are used if the CDA entity has two originating rate centers.

7.22 The AMARC determines whether an entity has 1SR service by consulting the entry in the Channel Table for the channel through which the billing data were transmitted. This entry contains a flag that indicates whether the entity associated with the channel has 1SR service.

B. Selection of MBI Table, 1SR Service Not Offered

7.23 If the AMARC determines that the entity does not have 1SR service, MBI Table 0 or 1 is used. The MBI Table number corresponds to the rate center 0 or 1 determined from the COI Translation Table or the Theoretical Office Code Table.

C. Selection of MBI Table, 1SR Service is Offered

7.24 If the AMARC determines that the entity does have 1SR service, the classmark transmitted on the call is used in selecting the MBI Table.

7.25 If the classmark is measured, the customer is a regular measured customer. MBI Table 0 or 1 is used, depending on the rate center determined from the COI Translation Table or the Theoretical Office Code Table.

7.26 If the classmark is flat, the customer is a 1SR customer. If the rate center determined from the COI Translation Table or the Theoretical Office Code Table is 0, MBI Table 2 is used. If the rate center is 1, MBI Table 3 is used.

D. MBI Translation

7.27 Once the MBI Table is selected, the table is accessed, using the called central office code as a pointer. The MBI Table lists each called central office code which will return answer supervision and which can be dialed as a local call by customers in the rate center associated with the table. For each central office code, an MBI is specified.

7.28 If the MBI value that applies to the call is 9, the call will be discarded and will not be recorded. In an entity that offers 1SR service, MBI 9 must be specified by the telephone company ***only*** for called central office codes that represent a flat rate call for a 1SR customer. This special treatment for MBI 9 applies only to an entity that offers 1SR and only to calls on which a flat rate classmark is transmitted.

8. DETERMINATION OF CALL FORMAT

GENERAL

8.01 Comptroller's Letter M284A defines the call details that are to be included in call records for various call types. It also specifies the format of the call record for each call type. Every call recorded by any automatic recording system must conform to a call format defined in this comptroller's letter. The AMARC determines the appropriate

call type for each CDA call and formats accordingly, conforming to the comptroller's letter. The present M284A does not include the call formats used for the No. 1A AMARC Generic 3. A future update of the M284A will include these formats.

8.02 Figure 4 illustrates the process by which the AMARC determines the call format to use for a particular CDA call.

NPD TABLES USED FOR CALL FORMAT DETERMINATION

8.03 The following NPD tables are used for this translation:

- AMARC Identification Table
- Special Number Table (SPN).

  This table specifies each calling telephone number that requires the use of a specific call format regardless of characteristics of the call that otherwise would dictate the use of a different call format. Telephone numbers from CDA and 3ESS entities may be specified in this table.

NPD FORMS THAT AFFECT CALL FORMAT DETERMINATION

8.04 The following specifies the NPD forms that affect the data in each of the NPD tables used for this translation:

- Form 0100—AMARC Identification Table
- Form 0400—Special Number Table.

8.05 The MBI determined for a call may affect the call format translation. The NPD forms that affect the MBI translation, therefore, may affect the call format translation.

AMA CALL RECORD FORMATS

8.06 The following paragraphs describe the AMA call record formats that AMARC uses for CDA calls.

8.07 The AMARC formats a CDA call record as one of three Call Type Call Codes:

- 001—Detailed, Message Rate, Timed, MBI
- 002—Message Rate, Timed, MBI
- 009—Directory Assistance.

8.08 There are a number of optional data fields that may be included in a call record formatted as a specific Call Type Call Code (hereafter referred to as Call Type, for convenience). The use of the optional data fields is dependent on the data transmitted from the CDA for a particular call and on the translations performed by the AMARC. For example, if the AMARC determines (from the Special Number Table) that the call was originated by a Hotel/Motel line, the Service Feature data field must be included in the call record.

8.09 Each Call Type has two or more associated Structure Codes. The Structure Code defines the data fields to be included in the particular call record. The Structure Code used is dependent on the data received from the CDA for a particular call.

8.10 The AMARC determines the Call Type that applies to a call based on determinations described beginning with paragraph 8.39. The AMARC then determines which Structure Code for that Call Type applies to the call.

8.11 Table A defines for each Structure Code associated with a Call Type the data fields that may be included in the call record. A checkmark entered for a data field on Table A indicates that the field may be included in a call record formatted according to the Structure Code specified at the top of the column.

