

FEATURE DOCUMENT
MESSAGE REGISTERS
NO. 3 ELECTRONIC SWITCHING SYSTEM

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NOTICE

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FEATURE DEFINITION AND DESCRIPTION**1. DEFINITION**

1.01 The message register feature is used to provide the customer with charge information immediately upon completion of a message-rate call. The customer is then billed on a monthly basis for all message-rate calls. Private branch exchange (PBX) customers, such as hotels, motels, hospitals, and other business customers are the primary users of this feature; however, the feature can be used on any line. The feature enables the hotel, motel, or hospital to charge its customers individually for their message-rate calls without having to wait for the monthly bill.

1.02 Hardware message registers (14 type) are located on the customer's premises which provide the charge information (in terms of message units) used to compute the actual charge of the individual message-rate call. The No. 3 Electronic Switching System (ESS) contains a software message register (comprised of electronic memory components rather than mechanical counters) which accumulates message units for the incoming PBX trunk or the individual line. In the case of a PBX, the accumulation would represent the total number of message units collected by all PBX members. The contents of the message registers are read out daily and are recorded by a local or remote teletype machine. This printout may be at either 10 or 120 characters per second.

1.03 The message register feature is available for all No. 3 ESS systems. To implement the feature into an existing No. 3 ESS, some software assignments must be made through the use of recent change and reallocation messages. The 14-type hardware message registers must be installed on the customer's premises. For a PBX, there must be one hardware message register for each PBX station with one pair of control wires per line provided between the customer's premises and the No. 3 ESS. This pair is used to increment the hardware message registers. The software message registers are provided on a per-line basis by the No. 3 ESS.

2. DESCRIPTION**A. Customer (User) Perspective**

2.01 The customer (user) is not required to perform any special procedures to activate

the feature. The customer dials the call just like any other local call. When the call has been completed, the customer can read the hardware message register and subtract the previous reading from the present reading in order to determine the total number of message units to be paid for. In the case of a hotel, motel, or hospital, the hardware registers may be located in an office area instead of the individual rooms and are inspected by the employees rather than the guests. The number of message units is then computed with the cost per message unit (obtained from the operating company's business office) to determine the charge for the call. This charge, plus a surcharge (if any), may then be added to the guest's lodging or hospital bill.

B. System Implementation**Software Operations**

2.02 When a customer with the message register feature goes off-hook, it is recognized by ferrod saturation in the line scanner, and call processing begins with the selection of a transient call record (TCR) which will monitor the progress of the call. At this point the scan point number is translated to determine the identity of the calling line. If the calling line is a PBX (such as a hotel, motel, or hospital), PBX group and member translations must be performed in order to obtain the calling line's originating major class and screening class.

2.03 If the calling line is not from a PBX, further *line* translation must be performed to determine the originating major class and screening class.

2.04 At this time, dial tone is returned to the customer and a customer dial pulse receiver (CDPR) is connected to the customer's line. When the first three dialed digits have been collected in the TCR, the 3-digit translation program examines them and furnishes an associated code index. The code index is expanded to furnish a screening table address and a direct route index. The screening table then provides a charge index and a route index. The charge index is stored in the terminal memory record (TMR) to be used later.

2.05 The route index expansion is performed next to determine the destination of the call. If the route index expansion is a type 1, the call is recognized as an intraoffice call and the 4-digit

translation program must be utilized in order to identify the called line and complete the talk path. Route index expansion types 2 through 7 indicate various types of interoffice calls. The route index expansions for these types of calls also contain trunk group, outpulsing, and other information required to route the call to the distant office so the talk path can be completed there.

2.06 When the talk path is completed, ringing is applied to the called line and audible ringing is returned to the calling line. Normally, when the called line answers, the TCR is released and the TMR is used to hold information pertaining to the stable call; however, when charging is required, a 750-ms waiting period must expire to verify that the called party *has* actually answered. At this time, the charge index is retrieved from the TMR and is translated in order to access the charge table. The charge table contains the charging information (in message units) required to increment the software and hardware message registers for initial time periods and overtime periods (when required). The charging information in this table will be as follows:

- Type=10 (indicating message rate charging)
- Time=0 (indicating local untimed message rate) or
- Time=1 through 7 minutes (timed message rate-initial time or overtime)
- Charge=1 through 15 message units (for timed or untimed message rate).

