

FEATURE DOCUMENT
MULTILINE HUNT GROUP
NO. 3 ELECTRONIC SWITCHING SYSTEM

CONTENTS	PAGE	CONTENTS	PAGE
<i>INTRODUCTION</i>	3	9. INSTALLATION/ADDITION/DELETION	11
1. GENERAL INFORMATION	3	10. HARDWARE REQUIREMENTS	11
2. DEFINITION	3	11. SOFTWARE REQUIREMENTS	11
<i>DESCRIPTION</i>	5	12. DATA ASSIGNMENTS AND RECORDS	14
3. USER OPERATION	5	13. TESTING	14
4. SYSTEM OPERATION	7	14. OTHER PLANNING TOPICS	14
<i>CHARACTERISTICS</i>	8	<i>ADMINISTRATION</i>	14
5. FEATURE ASSIGNMENT	8	15. MEASUREMENTS	14
6. LIMITATIONS	8	16. CHARGING	14
7. INTERACTIONS	8	<i>SUPPLEMENTARY INFORMATION</i>	19
8. RESTRICTION CAPABILITY	11	17. GLOSSARY	19
<i>INCORPORATION INTO SYSTEM</i>	11	18. REFERENCES	19

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

SECTION 233-190-125

Figures

CONTENTS	PAGE
Fig. 1—No. 3 ESS Multiline Hunt Group Configurations	4
Fig. 2—Example of a Multiline Hunt Group Arrangement	6
Fig. 3—Flow of Calls to a Multiline Hunt Group	9
Fig. 4—Originating Translations for a Multiline Hunt Group (SO-2) . . .	12

Figures

CONTENTS	PAGE
Fig. 5—Terminating Translations for a Multiline Hunt Group (SO-2) . . .	13
Fig. 6—Originating Translations for a Multiline Hunt Group (3E3)	15
Fig. 7—Terminating Translations for a Multiline Hunt Group (3E3) . . .	17

Tables

Table A—Feature Reference	7
--	----------

INTRODUCTION

1. GENERAL INFORMATION

1.01 This document covers the Multiline Hunt Group (MLHG) feature in the No. 3 Electronic Switching System (ESS).

1.02 This feature document is being reissued to include the 3E3 generic program changes in MLHG and to add new information pertaining to earlier generic program issues (SO-2) not previously included in this document. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

1.03 The purpose of the MLHG feature is to provide a method of selecting an idle line from a group in the central office, as distinguished from the term PBX which refers to a type of equipment on the customer premises. In general, a MLHG is associated with a PBX on the customer premises; however, it could be associated with any group of individual lines in the central office.

1.04 The MLHG feature is available to all customers and can be provided with all versions of the No. 3 ESS program.

1.05 The MLHG requires no special hardware except for the optional night stop, stop hunt, and make-busy keys on the customer premises.

1.06 To incorporate multiline hunting into a No. 3 ESS, changes are required in the office translation data. These changes can be made by the recent change mechanism, or in the case of new offices, they can be made by an office data administration (ODA) run.

2. DEFINITION

2.01 The MLHG feature is a customer feature that allows lines to be arranged into a group primarily for the purpose of allowing calls to hunt over a sequential group of lines in an attempt to connect the calling party to an idle line within the group.

2.02 Any group of lines may be arranged into a MLHG. These lines may be regular telephone sets, keysets, CALL DIRECTORS®, PBX lines, etc (Figure 1). A MLHG is assigned primarily for

the purpose of terminating hunting but offers many other features as described in the following text.

2.03 The MLHG feature is used by the No. 3 ESS to provide PBX service. The PBX trunks are recognized and translated as MLHG lines. When calls are placed to a PBX, hunting is done over the trunks from the No. 3 ESS office to the customer's switching system in an attempt to find an idle trunk. The same features are available to these trunks that are available to MLHG lines.

A. Terminating Features

Line Hunting

2.04 In the No. 3 ESS, a MLHG may contain up to 64 member lines. When calls are placed to the MLHG, hunting begins with a member designated by the dialed directory number and progresses sequentially through the hunt list until an idle member is found or the end of the designated list is encountered. If no idle member is found, busy tone is returned to the calling party. A customer may have several hunting lists (possibly overlapping) associated with one MLHG.

2.05 In addition to the normal hunting arrangement, the No. 3 ESS offers three optional features that alter the hunting sequence as follows:

- ***Night Stop***—This feature allows one member of a MLHG to be designated as a night stop number. When a night stop key on the customer premises is operated, the sequential hunt for an idle member begins at member number 00 instead of the first member number and stops when the night stop number is reached or an idle member is found.
- ***Stop Hunt***—This feature is also activated by a key on the customer premises. When the key is activated, the hunt starts at the member assigned to the TN and stops either at the stop hunt member or the specified last hunt member whichever comes first.
- ***Remote Make Busy***—This feature allows a preselected set of members to appear busy to incoming calls. The remote make-busy feature is activated by keys on the customer premises. Each MLHG may have up to