8.12 As an example of how the Structure Code for a particular Call Type is determined by the data received from the CDA, consider the following:

> The called digits for a call are 411, identifying a Directory Assistance call. The calling telephone number is not listed in the Special Number Table. From this information, the AMARC determines that the Call Type that applies to the call is 009. If the data received from the CDA include Call Status information, such as that the call was abandoned, Structure Code 00069 (See Table A), which includes the Call Status data field, is used. An abandon indication in this example would indicate that an answer occurred after the calling party had hung up.

8.13 The following paragraphs describe each data field that applies to the Structure Codes used for CDA call records. The description of each data field specifies only the values that apply to CDA calls.

8.14 AA or AB: Value AA indicates start of record. Value AB indicates start of record and that the "SIGN" value for one of the data fields was a hexadecimal D. Hexadecimal D indicates that one of the digits received from the sensor for the data field was mutilated or was an NCD (noncheck dummy).

8.15 For a CDA, a hexadecimal D in the "SIGN" position for any of the following data fields results in an AB value for the start of record entry:

- Originating NPA
- Originating Number
- Terminating NPA
- Terminating Number.

8.16 Structure Code: The Structure Code defines the data fields for a Call Type that are included in the particular call record. Structure Codes are defined as follows:

BCD CHARS	STRUCTURE CODE	DESCRIPTION
1-5	00015	No call status With operator action With sample and observe (Hotel/Motel/Hospital)
	00017	With call status With operator action With sample and observe
	00020	No call status
	00022	With call status (Suspected anamolies)
	00028	No call status
	00029	No call status No operator action No sample and observe
	00030	With call status No operator action No sample and observe
	00069	With call status
6	SIGN (hex C)	

8.17 Call Type Call Code: This field defines the call type format used for the call record.

BCD CHARS	CALL TYPE CALL CODE	DEFINITION
1-3	001	Detailed, Message Rate, Timed, MBI
	002	Message Rate, Timed, MBI
	009	Directory Assistance
4	SIGN (hex C)	

8.18 Sensor Type: This field identifies the type of sensor from which the call originated.

BCD CHARS	SENSOR TYPE	SENSOR
1-3	019	CDA
4	SIGN (hex C)	

8.19 Sensor Identification: This field contains the 6-digit code that identifies the sensor entity.

BCD CHARS	SENSOR ID
1	Padding (0)
2-7	Identifying code
8	SIGN (hex C)

8.20 Recording Office Type: This field identifies the type of system that recorded the call record.

BCD CHARS	RECORD. OFC. TYPE	RECORDING OFFICE
1-3	018	No. 1A AMARC
4	SIGN (hex C)	

8.21 Recording Office Identification: For No. 1A AMARC, this field specifies the 6-digit identification number assigned by the telephone company to the recording AMARC. This number also is included on the label that is placed on the magnetic tape before it is sent to the Accounting Center.

BCD CHARS	RECORD. OFC. ID
1	Padding (0)
2-7	Identifying code
8	SIGN (hex C)

8.22 Connect Date: This field identifies the last digit of the year, two digits of the month and two digits of the day.

BCD CHARS	MEANING
1	Last digit of year
2-3	Month
4-5	Day
6	SIGN (hex C)

8.23 Timing Indicator: This field identifies special timing conditions that applied to the call.

BCD CHARS	MEANING
1	0 = Not used
2	2 = UMCD (not at disconnect, no SST)
3	4 = Old type long duration call
4	0 = Not used
5	0 = Not used
6	SIGN (hex C)

8.24 Study Indicator: This field identifies various study conditions that applied to the call.

BCD CHARS	MEANING
1	0 = Unused
2	0 = Unused 1 = Complaint observed 2 = Network completion 3 = Complaint observed and network completion
3	0 = Unused
4	0 = Unused
5	0 = Unused
6	0 = Unused
7	0 = Unused
8	SIGN (hex C)

8.25 Answer: This field identifies whether the call was answered.

BCD CHARS	MEANING
1	0 = Answer 1 = Unanswered
2	SIGN (hex C)

8.26 Service Observed, Traffic Sampled: This field identifies service observing and traffic sampling conditions that applied to the call.

BCD CHARS	MEANING
1	0 = Not service observed, Not traffic sampled
2	SIGN (hex C)

8.27 Operator Action: This field identifies operator dialed and operator identified conditions that applied to the call.

BCD CHARS	MEANING
1	0 = Not oper. dialed Not oper. identified
2	SIGN (hex C)

8.28 Service Features: This field identifies special services that applied to the call.

BCD CHARS	MEANING
1	Padding (0)
2-3	00 = Other 02 = Hotel/Motel sans tax
4	SIGN (hex C)

8.29 Originating NPA: This field identifies the NPA of the line that originated the call.

BCD CHARS	MEANING
1-3	NPA
4	SIGN (hex C)