After the delay period, the hardware and software message registers are incremented to reflect the number of message units to be charged for the initial time period. This charging information is retrieved from the charge table. Also the initial time period, in minutes, is retrieved from the charge table so that timing can begin. If the initial time period is listed as 0 minutes, the call is identified as an untimed message-rate call and no overtime charging or timing (for initial time or overtime) is required. At this point the call is considered stable and the TCR is released. The timing bit in the TMR is set to 0, indicating untimed message rate, and supervision for on-hook is begun.

2.07 If the initial time in the charge table is listed as being between one and seven minutes

inclusive, the call is identified as a timed message-rate call. The call is now considered stable, the timing bit in the TMR is set to 1 (indicating a timed message-rate call), timing of the initial period is begun, and the TCR is released.

2.08 Supervision is maintained during the initial timing period. If the call is completed and on-hook occurs before the period ends, a TCR will be selected to begin the normal disconnect process. If the initial time expires and the call is still stable, a TCR will be selected to charge for the overtime period. The hardware and software message registers are then incremented to reflect the message units charged for the overtime period (the message unit charge and length of the overtime period are retrieved from the charge table). The TMR is then set to time the overtime period, the call is made stable, and the TCR is released.

2.09 Supervision is continued during the overtime period to recognize when the call is completed. If on-hook occurs before the end of the overtime period, a TCR will be selected to begin the normal disconnect process. If the overtime period expires and on-hook has not yet occurred, a second overtime period is required. The second overtime period is processed identically to the first, and additional overtime periods are processed, if necessary, until on-hook occurs. At that time, the normal disconnect procedures will be followed.

Hardware Operations

2.10 The on-line 3A Central Control (3A CC) continually interrogates the line scanner through the frame input-output controller (FIOC) to determine the status of the customer's line. When the customer goes off-hook, the 3A CC performs the call processing through the use of the translation procedures previously described. When the called line answers, the 3A CC increments the software message register to reflect charges for the initial time period. A pulse is sent through the FIOC to the peripheral pulse distributor (PPD) which addresses the proper peripheral decoder (PD) and sends the pulse to it. The PD then causes the appropriate relay to operate in a particular distribute point applique circuit. When this relay operates, -48 volts is applied to the hardware message register via the control wires. This causes the hardware message register to increment one message unit. This process is repeated until all message units for the initial charge are shown on

the hardware message register. When the initial period has ended, a similar procedure is performed to increment the software and hardware registers for the overtime periods (if required). A block diagram showing the message register circuit is shown in Figure 1.

3. FEATURE FLOW DIAGRAM

3.01 A feature flow diagram explaining the functional operation of the message register feature is shown in Figure 2.

4. INTERACTIONS

4.01 No interaction problems exist between this feature and other features.

ATTRIBUTES

5. STATION/SYSTEM

5.01 A software message register is provided for each line of the No. 3 ESS. Distribute

point applique circuits are provided to operate approximately 200 hardware message registers.

6. LIMITATIONS

6.01 Although the software message registers are available for all lines, the distribute point applique circuits (used to control the hardware message registers) are available for about only 200 lines. This does not necessarily mean that only 200 hardware message registers can be controlled by the No. 3 ESS. A PBX may have numerous hardware message registers and only a few outgoing lines into the No. 3 ESS. Each of these lines will have a distribute point applique circuit associated with it to control the hardware message registers. The PBX receives the message unit accumulation from the distribute point applique circuit via the control wires as previously mentioned. The PBX then determines which of its members is currently using the outgoing line and routes the message unit accumulation to the appropriate hardware message register.