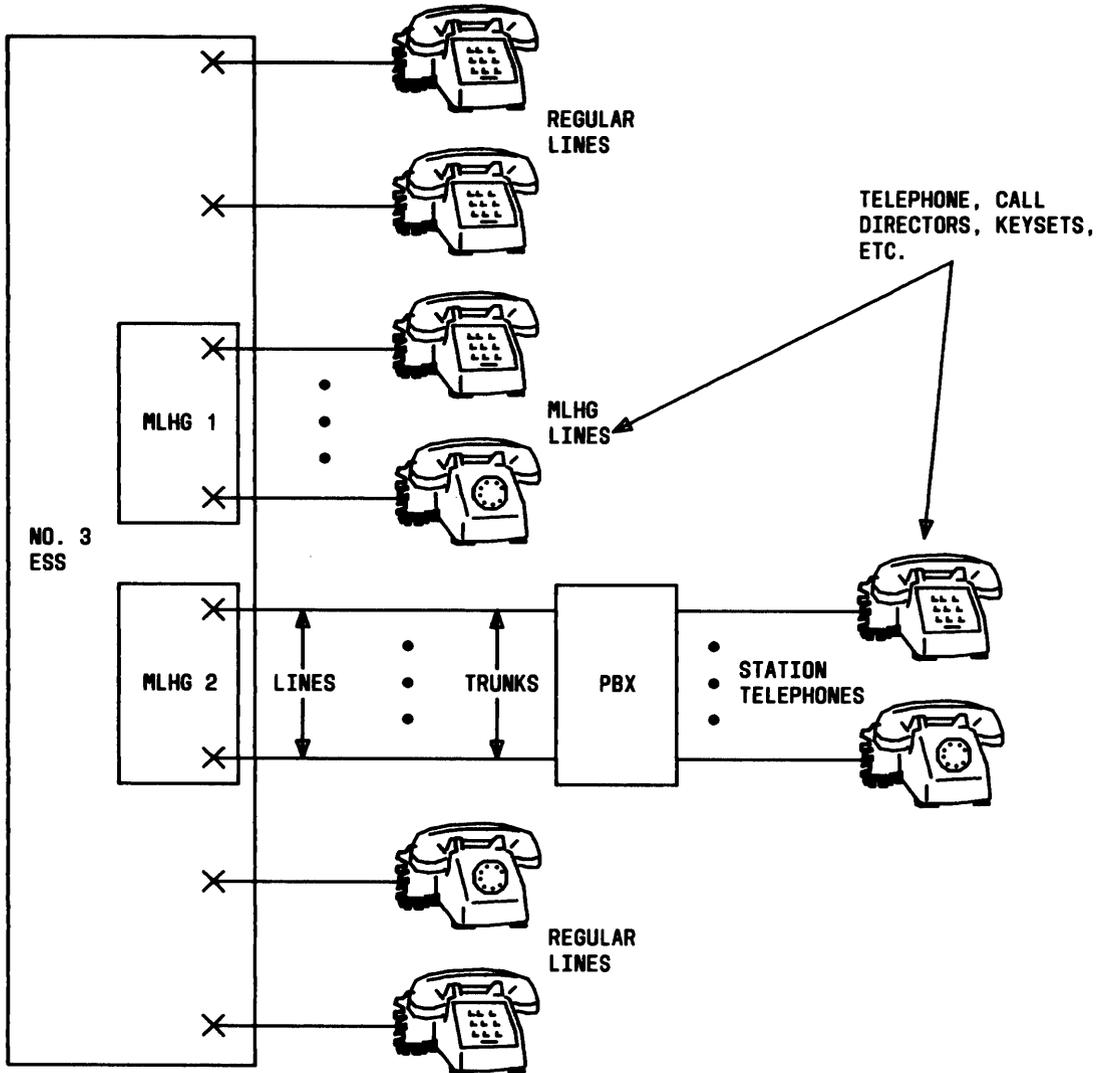


Fig. 1—No. 3 ESS Multiline Hunt Group Configurations

seven keys. Upon operation of a key, all members associated with that key appear busy to incoming calls. Calls can be originated from lines that are made busy.

Call Forwarding

2.06 Call forwarding may be assigned to any member of a MLHG. Forwarding is activated after a member has been selected.

B. Originating Features Applying to All Members

2.07 The following list describes the originating features that may be applied to a MLHG. These features apply to all members of the group.

- **Group Billing Number**—The group billing number allows all members calls to be billed to a single billing number.
- **Special Toll Billing**—This feature allows calls from a MLHG to have QZ billing or operator number identification (ONI).
- **Speed Calling**—A MLHG may have an 8-code or 30-code speed calling list or both an 8-code and 30-code list. These lists apply to all members of the MLHG.
- **Change Speed Calling**—This feature allows all members to change the MLHG speed calling list.

- **Threeway Calling**—Threeway Calling allows members to add a third party to an existing talking connection.
- **TOUCH-TONE® Calling**—All members of a MLHG may be equipped with TOUCH-TONE telephones.
- **Essential Line**—Allows all members of a MLHG to have class A service.
- **Ground Start**—This defines all members of a MLHG as being arranged for ground start operation.

C. Originating Features Applying to Selected Members

2.08 The following list of features may be applied to selected members of a MLHG.

- **Ability to Change Group Speed Calling List**—Selected members can be given the ability to change the MLHG speed calling list.
- **Ground Start**—MLHG lines may be arranged for ground start to accommodate customer equipment.
- **Individual Billing Number**—This feature allows a member to have all charges billed to a billing number that is different from the group billing number.
- **Line Class Code**—MLHG lines may have different line class codes for individual members.
- **Message Registers**—A message register may be assigned to any member of the MLHG.
- **Outdial Members**—Members may be assigned as outdial only members. These members do not have terminating service and cannot be included in a hunting sequence.
- **Sleeve Lead**—Any member may be assigned a sleeve lead for operation of relays that may be associated with line equipment.
- **Special Toll Billing**—This feature allows individual members of a MLHG to have special billing. The calling party verbally

transmits the billing information to a CAMA operator.

- **Speed Calling**—A MLHG member may have an 8-code or 30-code speed calling list or both an 8-code and 30-code list.
- **Threeway Calling**—Threeway Calling allows a member to add a third party to an existing talking connection.
- **TOUCH-TONE Calling**—Any member of a MLHG may be equipped with TOUCH-TONE telephones.
- **Essential Line**—Any member of a MLHG may have class A service.
- **Call Forwarding**—Any member of a MLHG may have their calls forwarded to another number.
- **Call Trace**—Calls to a MLHG member can be traced.
- **Noise Immunity Line Circuit**—Any MLHG member can have this circuit to eliminate false service request caused by induced noise from external sources.