8.30 Originating Number: This field identifies the 7-digit telephone number of the line that originated the call.

BCD CHARS	MEANING
1-3	NXX
4-7	Four-digit number
8	SIGN (hex C)

8.31 Overseas Indicator: For a CDA call, this field always indicates that the call was not an overseas call.

BCD CHARS	MEANING
1	1 = Not an overseas call (NPA not dialed)
2	SIGN (hex C)

8.32 Terminating NPA: For a CDA call, the NPA portion of this field is always 000.

BCD CHARS	MEANING
1-2	Overseas expander positions
3-5	NPA
6	SIGN (hex C)

8.33 Terminating Number: This field identifies the 7-digit number to which the call terminated.

BCD CHARS	MEANING
1-3	NXX
4-7	Four-digit number
8	SIGN (hex C)

8.34 Connect Time: This field identifies the hours, minutes, seconds, and tenths of seconds at which answer occurred.

BCD CHARS	MEANING
1-2	Hours
3-4	Minutes
5-6	Seconds
7	Tenths of seconds
8	SIGN (hex C)

8.35 Elapsed Time: For a CDA call, this field identifies the number of hours, minutes, seconds, and tenths of seconds between the answer and the calling party disconnect.

BCD CHARS	MEANING
1	0 (Padding)
2-6	Minutes
7-8	Seconds
9	Tenths of seconds
10	SIGN (hex C)

Note: On attempts, 0s are recorded for minutes, seconds, and tenths of seconds.

8.36 Call Status: For a CDA call, this data field identifies an abnormal condition detected by the step-by-step office.

BCD CHARS	MEANING
1	0 (Padding)
2-3	01 = Station busy or not ready 02 = Abandon 03 = Trunk busy 04 = Other unsuccessful attempt 21 = Foreign potential 22 = Excessive number of digits 23 = Insufficient number of digits 40 = No fraud reg. available
4	SIGN (hex C)

8.37 WATS Indicator: For a CDA call, this data field specifies "not used" to indicate that the following field, WATS Band or Type Indicator, is used to identify the MBI determined for the call.

BCD CHARS	MEANING
1	0 = This character not used
2	SIGN (hex C)

8.38 WATS Band or Type Indicator: For a CDA call, this field identifies the MBI determined by AMARC for the call.

BCD CHARS	MEANING
1-3	WATS band or type indicator (MBI)
4	SIGN (hex C)

CALL FORMAT TRANSLATION

8.39 CDA calls may be formatted as three call types:

- Call Type Call Code 001

- Call Type Call Code 002
- Call Type Call Code 009.

8.40 The following paragraphs describe the process by which the AMARC determines the call format to use for a call.

Directory Assistance Call

8.41 The AMARC first looks at the dialed digits to learn whether the call is to Directory Assistance, 411.

8.42 If the call is to 411, the call is formatted as Call Type 009. Structure Code 00069 is used if Call Status data are present in the billing data received from the CDA. Structure Code 00028 is used if Call Status data are not present.

MBI = 9 in a 1SR Entity

8.43 If the call is not to 411 and the AMARC has determined that the transmitting entity has 1SR service during the MBI translation, the AMARC checks to see if the MBI for the call is 9. If it is 9, the call is discarded and not recorded. This treatment of MBI 9 applies ***only*** to an entity which is determined to have 1SR service.

Special Number Table

8.44 The AMARC next searches the Special Number Table (SPN) for the calling telephone number.

8.45 If the calling number is in the SPN Table, the call is formatted according to the treatment specified in the table. The following treatments may be specified for CDA numbers:

- Complaint Observing
- Detail Billing
- Hotel/Motel/Hospital
- Complaint Observing and Hotel/Motel/Hospital.

8.46 If the treatment is Complaint Observing, Detail Billing, or Complaint Observing and Hotel/Motel/Hospital, Call Type 001 is used. Structure Code 00020 or 00022 is used, depending on whether Call Status data are present. A Complaint Observed call record is identified by a value of 1 in the second digit of the Study Indicator data field. A Hotel/Motel/Hospital call is identified by a value of 02 in the second and third digits of the Service Feature data field.

8.47 If the treatment is Hotel/Motel/Hospital, Call Type 002 is used. Structure Code 00015 or 00017 is used, depending on whether Call Status data are present.

Detailed Billing Option

8.48 If the call is not to Directory Assistance and the calling telephone number is not in the SPN Table, the AMARC next determines the Detailed Billing Option for all CDA, and 3ESS entities served by the AMARC. This option defines which of the calls remaining to be formatted at this step in the call format translation should be detail billed. The Detailed Billing Option is specified in the AMARC Identification Table.