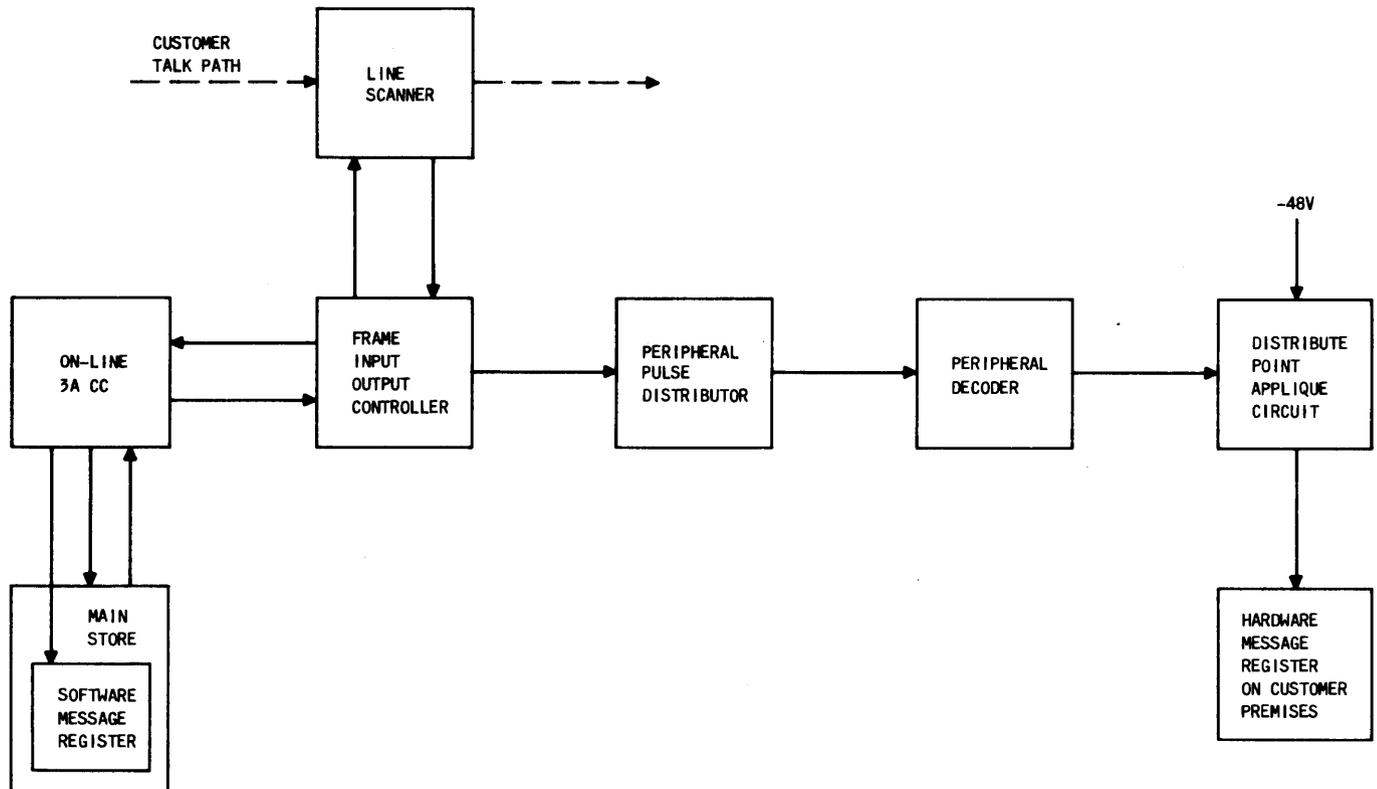


Fig. 1—Block Diagram of Message Register Circuit

7. RESTRICTION CAPABILITY

7.01 The customer must have the hardware message registers and the control pair in order to use this feature; however, the feature can be restricted from customers *having* the required hardware through use of a recent change message. The format for recent change message RC:LINE is used to restrict the feature from an individual line. In order to remove the distributor point so that the hardware message registers are not incremented, the DPM NO keyword is used with the RC:LINE message.

7.02 To restrict the feature from a PBX line, the recent change format RC:MLHG must be used. The DPM NO keyword is used with this message to remove the distributor point.

8. COST DATA

8.01 Each line having the message register feature requires two program store words for the hardware message register and one temporary store word for the software message register. In terms of hardware, one hardware message register is required for an individual line or one hardware register is required for each PBX member. Also, one control pair and a distribute point applique circuit are required for each line using the message register feature.

INCORPORATION INTO SYSTEM

9. PLANNING

9.01 Care should be taken to insure that adequate storage area is available for translation. Refer to COST DATA for detailed usage.

10. HARDWARE ENGINEERING

10.01 Adequate distribute point applique circuits must be reserved to provide pulse distribution to the hardware message registers. The No. 14-type hardware message registers must be installed along with the control pair associated with the individual line or outgoing PBX line.

11. SOFTWARE ENGINEERING

11.01 No additional engineering is required for software message registers.

12. COMPATIBILITY

12.01 The -48 volts dc required to operate the No. 14-type hardware message registers is switched directly through the distribute point applique circuit. No external relays are required to operate the hardware message registers.