DESCRIPTION

3. USER OPERATION

A. Originating Calls

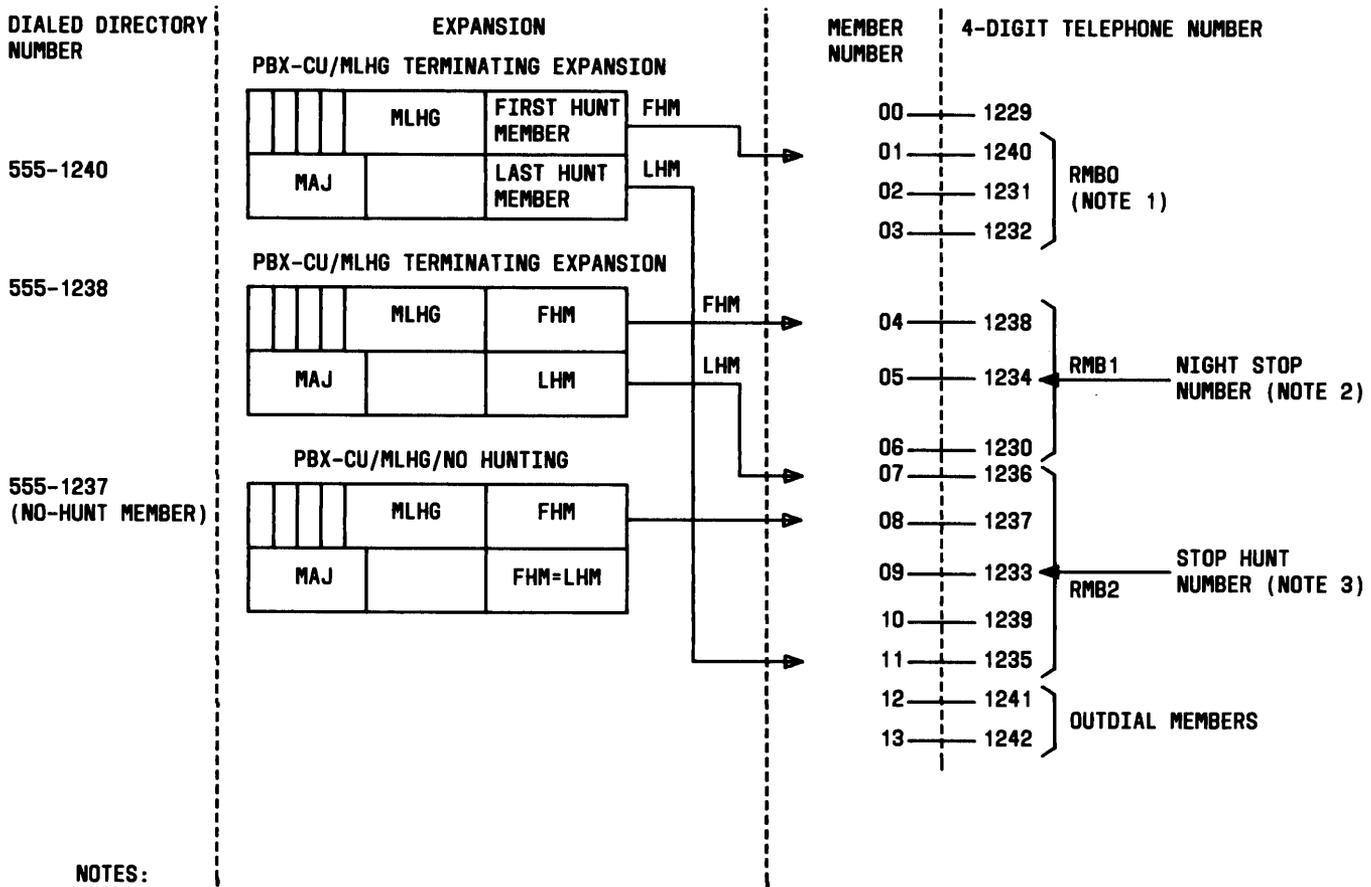
3.01 From the MLHG customer's viewpoint, the majority of the originating feature associated with MLHG lines operate the same as for any regular line. For a description of the operation of these features, refer to the feature document covering the specific feature (see Table A).

3.02 For a line with special toll billing, the user must provide billing information verbally to a CAMA operator. All other features associated with the line operate the same as for a regular line.

Terminating Calls

3.03 When a calling party dials a directory number that is a member of a MLHG, no indication is given to the calling party that a hunting

SECTION 233-190-125



NOTES:

1. WHEN A REMOTE MAKE BUSY (RMB) KEY IS OPERATED, ALL MEMBERS ASSOCIATED WITH THE KEY APPEAR BUSY TO INCOMING CALLS. UP TO 7 RMB KEYS MAY BE ASSOCIATED WITH A MLHG.
2. IN THIS EXAMPLE, WHEN NIGHT STOP IS IN EFFECT, ALL CALLS TO THIS MLHG HUNT FROM MEMBER 00 THROUGH 05. THE HUNT WILL NOT PROGRESS PAST MEMBER 05.
3. WHEN STOP HUNT IS IN EFFECT, ANY HUNT THAT BELONGS AT A MEMBER NUMBER LESS THAN THE STOP HUNT MEMBER WILL STOP WHEN THE STOP HUNT MEMBER IS REACHED.

Fig. 2—Example of a Multiline Hunt Group Arrangement

sequence is taking place. The calling party is connected to the first idle member in the sequence, or if all members are busy, receives busy treatment.

3.04 The customer subscribing to the MLHG feature receives calls sequentially beginning with the first member and simultaneous calls are completed until all members are busy.

3.05 When the night stop key is operated, only the members from member number 00 through the member designated as the night stop member receives calls.

3.06 With the stop hunt key operated, only the called member through the stop hunt member can receive calls, unless the dialed number causes the hunt to start beyond the stop hunt number.

In the latter case, the hunt continues normally to the specified last hunt member.

3.07 When a remote make-busy key is operated, the member(s) associated with the operated key cannot receive calls.

3.08 If the MLHG is equipped with outdial only members, these members cannot receive calls and are not included in the hunt list.

