FEATURE DOCUMENT
CHARGING ARRANGEMENTS
NO. 2 ELECTRONIC SWITCHING SYSTEM

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FEATURE DEFINITION AND DESCRIPTION

1. DEFINITION/INTRODUCTION

DEFINITION

1.01 Charging arrangements are those methods by which the telephone company (and in certain cases the telephone user) can measure, record, or collect charges incurred by individual and coin stations for telephone usage. The various charging methods used in No. 2 Electronic Switching System (ESS) are as follows:

- Coin Telephone Charging
- Local Automatic Message Accounting
- Centralized Automatic Message Accounting
- Traffic Service Position (System)
- Message Register Charging.

1.02 Coin telephone charging is telephone service provided by a coin telephone arranged to accept the deposit of a coin (or coins) at some time during the course of a chargeable call.

1.03 Local Automatic Message Accounting (LAMA) is a method of automatically recording on magnetic tape certain telephone call information on calls being processed by the local office. The recorded information is used by a Revenue Accounting Office (RAO) computer to prepare customer bills and perform special studies for the operating company. The calling party's billing number may be recorded on the LAMA tape. That billing number is usually the same as the calling party's directory number, but need not be.

1.04 Centralized Automatic Message Accounting (CAMA) is a means of recording telephone call details on paper or magnetic tape at a tandem office (typically crossbar tandem). The local office connects to this office via outgoing trunks. When the local office has automatic number identification (ANI), the local office outpulses the billing number and other call information to the CAMA office for recording on AMA tape. Alternately, the CAMA office may be arranged for operator number identification (ONI) whereby an operator is connected to obtain the billing information verbally and to key it into the CAMA office.

1.05 Traffic Service Position (System) TSP/TSPS is a switching system interposed between local and tandem offices that provides various operator services and also records billing information for customer dialed noncoin calls that require operator assistance. If the local office has ANI, the local office outpulses the billing number and other call information; and an AMA recorder within the TSP/TSPS control unit records call details in a manner similar to LAMA. If ONI or special billing is required, an operator is connected to verbally obtain the billing information and to key it into the TSP/TSPS office.

1.06 Message register charging is a method whereby each completed call made by a line with message register service increments a mechanical register by an amount determined by the length of the call and the called number. This register may be either at the central office or the customer's premises (or both).

INTRODUCTION

1.07 This section describes the various types of charging as used in the No. 2 ESS. In addition to providing standard billing information, charging arrangements include means of gathering call data used in statistical studies by the customer, in planning and administering the telephone system (such as centrex tie trunk network), or other uses not directly involved in preparing customer bills.

1.08 Various types of calls resulting in charging are covered in detail in other sections. These sections are referenced in Part 19. Certain aspects of charging not covered in other sections are treated in detail here. Figure 1 is a diagram showing various methods of charging in No. 2 ESS for various types of calls and how they relate to each other and to other documents.