8.49 Calls that are determined to require detail billing, based on the Detailed Billing Option, are formatted using Call Type 001. Structure Code 00020 or 00022 is used, depending on whether Call Status data are present in the transmitted data.

8.50 Calls that are determined to require nondetail billing are formatted using Call Type 002. Structure Code 00015, 00017, 00029, or 00030 is used, depending on the data received from the CDA. If the data require the use of the Service Features data field, Structure Code 00015 or 00017 is used, depending on whether Call Status data are included. If the Service Feature data field is not required, Structure Code 00029 or 00030 is used, depending on whether Call Status data are included.

8.51 The following paragraphs define for each of the three Detailed Billing Options which calls require detail billing.

8.52 ***Maximum 1% (400):*** When this option is specified, only calls from telephone numbers that are listed in the SPN Table (maximum 400 numbers) may be detail billed. All other calls are formatted using Call Type 002, as explained in paragraph 8.50.

8.53 ***MBI Greater Than 1:*** When this option is specified, the AMARC checks the MBI value that is required for each call. If the MBI

is greater than 1, the call is detail billed using Call Type 001, as explained in paragraph 8.50. If the MBI is 0 or 1, the call is formatted as Call Type 002.

8.54 ***100% Detail Billed:*** When this option is specified, all calls remaining to be formatted are detail billed using Call Type 001.

9. ADMINISTRATIVE CONSIDERATIONS FOR GROWTH AND REARRANGEMENTS

NPD FORMS REQUIRED FOR GROWTH AND REARRANGEMENT CONDITIONS ASSOCIATED WITH CDAs

9.01 Growth in an existing CDA entity, the addition of a new CDA, the removal of a CDA, or changes to the characteristics of CDA entities served by an AMARC may affect NPD. Table B outlines the consequences on NPD forms that result from these changes. The following paragraphs explain the layout of the table.

9.02 Change: This column lists the usual changes which may be made to CDA entities and characteristics.

9.03 NPD Forms: This column lists the NPD forms which may be affected by the change. For example, suppose an existing CDA entity established a new central office code. Table B specifies that NPD Forms 0101, 0201, 0205, 0206, 0207, and 0208 may be affected. With some analysis of these forms it can be determined that:

(a) Form 0201, defining each COI in a CDA entity, is always affected.

(b) Forms 0207 and 0208 are affected only if the message rate charging plan in effect is MMU. Further, Form 0207 is affected only if the new code can be called by customers in the entity by dialing less than three digits.

(c) Forms 0101, 0205, and 0206 are affected only if the code has a theoretical translation and none of the codes previously established in NPD for that entity have theoretical translations.

9.04 Notes: This column contains any special considerations related to NPD that must be made as a result of the specified change.

ENTITY ASSIGNMENTS FOR CDA ENTITIES

9.05 Any unequipped entity may be equipped for a CDA entity provided sufficient memory is available for the additional memory required.

9.06 Any equipped entity may be unequipped provided no channels are equipped for the entity.

CHANNEL ASSIGNMENTS FOR CDA ENTITIES

9.07 Any unequipped channel may be equipped as a CDA channel provided the next lower-numbered non-dialup channel is not a BDT channel equipped for encoder 0 and the next higher-numbered non-dialup channel is not a BDT channel equipped for encoder 1. BDT channels for the same entity and BDT must be assigned to sequentially-numbered channels.

9.08 The following three conditions must be satisfied before a non-dialup channel may be equipped:

(a) The multiplexer on which the channel is being equipped must be marked as equipped in the Multiplexer Table (via NPD Form 0103).

(b) The entity for which the channel is being equipped must be marked as equipped in the Entity Table (via NPD Form 0101).

(c) Additional memory for one Call Record Register must be available.

9.09 The following two conditions must be satisfied before a non-dialup channel may be unequipped:

(a) The channel must be marked as equipped in the Channel Table.

(b) The channel must not be equipped as a dialup in the Channel Table.

ENGINEERING JUDGEMENTS

9.10 Growth in an existing CDA entity, the addition of a new CDA entity, or changes to the characteristics of all CDA entities served by an AMARC may require reexamination of the capability of the AMARC to continue to serve the remote offices in its present configuration. For example,

changing the detailed billing option from **MAXIMUM 1%** to **100% DETAIL BILLED** would affect the magnetic tape usage. Detail billed call record formats require more tape space than the nondetail billed call record formats that would be used for the majority of calls when the **MAXIMUM 1%** option is specified. Changing the detailed billed option for the CDA and 3ESS entities served by the AMARC then would require reevaluation of the tape capacity.