3.09 The night stop feature can be used to provide "night make-busy" service. When this feature is activated, all calls to the MLHG are given busy treatment. This feature is accomplished by specifying member 00 as the night stop member and member 01 as the listed directory number member. Calls may be completed to the telephone number associated with member 00 on a no-hunt basis.

3.10 A customer may have several hunting lists (possibly overlapping) associated with one MLHG. Each member of a MLHG is assigned one and only one TN and this member is the first hunt member. Figure 2 illustrates an example of a MLHG arrangement. The example shows the directory numbers assigned to the MLHG, the line expansion pointed to by each, and the telephone numbers included in each hunting sequence. This example shows two overlapping hunting sequences, a no-hunt member, and two outdial only members. One hunting sequence designated by directory number 555-1240 hunts from member 01 through 11. The other sequence designated by 555-1238 hunts from 04 through 07. When night stop is in effect, all calls to this MLHG hunt from member 00 to member 05. When stop hunt is in effect, calls to directory number 555-1240 hunt from member 01 to member 09. Calls to 555-1238 are unaffected by stop hunt. Calls to 555-1237 only complete to member 08 and are unaffected by night stop and stop hunt.

4. SYSTEM OPERATION

A. Originating Calls

4.01 When a member of a MLHG originates a call, the No. 3 ESS does a scan point number (SPN) translation to identify the calling line. If the line (or PBX trunk) is a normal member of a MLHG, the line subtranslator is read to determine what features and billing treatment are allowed. If the member has billing information or features

TABLE A

FEATURE REFERENCE

FEATURE	SECTION
Call Forwarding	233-190-105
Message Registers	233-190-123
Sleeve Lead (Auxiliary Line Circuits)	233-190-102
Special Toll Billing	233-190-109
Speed Calling	233-190-136
Threeway Calling	233-190-138

that are different from the group features, they take precedence over the group features.

4.02 After the originating translation is done, calls from MLHGs are processed in the same manner as for regular lines.

B. Terminating Calls

4.03 When a call is placed to a MLHG, a sequential selection process takes place that attempts to select an idle line from the group. The call progresses in the normal manner until the 4-digit translation is done on the dialed directory number. The following paragraphs describe the system actions that occur when a call is made to a member of a MLHG. Figure 3 summarizes the flow of a call to a MLHG.

4.04 When the 4-digit translation indicates that this is a call to a member of a MLHG, the program accesses the group data for the MLHG and reads the first and last hunt member numbers to determine the number of members to hunt over. It then checks the busy/idle status of the group to determine if all members of the group are busy. If they are busy, busy tone is returned to the caller and the group overflow count is incremented.

4.05 If the status check indicates that all members are not busy, a check is then made to determine if night stop or stop hunt is activated. If neither of these are activated, the status bits between the first hunt member and the last hunt member are searched for an idle member. If all members have been hunted and no idle member found, busy tone is returned to the caller.

Remote Make Busy Check

4.06 If the selected member is valid, its remote make-busy assignment is checked to determine if remote make busy is in effect. If it is, the program continues the hunt with the next member number. If not, the selected line's status bit is marked busy and the group peg count is incremented. The terminal equipment number of the selected line is secured and the call is processed to completion in the same manner as any other intraoffice or incoming call.

Night Stop

4.07 When the MLHG has a night stop key and it is operated, the normal hunting sequence is altered. If a call is placed to a MLHG that has night stop in effect, the program reads the night stop number from the group information. It then replaces the last member number with the night stop number and sets the first member number to zero. This allows the hunting to begin at member 00 and continue through the night stop number. From this point on, the hunting progresses as described previously for a normal hunt.

Stop Hunt

4.08 The stop hunt feature also alters the normal hunting sequence. If the stop hunt key is operated when a call is placed to a MLHG, the program reads the stop hunt number from the group data and tests to determine if it is within the hunting sequence for the called directory number. If the stop hunt number is less than the first member number or greater than the last member number, the stop hunt number is ignored and hunting proceeds in a normal manner. When the stop hunt number is within the hunt sequence (less than last member but greater than the first member), the program replaces the last member number with the stop hunt number. Hunting then proceeds from the first member through the stop hunt member. All members greater than the stop hunt member are ignored as long as stop hunt is in effect. Once the last member number is replaced by the stop hunt number, the hunt progresses as described previously for a normal hunt.

CHARACTERISTICS

5. FEATURE ASSIGNMENT

5.01 The MLHG feature is assigned on a customer group basis. A MLHG may have as many sequential hunting arrangements as desired. The telephone numbers of MLHG members do not have to be numbered sequentially. Each sequential hunt must have a directory number assigned which points to the first and last hunt member number in that sequence. Other members may have unique directory numbers with no hunting. MLHGs may also be assigned outdial only members that are excluded from all hunting sequences. The MLHG feature is compatible with both loop start and ground start lines.

6. LIMITATIONS

6.01 The following limitations apply to this feature:

- The No. 3 ESS may have a maximum of 64 MLHGs.
- A MLHG may have a maximum of 64 members and a minimum of 2.
- Up to seven remote make-busy keys may be associated with a MLHG.
- No receiver-off-hook (ROH) tone is provided to members of a MLHG.
- Only one member of a MLHG may be designated as the stop hunt member.
- Only one member may be assigned as the night stop member.
- If the MLHG contains outdial only members, their member numbers must be larger than the last hunttable member number.

7. INTERACTIONS

7.01 *Call waiting* cannot be assigned to a member of a MLHG since it would alter the hunting sequence.