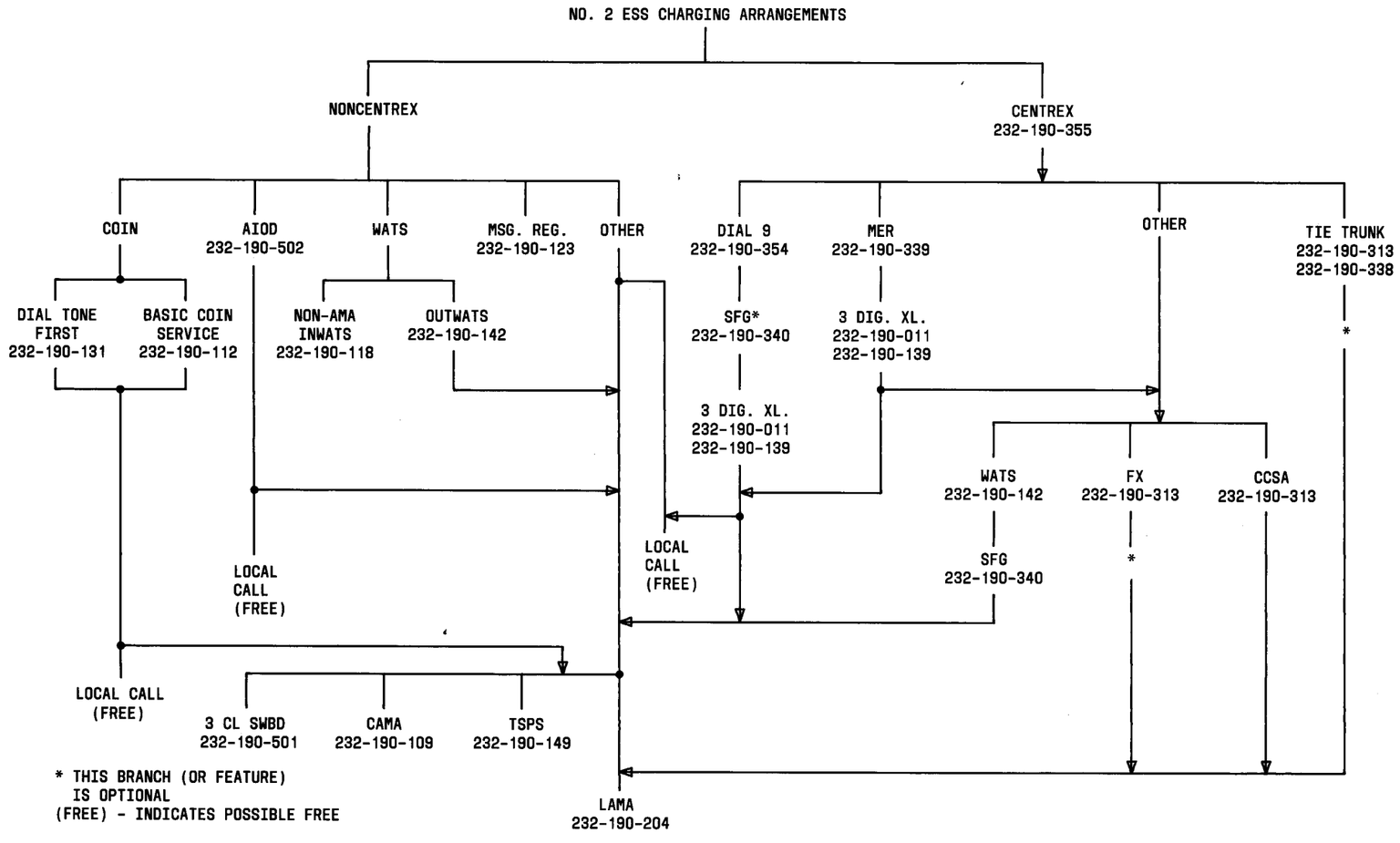

Fig. 1—No. 2 ESS Charging Methods

2. USER PERSPECTIVE

CUSTOMER

2.01 Depending on the customer's class of service, the charging method in No. 2 ESS varies widely. Table A lists the methods of charging for the various classes of service in No. 2 ESS.

TABLE A

CHARGING METHODS

CLASS OF SERVICE OR TYPE OF CALL	METHODS OF CHARGING
COIN	DIRECT DEPOSIT OF COIN(S) IN COIN TELEPHONE, CAMA, 3CL, TSPS*
RESIDENCE	LAMA, CAMA, TSPS, MESSAGE REGISTER, 3CL*
BUSINESS, PBX, MLHG, CENTREX VIA AIOD	LAMA, CAMA, TSPS, MESSAGE REGISTER, 3CL*
CENTREX-CO DIAL "9" WATS, MER WATS CCSA, MER CCSA FX, TIE TRUNK	 LAMA, CAMA, TSPS, 3CL* LAMA, CAMA, TSPS LAMA LAMA IS OPTIONAL
OUTWATS INWATS	LAMA INWATS METER

* Also credit card, third party, etc.

2.02 Customer billing in all cases is not always done to the calling line's directory number, but to the calling line's billing number. That billing number is usually the same as the calling party's directory number, but need not be. If desired, several directory numbers can have the same billing number.