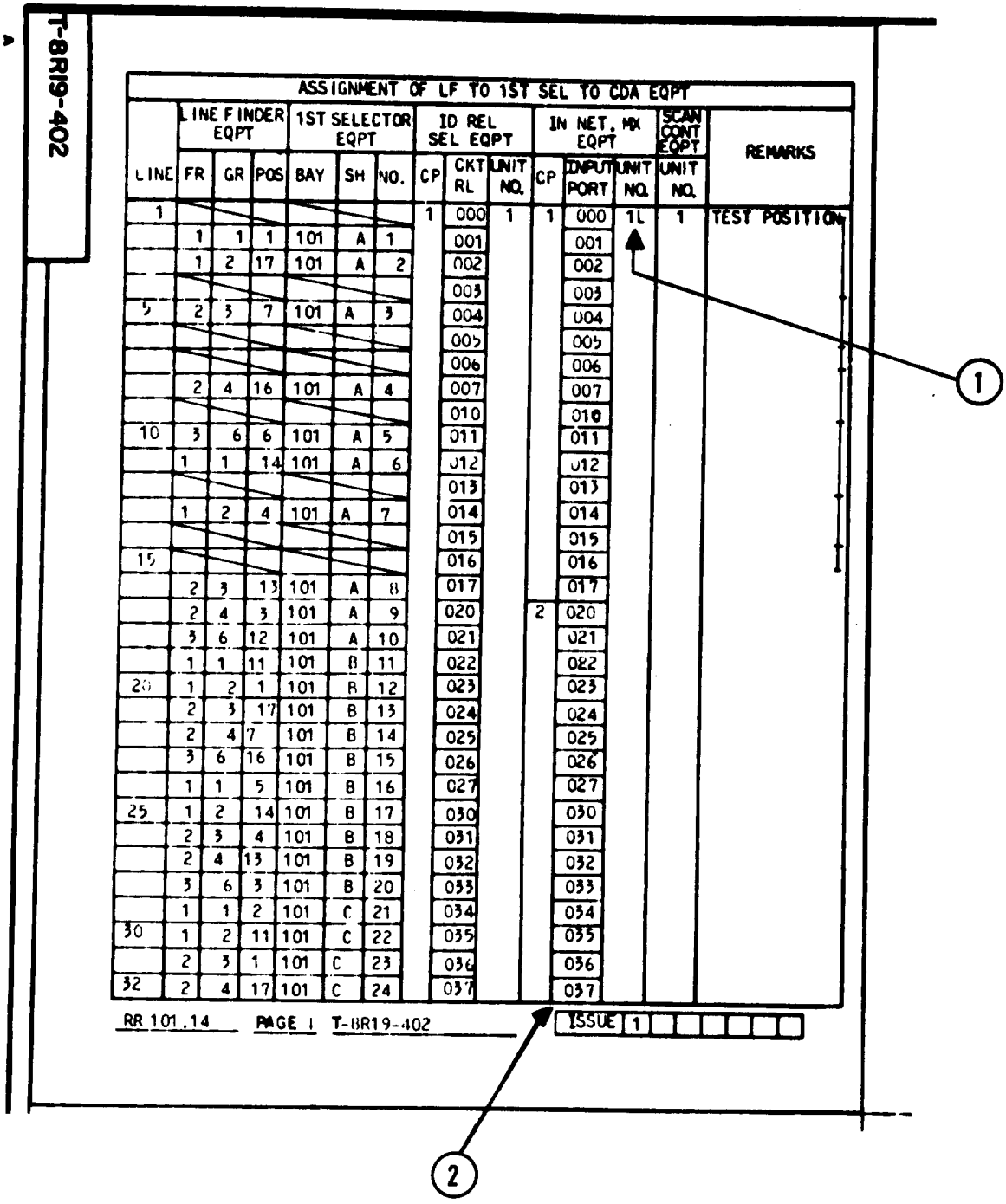

Fig. 1—Sample T-XXXX-402 Drawing (3.05)