7.02 *Call forwarding* may be assigned on an individual member basis to members of a MLHG. When a call is placed to an idle member

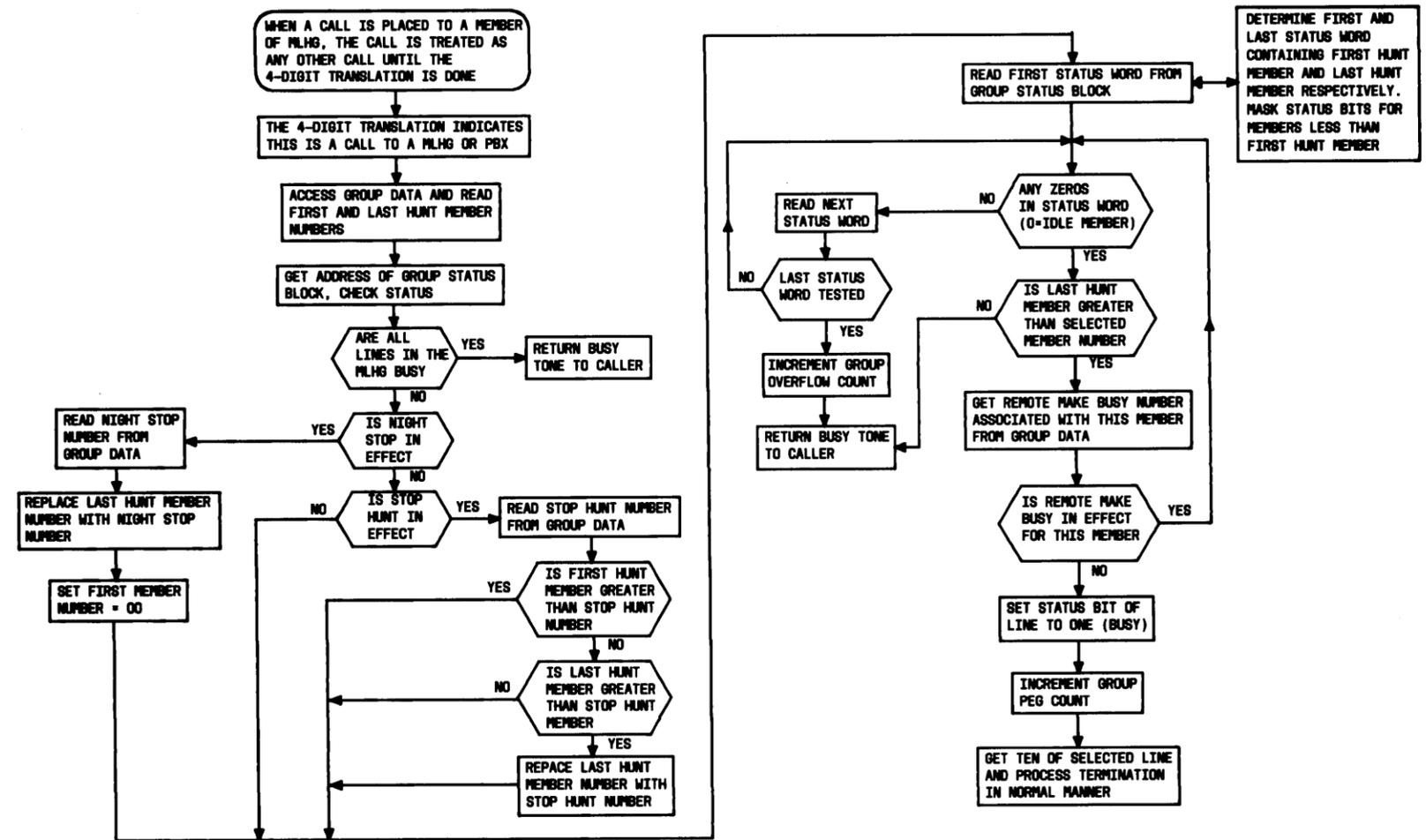


Fig. 3—Flow of Calls to a Multiline Hunt Group

with call forwarding and it is activated, the call is forwarded.

7.03 Threeway Calling (add-on) may be assigned to MLHG members; however, this feature is not available to members that have ground start lines.

7.04 Speed calling may be applied to a MLHG on an individual member or on an entire group basis. Both 8-code and 30-code speed calling may be assigned. The ability to change the speed calling list may be assigned on either a group or an individual member basis.

7.05 The night stop feature has precedence over the stop hunt feature if both features are activated at the same time.

8. RESTRICTION CAPABILITY

8.01 A MLHG may be restricted by the customer through use of the optional remote make busy, stop hunt, and night stop features. The operating company may restrict a MLHG's members by recent changing their originating and terminating classes.

INCORPORATION INTO SYSTEM

9. INSTALLATION/ADDITION/DELETION

9.01 No hardware changes are required for installation, growth, or removal of the MLHG feature. Software changes should be made as specified in DATA ASSIGNMENTS AND RECORDS and IM-3H300.

10. HARDWARE REQUIREMENTS

10.01 No hardware is required for the MLHG feature. The option make busy, night stop, and stop hunt features require keys at the customer premises and additional scan points in the No. 3 ESS office. Refer to Section 233-060-220, Network Design, for more details about these keys and scan points.

11. SOFTWARE REQUIREMENTS

A. Translations

11.01 The following translation words are required for a MLHG (see Figures 4 and 5 for SO-2

word layouts and Figures 6 and 7 for 3E3 word layouts):

- Two words per MLHG member in the line subtranslator
- Two words in the line subtranslator plus a 1-word expansion for each member that has data different from the group data plus one word for each set of data that is different
- Eight words per MLHG for the group data in the PBX/MLHG group translation. With 3E3 and later, word 7 will contain a table and entry number. The expansion entry is needed when SPNs are assigned for stop hunt, night stop, or any of the seven remote make-busy keys. The initial expansion entry can be either a 2/4/8 word expansion depending on the number of keys that are assigned. The first word in the expansion entry contains the night and stop hunt member number. One word per assigned key is required for the remainder of the expansion. If more than six keys are assigned, word 7 of the expansion entry will contain a table and entry number for a 2/4 word expansion entry. The remaining keys are placed in the second expansion entry and are in no special order.
- Two words per telephone number in the hundreds group table of the 4-digit translator. This is expanded to three words per telephone number with 3E3 and later.
- A group status block per MLHG containing up to eight words for keeping the busy/idle status of members plus traffic counts
- One word per MLHG member in the member list translation
- One word per group in the member list.

Refer to the PA-3H3XX for more detailed word layouts.