Coin Charging

2.03 Customers using a coin telephone set are charged by the direct deposit of coins in a coin telephone. Charges are divided into initial rate, overtime rate, and toll charges. The initial rate is applied at the beginning of the call and is deposited by the customer before the conversation begins. An overtime rate may be applied after the initial period elapses. The customer is requested to deposit the overtime charge by either a recorded announcement or an operator. Toll charges are always requested by an operator unless the call is charged to a credit card, a third party, or is collect. (In this case, the operator manually enters the billing information.) An initial toll charge is requested before conversation begins and any overtime charge is collected at the end of the conversation.

2.04 Coin calls to certain free numbers (e.g., 911, 411, "dial 0") may be made without the deposit of an initial rate if the office is equipped with the Dial-Tone-First (DTF) feature. If the call is to a free number, and the office does not have DTF, the initial deposit is returned depending on local operating company option, either at the beginning of the call or at the end of the call.

2.05 Refer to items 1 and 2 of Part 19 of this document for coin charging details.

LAMA Charging

2.06 If the office is equipped with LAMA, a customer may dial a station-to-station charged call with the details of the call (billing number, called number, answer and disconnect time) automatically recorded on magnetic tape at the No. 2 ESS. This tape is removed from the AMA tape transport periodically and processed at a revenue accounting office.

2.07 Not all LAMA calls are "toll" calls. Extended area service, common control switching arrangement (CCSA), tie, foreign exchange (FX), etc., also use LAMA for billing purposes. Bulk billing can be provided via LAMA. Except for complaint observing purposes, LAMA does not apply to coin calls.

2.08 Refer to item 4 of Part 19 of this document for LAMA charging details.

CAMA and TSPS Charging

2.09 In offices not equipped with LAMA or for special types of toll calls such as person-to-person, collect, credit card, and charge to third party, charging may be done via a CAMA or TSPS office. This method allows the customer to dial the called number and the call is routed directly to the CAMA or TSPS office. When the No. 2 ESS is arranged to pulse forward the billing number and class information along with the called number, and no operator assistance is required, this information is recorded on the AMA tape in the respective CAMA or TSPS office and the call is forwarded through the network. If the calling party is not identifiable (e.g., a multiparty line) or the call is a special toll call, an operator is temporarily connected. In a CAMA office, the operator verbally obtains the billing information from the calling party, enters it into the CAMA office with a keyset, and allows the call to complete through the network. In a TSPS office, this information may be verbally obtained, displayed on the operator's console, and/or recorded on the AMA tape at the TSPS as appropriate. The call is then allowed to complete through the network via the tandem office associated with the TSPS.

2.10 Refer to items 5 and 6 of Part 19 of this document for CAMA and TSPS charging details.

Message Register Charging

2.11 When a customer with a line equipped with a message register completes a chargeable call, the message register is incremented. This register may be incremented either on a per-call basis or in units of time. Also, several lines can peg the same message register if the customer so desires. It may be used as a means of providing measured rate service when an office is not equipped with LAMA. The register may also be located on the customer's premises (hotel/motel service). In this case, the message register is used to provide the customer with charge information about a guest's call immediately on completion of the call. This charge information is used to determine what charges are to be added to the guest's lodging bill.

2.12 Refer to item 3 of Part 19 of this document for message register charging details.

Centrex Charging

2.13 When a centrex customer dials the central office access code ("dial 9"), they are charged in a similar manner as a noncoin telephone set. Any one of the methods using LAMA, CAMA, or TSPS as explained in previous paragraphs may be used. In addition, if the line is toll restricted, the customer may not place certain calls except through the attendant. In this case, the attendant's billing number is used in charging for the call. Calls made to stations within the same centrex group are not charged. Details of tie trunk and FX calls may be AMA recorded. CCSA calls must be AMA recorded.

2.14 Refer to item 10 of Part 19 for possible billing numbers that can be used for various types of centrex calls.

TELEPHONE COMPANY

2.15 Each type of charging method in noncentrex telephone service is described in detail in its own section. These sections are as follows:

- Section 232-190-112—Basic Coin Service
- Section 232-190-131—Dial-Tone-First
- Section 232-190-123—Message Registers

- Section 232-190-204—Local Automatic Message Accounting
- Section 232-190-109—Centralized Automatic Message Accounting
- Section 232-190-149—Traffic Service Position System

2.16 For charging purposes, all customers can be grouped into three classes. These are coin, measured rate, and all others. The various types of coin charging can be implemented without regard to the type of AMA recording used. However, AMA records of coin calls cannot be made for complaint observing purposes except in a LAMA equipped office.