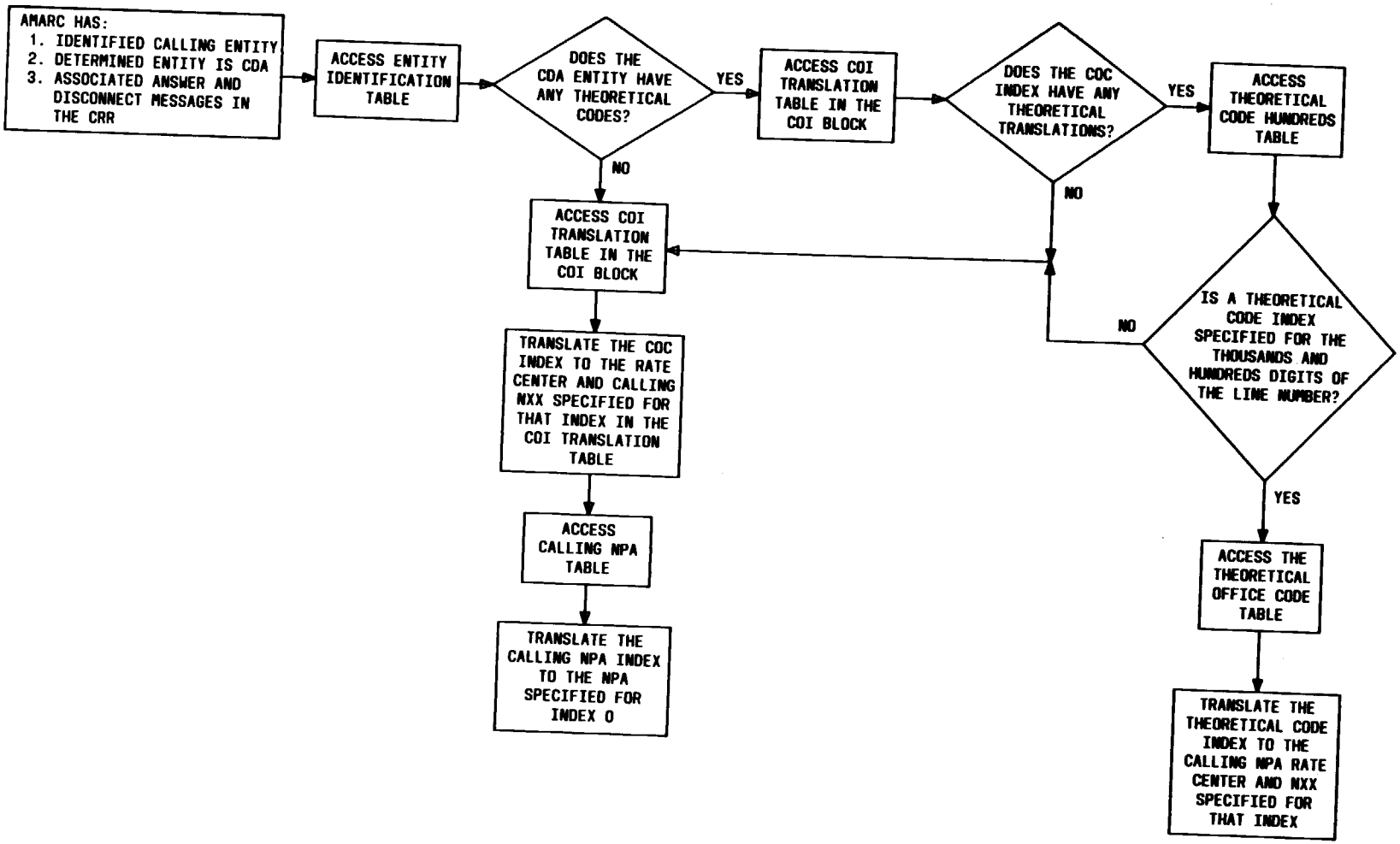

Fig. 2—Determination of Calling Telephone Number—CDA (5.03)

TABLE A				
ASSIGNMENT OF OFFICE AND TREATMENT RELAYS IN AN OUTPULSER IDENTIFIER GROUP				
LINE	OFFICES	PHYSICAL OFFICE CODE	TREATMENT	REMARKS
121	OF - 0	834	—	
122	OF - 1		—	
123	OF - 2		—	
124	OF - 3		—	
125	SP - 0 & 1	—		
126	SP - 2 & 3	—		
127	SP - 4 & 5	—		
128	SP - 6 & 7	—		
129	SP - 8 & 9	—		
130				
COL	A	B	C	D

Fig. 3—Sample T-7970 Drawing, Table A, Assignment of Offices in an Outpulser-Identifier Group (5.08)