11.02 Processor real-time data required by this feature will be supplied when the data becomes available.

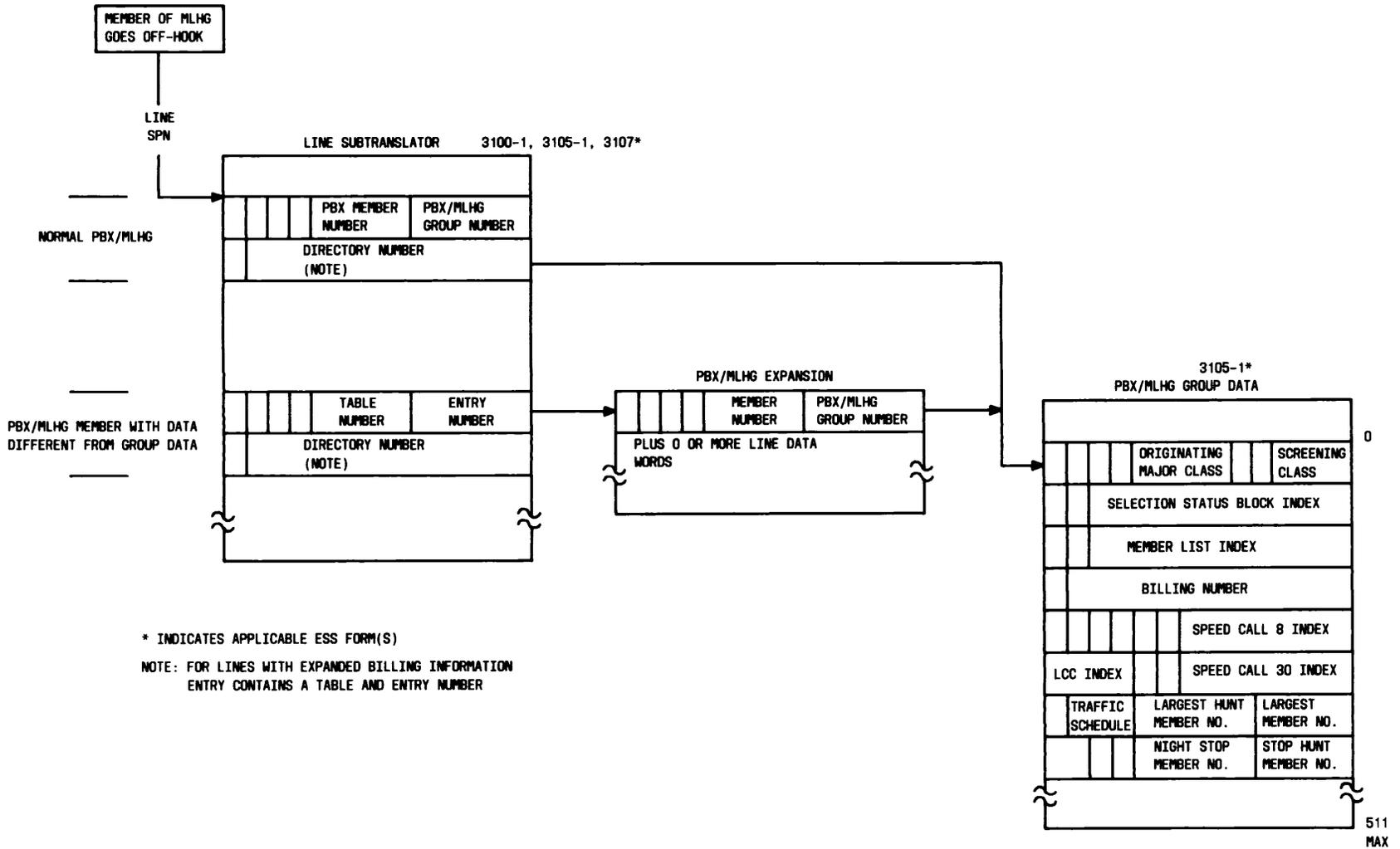


Fig. 4—Originating Translations for a Multiline Hunt Group (SO-2)