2.17 For measured rate service in a LAMA office, all chargeable local calls (in addition to toll calls) can be recorded on AMA tape. In addition, mechanical message registers may be provided at the customer's premises (hotel/motel services). In offices without LAMA, all locally charged calls are recorded on message registers. All other charged calls must be routed to CAMA or TSPS.

2.18 All other classes of service that need to be charged are done so by entries on the AMA tape if the office is equipped with LAMA. In non-LAMA offices, toll charging must be done in conjunction with a CAMA or TSPS office. A manual switchboard such as a 3CL may also be used to record billing information.

3. SYSTEM PERSPECTIVE

FEATURE OPERATION

3.01 When a customer originates a chargeable call by removing the handset, dial tone is returned and the call proceeds as a normal call through dialing and outpulsing or ringing. The local charging programs are entered in various stages of the call to charge the call as determined by the charge index. The charge index is an output of the translation programs and is derived from the calling line's class of service (as defined by its line class code) and the 3-digit dialed office code (the charge index can be overridden by the 4-digit translator on local calls) on noncoin calls. At answer recognition, a 700-millisecond charge delay interval is timed before the call is considered a charge call. If either subscriber disconnects before the end of the charge delay period, the call is removed from the system. Once the charge delay period is over and the calling and called subscribers are in the talking state, no further action is needed until recognition of a disconnect.

Coin Charging

3.02 The Local Charge Program is involved three times during the processing of a call. These entries are as follows:

- At the completion of dialing to check the charging information, and if required, to set up timing entries for the various call types.
- After called party answers to activate timing entries.
- After disconnect to conclude charging and to clear any timing entries.

3.03 A customer at a coin station originates a call by removing the handset and depositing a coin (or coins). In the case of dial-tone-first lines, the customer simply removes the handset, waits for dial tone, and makes the required deposit before dialing is complete. A local untimed coin call proceeds as a normal call up to answer detection. This call may be intraoffice or interoffice. If, after answer recognition, either party disconnects before the end of the charge delay period, the coin deposit is returned. At disconnect, the coin deposit is collected.

3.04 Other types of coin charging, coin zone, and coin overtime are discussed in detail in item 1 of Part 19.

Local AMA

3.05 The AMA equipment in the local No. 2 ESS office provides an automatic recording service for toll calls, coin calls, and message rate calls. Also, FX and tie trunk calls can be AMA recorded, and CCSA and WATS calls must be AMA recorded. The AMA program assembles the AMA data to be recorded during the progress of an AMA recorded call and packs the data in a call store buffer. This AMA program also unloads the buffer during the input-output 25-millisecond interrupt (IO25) and transmits the entries to the AMA frame for recording on a 9-track magnetic tape recorder. The recorded tape is periodically replaced and sent to a regional

accounting center for processing individual customer bills. A multientry format is used in No. 2 ESS. This format is similar to the No. 5 crossbar in which ***initial, answer,*** and ***disconnect*** entries are made at appropriate stages in the progress of a call. During the processing of calls, AMA recorded information is placed in an AMA buffer in the No. 2 ESS call store. The data is placed in the AMA buffer by the ***base level program*** as it becomes available. The AMA ***interrupt level program*** transfers the data out of the buffer to magnetic tape as soon as recording is possible. The AMA tape transport operates incrementally, stepping and recording each time data is received from the AMA buffer.

3.06 Automatic Identified Outward Dialing (AIOD) permits stations at a PBX to dial chargeable calls and have their station numbers recorded by LAMA. When a station using AIOD originates a call, automatic number identification (ANI) equipment at the customer's premises identifies the station number and the trunk/line over which the call is connected to the central office. The station and trunk number are transmitted to the central office AIOD equipment early in the call. If the customer dials a chargeable call, the number the AIOD received from the ANI equipment is substituted for the group billing number.