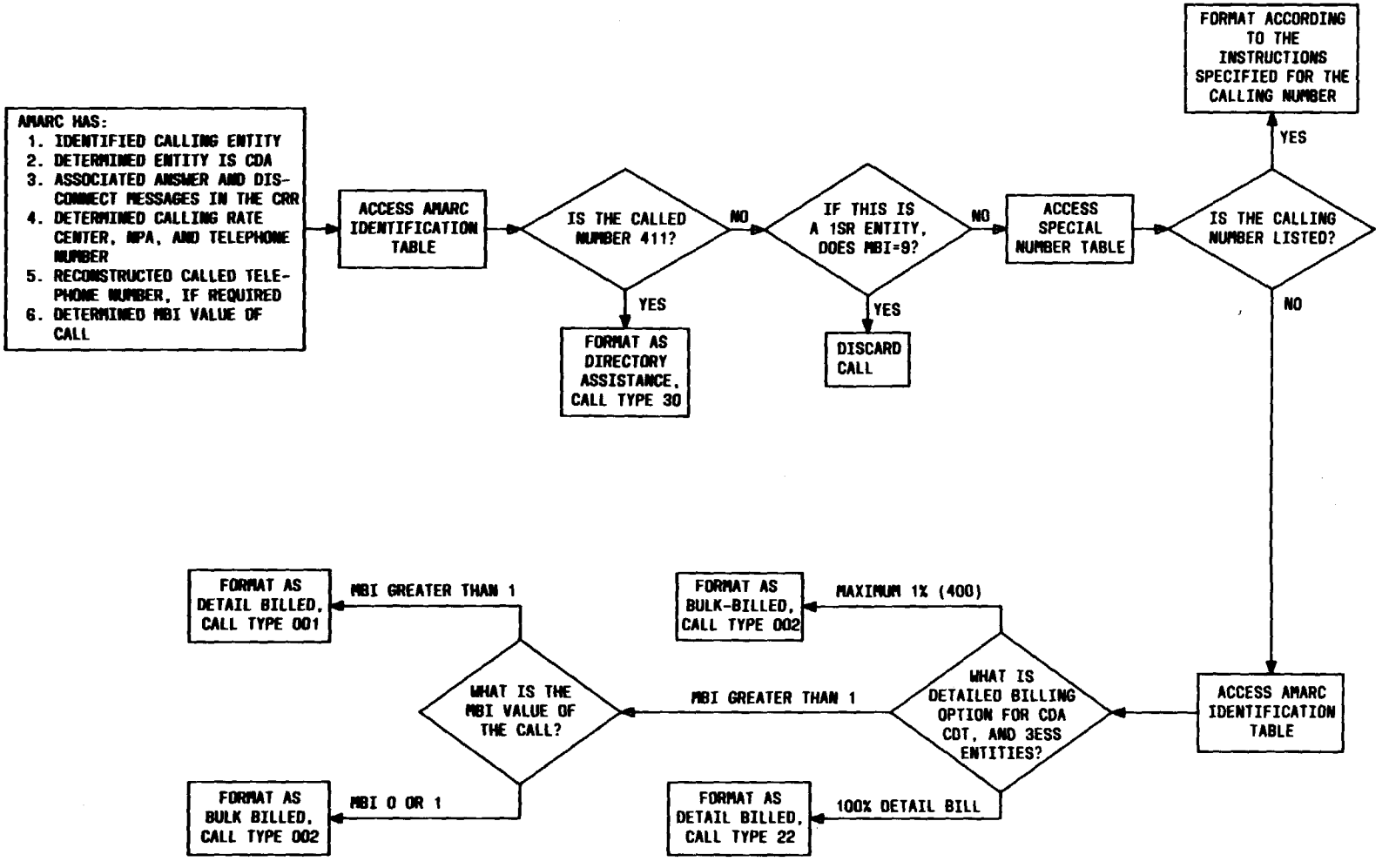

Fig. 4—Determination of Call Format—CDA (8.02)

TABLE A

AMA CALL RECORD DATA FIELDS ASSOCIATED WITH EACH CALL TYPE CALL CODE

DATA FIELDS AA or AB	CALL TYPE CODE 001 (DETAILED MR)		CALL TYPE CODE 002 (BULK-BILLED MR)				CALL TYPE CODE 009 (DIRECT. ASSIST.)	
Structure Code	00020	00022	00015	00017	00029	00030	00028	00069
Call Type Code	✓	✓	✓	✓	✓	✓	✓	✓
Sensor Type	✓	✓	✓	✓	✓	✓	✓	✓
Sensor Identification	✓	✓	✓	✓	✓	✓	✓	✓
Recording Office Type	✓	✓	✓	✓	✓	✓	✓	✓
Recording Office Identification	✓	✓	✓	✓	✓	✓	✓	✓
Connect Date	✓	✓	✓	✓	✓	✓	✓	✓
Timing Indicator	✓	✓	✓	✓	✓	✓	✓	✓
Study Indicator	✓	✓	✓	✓	✓	✓	✓	✓
Answer	✓	✓	✓	✓	✓	✓	✓	✓
Service Observed, Traffic Sampled	✓	✓	✓	✓			✓	✓
Operator Action	✓	✓	✓	✓			✓	✓
Service Feature	✓	✓	✓	✓			✓	✓
Originating NPA	✓	✓	✓	✓	✓	✓	✓	✓
Originating Number	✓	✓	✓	✓	✓	✓	✓	✓
Overseas Indicator	✓	✓						
Terminating NPA	✓	✓						
Terminating Number	✓	✓						
Connect Time	✓	✓	✓	✓	✓	✓	✓	✓
Elapsed Time	✓	✓	✓	✓	✓	✓		
Switch Supervisory Network Number								