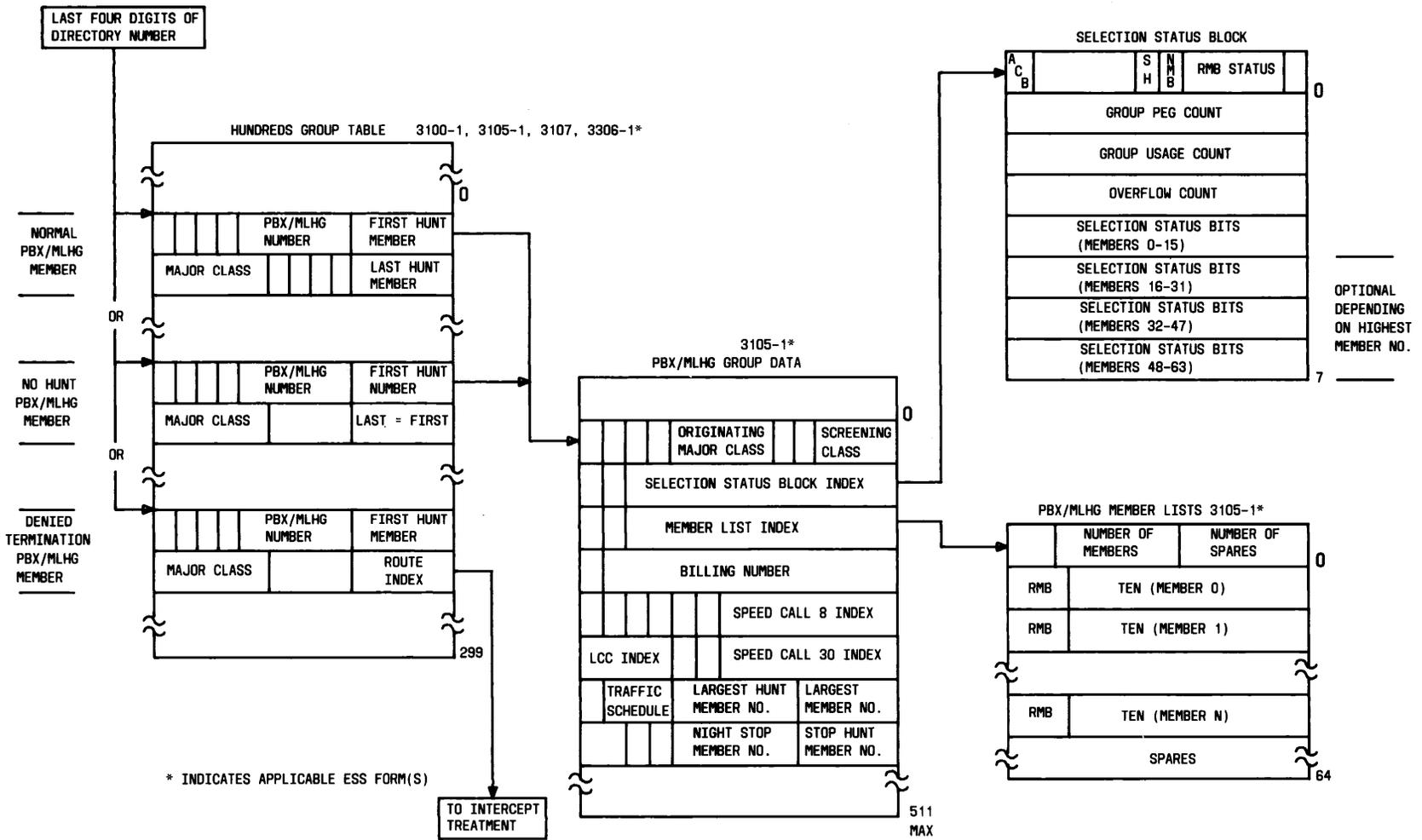


Fig. 5—Terminating Translations for a Multiline Hunt Group (SO-2)

12. DATA ASSIGNMENTS AND RECORDS

12.01 When initial office translations are being built for a new office, a MLHG may be incorporated when the ODA run is made. The following forms must be completed and submitted to the WECO Regional Data Center when the ODA method is used. Refer to Translation Guide TG-3 for details concerning the completion of these forms. Also refer to the PA-3H3XX.

- **3100-1 Telephone Number Table:** All directory numbers associated with the MLHG must be listed on this form.
- **3105-1 Multiline Hunting Group Table:** This form defines a MLHG and all of its members. The information on this form builds portions of the PBX/MLHG group and member translations and the 4-digit translator.
- **3107 Supplementary Information Table:** This table is needed if a message register is used with a member of the MLHG or if a member requires special billing.
- **3303-1 Route Index Expansion:** A normalized office code (NOC) must be defined on this form for the office code specified on the 3501 form.
- **3306-1 Line Class Code Table:** This table is used to define the line class codes for the different types of lines in a MLHG.
- **3501 Office Code Table:** This form is required to associate the MLHG directory numbers with an office code.

12.02 If initial office translations have already been done, a MLHG may be incorporated by recent change message. To build a new MLHG, use the DIST:GRP input message. This message builds the group information, member list, and selection status blocks.

12.03 For changing information in an existing or unassigned MLHG, use the RC:MLHG message for changes to group information and the RC:MTL and RC:LCC messages for changes to member data. Refer to Input Message Manual, IM-3H300, for complete details on the use of these messages.

12.04 When changes are made via recent change messages, the applicable ESS forms should be marked to indicate the changes.

13. TESTING

13.01 The MLHG translations should be verified via the VER:MLHG and VER:MTL (for SO-2) or OP:OFR (for 3E3 and later) input messages. Refer to IM-3H300 for complete details.

13.02 To verify correct operation of the hunting feature, as many test calls as the number of members in the group should be made. As each member is reached, it should be made busy and another call placed to ensure hunting is done on all hunttable members. If the MLHG is equipped with remote make busy, stop hunt, or night stop keys, calls should be made with the keys operated to ensure their operation.

14. OTHER PLANNING TOPICS

14.01 When planning is done for a MLHG, the ultimate size of the group should be estimated and spare members included in each group. Spare groups should also be built. This allows expansion and growth by using the recent change mechanism.