Centralized AMA

3.07 With centralized AMA charging, the outgoing call is handled in the same manner as a normal outgoing call except both the called party number and the billing number must be outpulsed. Following routing translations and trunk selection, the called number is outpulsed to the CAMA office using multifrequency pulsing. At this point, the No. 2 ESS waits for an ANI signal (off-hook) from the CAMA office (different from the ANI described in 3.06 in that the ANI described here is a signal which says when to pass information and the other is a method of passing charge information). When this signal is received, the billing number is outpulsed. If the calling party is not identifiable (e.g., a multiparty line) a digit 1 (one) is written into digit position zero at the originating register (OR). This information is outpulsed to the CAMA office and an operator is connected to the calling party via the CAMA trunk. The operator verbally obtains the billing number from the calling party, enters it into the CAMA office with a keyset and allows the call to complete.

Traffic Service Position System (TSPS)

3.08 Calls routed to a TSPS are handled in a manner similar to CAMA. Both the called number and the billing number are outpulsed to the TSPS when the No. 2 ESS has automatically identified the calling line. When the calling party cannot be identified because of the type of service (e.g., multiparty), the operator verbally identifies the party and keys the billing number into the TSPS. The format No. 2 ESS uses when outpulsing information to the TSPS is shown in item 6 of Part 19. Billing information is recorded on the AMA tape transport at the TSPS.

Message Register Charging

3.09 On message register lines, a peripheral decoder point and a peripheral decoder applique circuit are associated with the customer's line in translations. This point is wired to a mechanical message register either in the central office or at the customer's premises (or both). When the calling line originates a call, the call is processed in the normal manner until the called party answers. A pulse is sent through the input-output control to the central pulse distributor (CPD) which addresses the proper peripheral decoder (PD) point and sends the pulse to it. The PD then causes the appropriate relay to operate in a particular peripheral decoder applique circuit. When this relay operates, -48 volts (typically) is applied to the message register via a control pair. This causes the register to increment one message unit. This process is repeated until all message units (either one per call or one for each unit of time) for the initial charge are shown on the register.

3.10 If the customer has untimed message unit charging, the register is only incremented once per call. Otherwise, the register is incremented once for each unit of time that is equivalent to one message unit. The initial time period is an operating company option and can range from 0 to 6 minutes. This time period can be equal to 0 to 14 message units. In the case of a timed call, an overtime period can be charged in a similar manner to the initial period.

Centrex Charging

3.11 Centrex stations can be arranged to bill outgoing chargeable calls directly using the No. 2 ESS LAMA feature. When a centrex station

originates a chargeable call, the No. 2 ESS obtains the billing number from the appropriate translator and makes it available to the AMA programs. The method of recording AMA data is the same as that covered in 3.05.

3.12 Each station within a centrex group may be arranged to have a billing number that is the same as its directory number, to have a billing number distinct from its directory number, or to have a billing number which is contained in the centrex group translator. This centrex group billing number may be shared by various parties in the customer group. The No. 2 ESS enters the appropriate billing number on the AMA tape during the initial entry.

3.13 Centrex stations using simulated facilities to access dial 9 or WATS may have calls placed via these facilities recorded using a separate number assigned to the simulated facilities group. (This billing number associated with the simulated facilities group is commonly used for WATS and is seldom used for central office access.) When a station originates a call using simulated facilities, the No. 2 ESS looks in the simulated facilities translations to determine if a group billing number exist for the facility dialed. This number is used in place of the station's billing number on the AMA tape.

3.14 Incoming tie trunks in a centrex group can originate dial 9, WATS, and other kinds of calls which require billing numbers. The billing number for a tie trunk group can be associated with the trunk group or the centrex group.

SOFTWARE DATA STRUCTURES

3.15 Software for the charging function is provided in the generic program and in the translation memory area. Any current issue of any generic program can provide basic charging functions. The EF-1 or later generic program is needed for centrex charging arrangements. Translations areas that must be considered when implementing this feature are as follows:

- General Information Table (ESS Form 2500)
- Line Translations (ESS Forms 2100, 2101, 2102)
- Charge Tables (ESS Form 2302)
- Rate and Route Table (ESS Form 2301)
- Line Class Code Table (ESS Form 2306)

3.16 Figure 2 shows the interrelation of translation data involved in the charging function for a centrex or noncentrex call. As an aid to understanding the translation process, the flow in Figure 2 is presented from the point of view of the translations forms rather than the actual structure of translations in program store. For actual word layouts in program store concerning charging, refer to item 20 of Part 19 of this document. Specific details for providing translation data are given in Part 12 of this section.