TABLE A (Contd)

AMA CALL RECORD DATA FIELDS ASSOCIATED WITH EACH CALL TYPE CALL CODE

DATA FIELDS AA or AB	CALL TYPE CODE 001 (DETAILED MR)		CALL TYPE CODE 002 (BULK-BILLED MR)				CALL TYPE CODE 009 (DIRECT. ASSIST.)	
Structure Code	00020	00022	00015	00017	00029	00030	00028	00069
Customer Dialed Account Number								
Amount of Charge								
Special Billing Number Type								
Credit Card Failure								
Special Billing Number								
Circuit Time								
Call Status		✓		✓		✓		✓
WATS Indicator	✓	✓	✓	✓	✓	✓		
WATS Band or Type	✓	✓	✓	✓	✓	✓		
WATS Administration								
Customer ID								
Tandem Digits Dialed								
RTA Type								
Screening Code								
SSAS								
Coin Credit Indicator								
SSAS Indicator								
Walkaway or Deposited Amount								
Operator Identification								
Type of Tracer								

TABLE B

NPD FORMS REQUIRED FOR GROWTH AND REARRANGEMENT CONDITIONS ASSOCIATED WITH CDAs

CHANGE	NPD FORMS	NOTES
CHANGES TO AN EXISTING CDA ENTITY		
Add channel	0300, 0301, 0303	
Add line finders	0301	
Remove line finder	0301	Will only affect Form 0301 if the line finder that was removed was assigned to the highest equipped scan port address of CDA multiplexer 0 or 1. If this is not the situation, this unassigned scan port address will be reported daily with the message **REPT CHL UNUSED SCAN PORT** as unused for the previous 24 hours.
Digit absorption characteristics	0207, 0208	
1SR offering	0208, 0300	
Rate structure	0201, 0205, 0208	
Add new central office code	0101, 0201, 0205, 0206, 0207, 0208	If CDA is equipped with ANI-C or ANI-D, a new COI must be assigned to represent this central office code on local calls. This central office code might be a locally dialable call for some other CDA entities served by the AMARC. If so, it may need to be listed in their MBI Tables (Form 0208) and Digit Reconstruction Tables (Form 0207). In a multi-AMARC system, tables for CDA entities served by other AMARCs may be affected.
Add theoretical translation to existing COI	0101, 0201, 0205, 0206, 0207, 0208	
Add thousands and/or hundreds digits to theoretical translation of existing COI	0206	

TABLE B (Contd)

NPD FORMS REQUIRED FOR GROWTH AND REARRANGEMENT CONDITIONS ASSOCIATED WITH CDAs

CHANGE	NPD FORMS	NOTES
ADDITION OF CDA ENTITY		
Add CDA entity to AMARC	0100	If this is the first CDA entity to be served by the AMARC, the entries for the message rate and input entry format must be changed. Also, if this is the first CDA and no 3ESSs are served, a detailed billing option must be specified.
	0101, 0300	Revised copies required to show new entity and channel assignments.
	0103	Required only if the data channels added for the new entity are on multiplexers that were previously unequipped.
	0201, 0203, 0208	Required for all CDAs.
	0205, 0206	Required if the entity has any theoretical central office codes.
	0207	Required if the step-by-step office is equipped with digit absorbing selectors.
	0208	Required if the message rate charging plan for all CDAs and 3ESSs served by the AMARC is MMU.
	0301, 0303	Revised copies or new forms (if this is the first CDA served by the AMARC).
	0400	Revised copy or new form (if CDA, or 3ESSs not served previously by the AMARC).
REMOVAL OF CDA ENTITY AND ASSOCIATED CHANNELS		
Remove CDA entity and associated channels	Same forms as listed for addition of CDA entity	

TABLE B (Contd)

NPD FORMS REQUIRED FOR GROWTH AND REARRANGEMENT CONDITIONS ASSOCIATED WITH CDAs

CHANGE	NPD FORMS	NOTES
CHANGE CDA CHARACTERISTICS		
Change detailed billing option for all CDAs and 3ESSs served by the AMARC	0100	Revised to show new charging plan.
Change message rate charging plan for all CDA entities served by the AMARC from SMU to MMU	0100	Revised to show new charging plan.
	0207, 0208	Required for all CDAs when charging plan is MMU.