13. OFFICE DATA

13.01 The translation organization required to perform the functions of the message register feature is shown in Figure 3. Recent change messages associated with the translation layouts are as follows:

RC:CHI This message format is used to input the charge index, identify a call as a message rate call, and change the charging information (identifying the call as timed or untimed message rate and providing time and message unit charging requirements for initial and overtime periods).

RC:LCC This format is used to input the line class index, the line class code, the rate area, the originating and terminating major classes, the screening class, and the party number.

RC:LINE This message is used to specify a line class code, rate area, bill-to number, distributor triplet address, terminal equipment number, and scan point number for a particular line. Information pertinent to other features is also specified by this message.

RC:SCR Used to input screening class, screening table, route index, and charge index identities.

RC:MTL Used to specify line class code, rate area, distributor triplet address for message registers, bill-to number and terminal equipment number for a particular line within a multiline hunt group (for PBX). Information pertinent to other

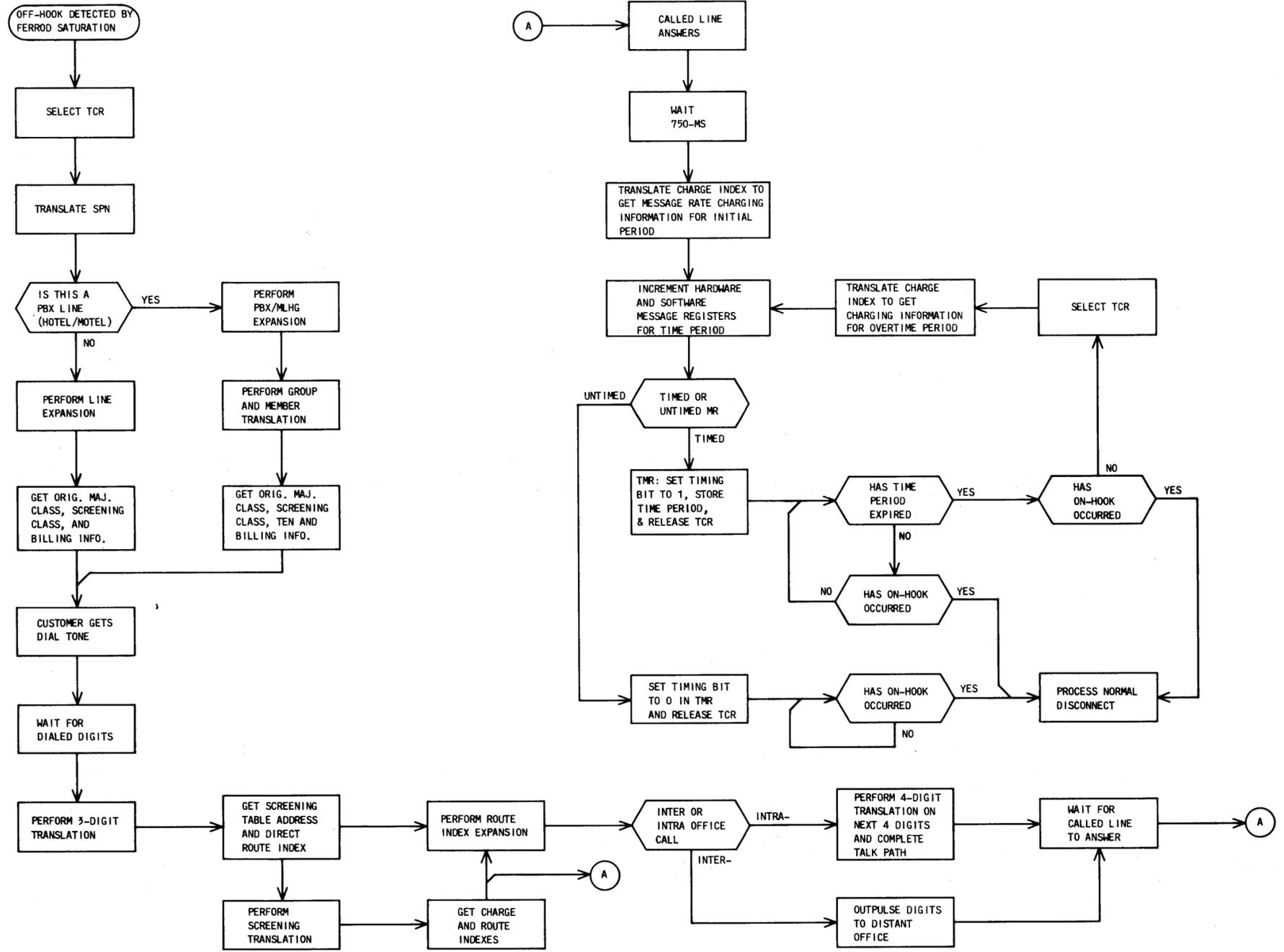


Fig. 2—Message Register Flow Diagram

features is also specified by this message.