FEATURE ATTRIBUTES

4. APPLICABILITY

4.01 Charging is provided on a per-customer and per-system basis.

4.02 Charging may be applied to all classes of service. Customers with flat rate telephone service may be billed for calls outside their free calling area even though their monthly rate is a fixed amount.

5. LIMITATIONS AND RESTRICTIONS

5.01 Refer to the appropriate section for limitations and restrictions on the various types of charging arrangements. These sections are listed in Parts 2 and 19 of this document.

6. COMPATIBILITY AND INTERACTIONS

6.01 The Charging Arrangements feature is compatible with all other No. 2 ESS features.

6.02 This feature is an inherent part of the No. 2 ESS system and therefore interacts with any other feature where charging and routing must be determined.

7. COST FACTORS

7.01 Cost for the various methods of charging may be determined by referring to the sections listed in Part 19 of this document.

8. AVAILABILITY

8.01 All charging arrangements discussed in this section except the centrex features are available in any current issue of the generic program. Centrex charging arrangements are available only in EF-1 and later generics.

CONSIDERATIONS FOR INCORPORATION OF FEATURE INTO SYSTEM

9. PLANNING

9.01 Planning is required for message registers, AMA, and accounting center programs. Refer to the sections in Part 19 for planning details of these charging arrangements. All activities for incorporation of the various charging arrangements should be coordinated with all departments involved. Normal schedules should be used for office data administration (ODA) changes.

10. HARDWARE

10.01 Hardware requirements for the various methods of charging may be determined by referring to the sections in Part 19 of this document.

11. DETERMINATION OF QUANTITIES

11.01 For determination of quantities, refer to the Traffic Facilities Practices, Division D, Section 12 and the sections in Part 19 of this document.

12. ASSIGNMENTS AND RECORDS

Assignment Recommendations and Guidelines

12.01 For assignment recommendations and guidelines, refer to the sections in Part 19 of this document.

Input and Record Keeping

12.02 The translation organization required to perform the functions of the Charging Arrangements feature is shown in Figure 2. For referencing actual word layouts in program store concerning charging, refer to item 20 of Part 19 of this document. Changes in these translations may be made through the use of recent change messages or by an ODA run.

12.03 Refer to items 24 and 25 in Part 19 of this document for recent change messages that pertain to charging arrangements.

12.04 When charging arrangements are to be incorporated via an ODA run, the following ESS input forms must be completed and submitted to the Western Electric Regional Data Center. Refer to item 19 of Part 19 of this document for details and other information required to complete these forms.

FORMS	TITLE
2100	Directory Number Table
2101	Centrex Directory Number Table
2301	Rate and Route Table
2302	Charge Tables
2306	Line Class Code Table
2500	General Information Table

Uniform Service Order Codes

12.05 Refer to item 23 of Part 19 of this document for the different codes that may be used.

13. NEW INSTALLATION AND GROWTH

13.01 Refer to the sections in Part 19 for information on new installations and growth procedures.

14. TESTING

14.01 Refer to the sections in Part 19 for information pertaining to the testing of any one type of charging arrangement.