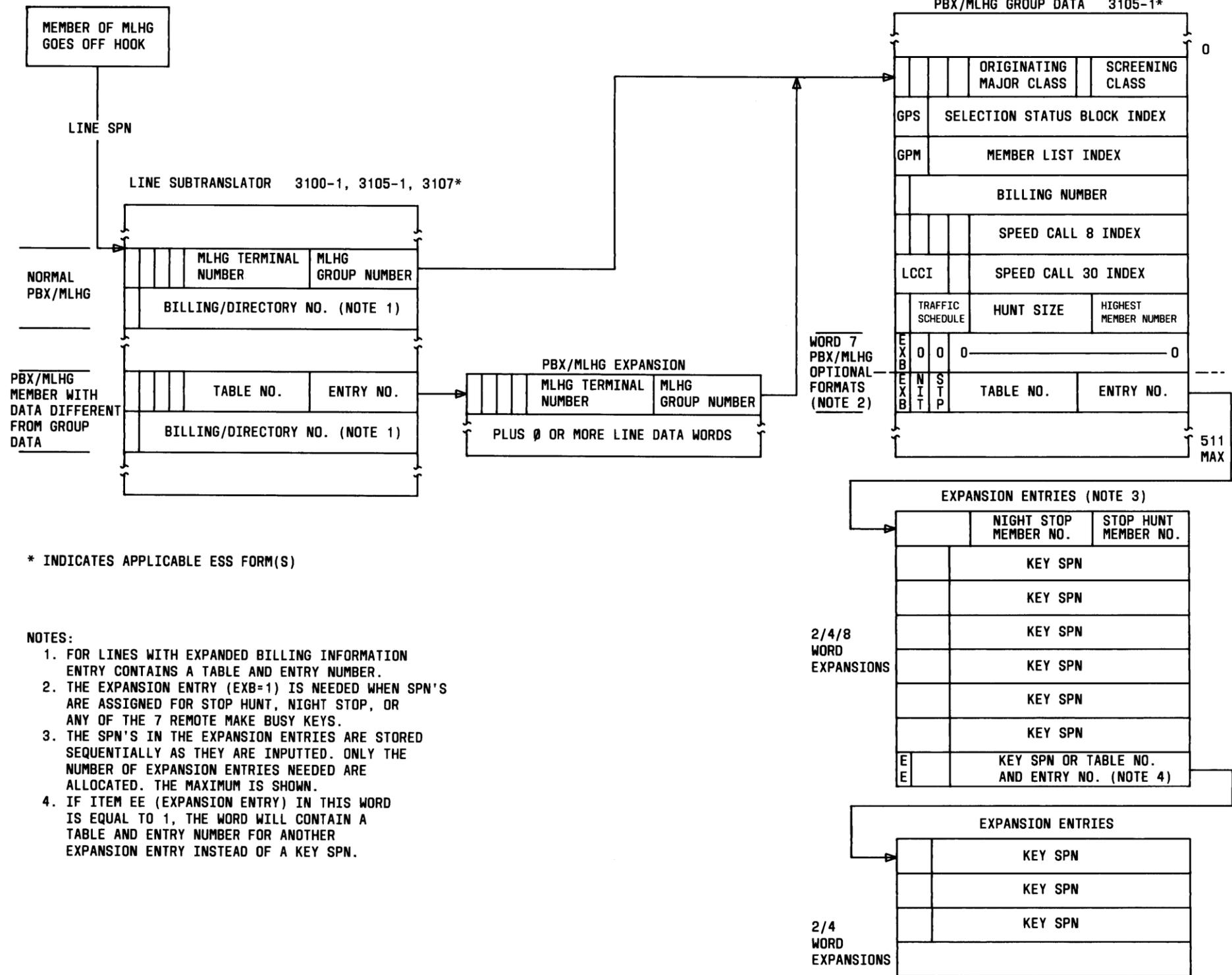
ADMINISTRATION

15. MEASUREMENTS

15.01 Peg count, usage, and overflow counts are recorded for each MLHG as an aid in administration of the group. Refer to Section 233-152-135 for more details concerning traffic measurements for multiline hunting.

16. CHARGING

16.01 If the No. 3 ESS has the Automatic Message Accounting Recording System (AMARS) feature, billing to a group billing number or to an individual member billing number is available. If each member is a separate line in the office, AMARS billing can be done on each line. For PBX lines with multiline hunting, individual AMARS billing is not available. If the office does not have AMARS, all charging is done by a CAMA office to a group billing number, to an individual billing number, or to a special toll (QZ) billing number.



* INDICATES APPLICABLE ESS FORM(S)

NOTES:

1. FOR LINES WITH EXPANDED BILLING INFORMATION ENTRY CONTAINS A TABLE AND ENTRY NUMBER.
2. THE EXPANSION ENTRY (EXB=1) IS NEEDED WHEN SPN'S ARE ASSIGNED FOR STOP HUNT, NIGHT STOP, OR ANY OF THE 7 REMOTE MAKE BUSY KEYS.
3. THE SPN'S IN THE EXPANSION ENTRIES ARE STORED SEQUENTIALLY AS THEY ARE INPUTTED. ONLY THE NUMBER OF EXPANSION ENTRIES NEEDED ARE ALLOCATED. THE MAXIMUM IS SHOWN.
4. IF ITEM EE (EXPANSION ENTRY) IN THIS WORD IS EQUAL TO 1, THE WORD WILL CONTAIN A TABLE AND ENTRY NUMBER FOR ANOTHER EXPANSION ENTRY INSTEAD OF A KEY SPN.

Fig. 6—Originating Translations for a Multiline Hunt Group (3E3)

SUPPLEMENTARY INFORMATION**17. GLOSSARY**

17.01 The following is an explanation of terms used in this document that may be unfamiliar to the reader.

- **Hunt List:** A list of telephone terminals that is hunted over sequentially in an attempt to find an idle terminal.
- **Normalized Office Code (NOC):** A 3-bit number used to represent an office code.
- **Outdial Member:** A member of a MLHG that only has originating service. An outdial member cannot receive calls.
- **Overflow Count:** A count kept by a traffic register of the number of times the MLHG received a call and all members were busy.
- **PBX (Private Branch Exchange):** A business customer service that allows intragroup calling on an extension dialed basis. Access to the PBX lines is through a limited number of listed directory numbers.
- **Peg Count:** A count kept by a traffic register of the number of times a facility is accessed; in this case, the number of completed calls to the MLHG.
- **Usage Count:** A register count of the number of facilities that are simultaneously busy when examined at regular intervals.

18. REFERENCES

18.01 The following is a list of documents that may be referred to for additional information on multiline hunting.

- PR-3H175—Completion of Incoming and Intraoffice Calls (TERM)
- Section 233-190-105—Call Forwarding, No. 3 ESS
- Section 233-190-123—Message Registers, No. 3 ESS
- Section 233-190-102—Noise Immunity Line Circuit, No. 3 ESS
- Section 233-190-109—Centralized AMA and Special Toll Billing, No. 3 ESS
- Section 233-190-136—Speed Calling, No. 3 ESS
- Section 233-190-138—Threeway Calling, No. 3 ESS
- Section 233-060-220—Network Design, No. 3 ESS
- Section 233-152-135—Traffic and Plant Measurements, No. 3 ESS
- Section 233-154-130—Recent Change Users Guide, No. 3 ESS
- Section 233-151-130—Basic Call Processing Software Subsystem Description, No. 3 ESS
- TG-3—Translation Guide
- IM-3H300—Input Message Manual, No. 3 ESS
- OM-3H300—Output Message Manual, No. 3 ESS
- PA-3H3XX—Office Data Tables Layout Specification, No. 3 ESS
- Installation Engineering Handbook 269