RC:MLHG Used to specify line class code, rate area, bill-to number, and group number for a multiline hunt group. Information pertinent to other features is also specified by this message.

RC:TWOPTY Used to specify line class code, rate area, distributor triplet address (for hardware message register), scan point number, and party number for a 2-party line.

Refer to the Input Message Manual (IM-3H000) for further details on these recent change messages.

13.02 For the initial Office Data Administration (ODA) run, the following forms must be completed and submitted to the WEC0 Regional Data Center.

Form ESS 3105-1 Multiline Hunting Group Table is used to assign PBX lines to a group and to assign the rate area, line class code, and the billing number to the group.

Form ESS 3107 Supplementary Information Table is used to assign the distributor triplet address for the hardware message register and the billing number to each member within a multiline hunt group.

Form ESS 3300 Three-and Six-Digit Translation Table is the starting point for establishing routing and the subsequent treatment for all 3- and 6- digit NNX and NPA codes. This form provides a sequential listing of all dialable codes and provides the initial code reduction when all codes of similar treatment are assigned into code groups.

Form ESS 3301 Rate and Route Table is used to construct the screening tables by providing the proper charge and route indexes for each screening class.

Form ESS 3302 Charge Table is used to assign the time periods and message units for initial and overtime periods.

Form ESS 3303-2 Route Index Expansion Table is used to assign the call type, outgoing trunk identification, the type of outpulsing to be used, and the alternate route index to each route index.

Form ESS 3304 Code Index Table is used to construct the code index expansion by assigning the screening table and the direct route index to each code index.

Form ESS 3306 Line Class Code Table is used to relate various combinations of line class code, rate area, and party number to the originating and terminating major class combinations.

14. GROWTH/RETROFIT PROCEDURES

14.01 In order to add, change, or delete the message register feature for a line or PBX line, the appropriate recent change messages described in OFFICE DATA must be employed. The forms should be completed only in the case of the initial ODA run.

15. TESTING

15.01 The following verification messages are used to verify the proper assignment of this feature: VER:GRP and VER:LINE.

ADMINISTRATION

16. MEASUREMENTS

16.01 This part is not applicable to the message register feature.

17. RECORD KEEPING

17.01 If an ODA run was made to incorporate the feature, the resulting output forms should be retained as part of the office records. Records for trouble reports and maintenance should be kept in accordance with local procedures.

18. CHARGING

18.01 Charging is done as described in parts 1 and 2 of this section.

AVAILABILITY

19. NEW INSTALLATIONS

19.01 The message register feature is available in the Small Office-1 (SO1) generic program.

20. GROWTH/RETROFIT

20.01 The message register feature may be added to any existing No. 3 ESS.

SUPPLEMENTARY INFORMATION

21. GLOSSARY

21.01 The following list identifies terms used in this section that may be unfamiliar to the reader.

3A Central Control (3A CC)—A high-speed processor that serves as the controlling element of a No. 3 ESS.

Ferrod Sensor—A current sensing device used in scanners to detect the status of a unit or circuit.

Interoffice Call—A call involving two or more switching offices to establish a talk path.

Intraoffice Call—A call connection involving two subscribers assigned to the same switching office.

Line—Any connection to a network terminal that is not classified as a trunk or service circuit.

Main Store—The storage unit of the control unit that stores the system program and provides memory for system operation.

Off-Hook—The condition that indicates the active state (closed loop) of a line, trunk or service circuit.

On-Hook—The condition that indicates the idle state (open loop) of a line, trunk or service circuit.

Translation—The conversion of information from one form to another; in ESS for example, conversion of dialed digits into routing and terminating information.