15. MEASUREMENTS

15.01 Measurements relating to charging arrangements can be found in the sections listed in Part 19 of this document.

16. CHARGING

16.01 Tariffs for the charging arrangements described in this document are an operating

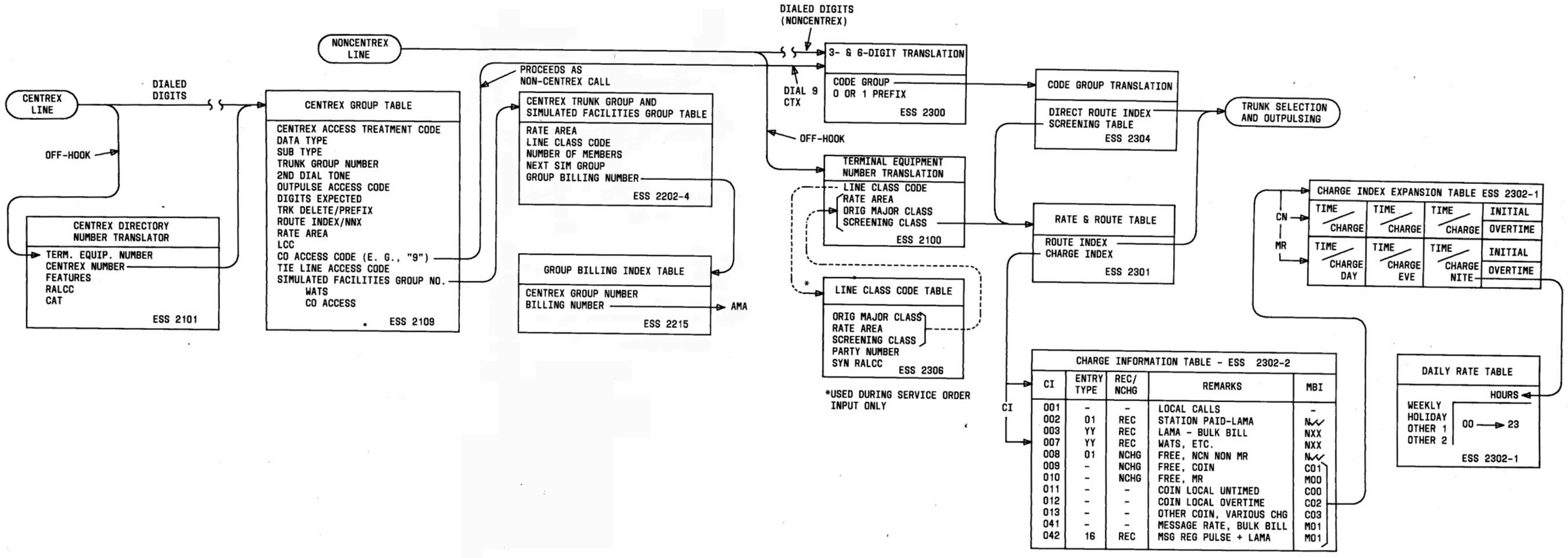

Fig. 2—Translation Forms Related to Charging

company option and are subject to state and federal tariff regulation.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

17.01 Refer to item 18 of Part 19 of this document to identify terms used in this document.

18. REASONS FOR REISSUE

18.01 This is the initial issue of this document.

19. REFERENCES

19.01 The following documents may be referenced for supplementary information concerning the Charging Arrangements feature.

(1) Section 232-190-112—Basic Coin Service

(2) Section 232-190-131—Dial-Tone-First

(3) Section 232-190-123—Message Registers

(4) Section 232-190-204—Local Automatic Message Accounting

(5) Section 232-190-109—Centralized Automatic Message Accounting

(6) Section 232-190-149—Traffic Service Position System

(7) Section 232-190-142—Outward Wide Area Telecommunications Service

(8) Section 232-190-118—Inward Wide Area Telecommunications Service

(9) Section 232-190-339—Most Economical Routing

(10) Section 232-190-355—Centrex Billing

(11) Section 232-190-502—Automatic Identified Outward Dialing (AIOD)

(12) Section 232-190-354—Direct Outward Dialing

(13) Section 232-190-313—Centrex Group Trunk Facilities

(14) Section 232-190-338—Tandem Tie Trunk Dialing

(15) Section 232-190-340—Simulated Facilities

(16) Section 232-190-011—Call Routing

(17) Section 232-190-139—Toll Diversion and Toll Restriction

(18) Section 232-190-003—Glossary of Terms for No. 2 ESS Feature Documents

(19) Translation Guide, TG-2H

(20) PA-2H2XX—Office Data Tables Layout Specification

(21) PD, PR, PF-2H218—Local Charging Program

(22) Traffic Facilities Practices, Division D, Section 12

(23) The USOC (Uniform Service Order Code) Manual, Issued by AT&T.

(24) IM-2H2XX—No. 2 ESS Input Message Manual

(25) OM-2H2XX—No. 2 ESS Output Message Manual