22. REASONS FOR REISSUE

22.01 This is the initial issue of this section.

23. REFERENCES

23.01 The following documents may be referred to for supplementary information concerning operations relating to the Message Register feature:

Bell System Practices

233-121-105 Pulse Distributor and Peripheral Decoders

966-210-100 No. 3 ESS General Description

233-125-205 Pulse Distributor and Peripheral Decoders

233-151-105 Call Processing

233-151-120 Charging

233-151-150 Translations

Feature Documents

233-190-010 System Description No. 3 Electronic Switching System

233-190-101 Charging Arrangements

Other Related Documents

SD-3H911-01—Distribute Point Applique Circuit

PR-3H161-01—Local Charging

No. 3 ESS-Preliminary Recent Change Input Message Manual IM-3H000

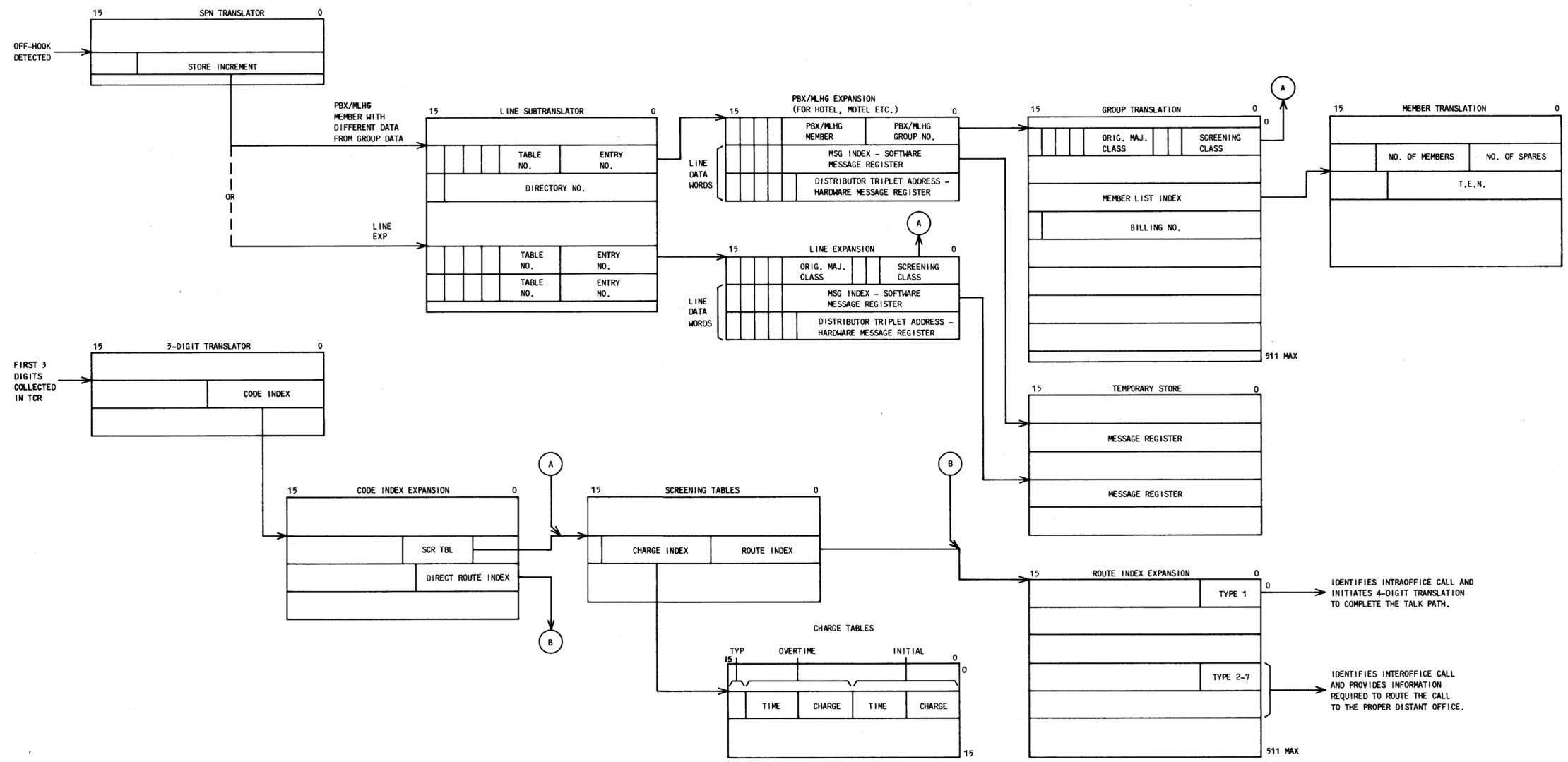


Fig. 3—Message Register Translation Layout