FEATURE DOCUMENT
INWARD WIDE AREA TELECOMMUNICATIONS SERVICE (INWATS)
NO. 2 ELECTRONIC SWITCHING SYSTEM

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Printed in U.S.A.

FIGURES PAGE

FEATURE DEFINITION AND DESCRIPTION

1. DEFINITION/INTRODUCTION

DEFINITION

1.01 Inward wide area telecommunications service (INWATS) is a form of distance dialing telephone service which allows a customer, in consideration of a monthly charge, to receive calls from specified geographical areas with no charge to the originating caller.

INTRODUCTION

1.02 An INWATS customer is connected to the dialing network by special lines which can receive directly dialed or operator assisted calls from points within a specific service area or band. These lines are normally assigned as "denied originating" lines because of existing tariff restrictions.

1.03 The intent of this document is to detail the role of the No. 2 Electronic Switching System (ESS) as a local serving central office in providing the INWATS feature.

1.04 The No. 2 ESS provides the INWATS feature with all available issues of the LO-1 and EF-1 generic programs. INWATS is available to noncentrex customers and is provided by dedicated hardware. Special hardware is required for each line (auxiliary line circuit, timing meter, and message registration circuits) and each customer service group (message registration circuit). An office data administration (ODA) run is required to initially establish the feature in an office.

2. USER PERSPECTIVE

CUSTOMER

2.01 Each INWATS customer specifies a service arrangement which is designed to meet the customer's particular needs. Service areas or bands represent geographical areas from which an INWATS customer may receive calls. An INWATS customer subscribes to a service arrangement which includes the desired band and the required number of lines.

2.02 The definition of the available service arrangements, the exact service area for each band in each home area, and other INWATS information can be obtained from the WATS coordinators in each operating company.

2.03 INWATS is provided on one or more "denied originating" lines. These lines can receive calls as follows:

(1) Dial station-to-station calls within the customer's selected WATS service area.

(2) Calls placed through the long distance operator who establishes a connection on calls within the service area that cannot be dialed directly from the originating station or on which assistance is needed. Calling customers may obtain directory assistance by dialing 800-555-1212.

2.04 An INWATS customer's telephone number is always 10 digits and consists of the format 800 + NNX + XXXX. The "800" is a special area code (SAC) which basically identifies the call as INWATS. The NNX digits represent the terminating telephone numbering plan area (NPA) in which the called customer is located. The XXXX digits represent the terminating central office, band, outpulsing requirements of the terminating central office, and the INWATS customer in that office.

2.05 Any interstate INWATS band includes service to all lower-numbered bands. Thus, a customer with nationwide service terminating to a single listed directory number is charged for that band on all calls, regardless of the call origin point. Any customer who receives the majority of calls from the lower-numbered bands may desire separate service for the lower-numbered bands. This separate service requires a separate listed directory number and is charged separately.

2.06 INWATS is billed on a customer service group basis. A customer service group is defined as an arrangement of INWATS lines for the same service area for the purpose of completing a given call. The monthly bill is computed from the usage of the customer's selected service.

TELEPHONE COMPANY

A. INWATS Routing Arrangements

2.07 Both interstate and intrastate INWATS calls are routed through various combinations of other offices prior to completion at a No. 2 ESS local serving central office. Specific details pertaining

to the types of office, translation requirements, code conversion, out-of-band screening, and other capabilities involved in forwarding a call to or toward a local serving central office are available in references 2 and 6 of Part 19.

B. Implementation

2.08 A combination of No. 2 ESS equipment and common systems equipment is utilized to provide a record of the different counts and the cumulative time usage for each INWATS line and the overflow count for each customer service group. The equipment arrangements for INWATS are shown in Figure 1.

2.09 Each INWATS line requires an auxiliary line circuit (SD-99439-01). The seizure register provides a count of all incoming call attempts to the line and the message register provides a count of the calls answered. The seizure register reading minus the message register reading yields a count of the calls abandoned. The running time meter times each call and totalizes all usage to a maximum of 999.9 hours. The overflow counter is incremented each time an attempted call is made and all lines in the customer service group are busy. A remote master scanner applique circuit provides a busy indication when the INWATS customer goes off-hook when not actually answering a call. The remote master scanner applique circuit is assigned in translations as if it is controlled by a remote make-busy key. One of the remote trunk peripheral decoder applique circuits provides an interconnection to the auxiliary line circuit when a call is attempted and the other is used to increment the overflow counter.

2.10 No action by No. 2 ESS central office personnel is required to complete an INWATS call. Periodic readings of the counters and timing meters are required.

3. SYSTEM PERSPECTIVE

FEATURE OPERATION

3.01 A calling customer or long distance operator dials an INWATS number which terminates to a No. 2 ESS local serving central office. Figure 2 is a flow diagram of the INWATS feature operation. Actions outside of the local serving central office either outpulse five digits to the local serving central office or provide a reorder tone to the calling customer if the call is determined to be out-of-band.

3.02 The incoming trunks are part of the direct distance dialing (DDD) network and are not dedicated to INWATS. When the incoming trunk is seized, the associated scan point number is translated in the scan point number translator to provide the terminal equipment number (TEN) and member of the trunk group. The trunk group data provides the information pertaining to the interpretation of the received digits.

3.03 The one-digit translation provides an office code and route index which is defined in the route index table with a special INWATS route index between 00 and 05. Only calls incoming to to this office over the trunk groups associated with INWATS calls can reach this special route index. All calls originating within the local office can be blocked from gaining access to this code by the absence of any code group defined with the route index in the 3- and 6-digit translation table and the code group translation table. Blocked calls are routed to a recorded announcement.

3.04 The 4-digit translation points to a multiline hunt group (MLHG) terminating hunting expansion in the general purpose expansion tables. The MLHG number in this expansion is used to access the MLHG group data in the MLHG translator.

3.05 The MLHG originating subtranslator and the associated MLHG terminal list and MLHG status block contain the features and busy/idle status for the MLHG.

3.06 Since each INWATS line requires a sleeve lead peripheral decoder (PD) point, each TEN in the MLHG terminal list is used to locate a special MLHG expansion in the general purpose expansion tables. This expansion includes the associated circuit word required for the sleeve lead PD point.

3.07 If an idle member of the MLHG is available, the line is marked busy in the call store status block and the sleeve lead PD point associated with the auxiliary line circuit is operated. The operation of the sleeve lead PD point in turn operates a relay in the auxiliary line circuit which increments the seizure register. If no idle member of the MLHG is available, busy tone is returned

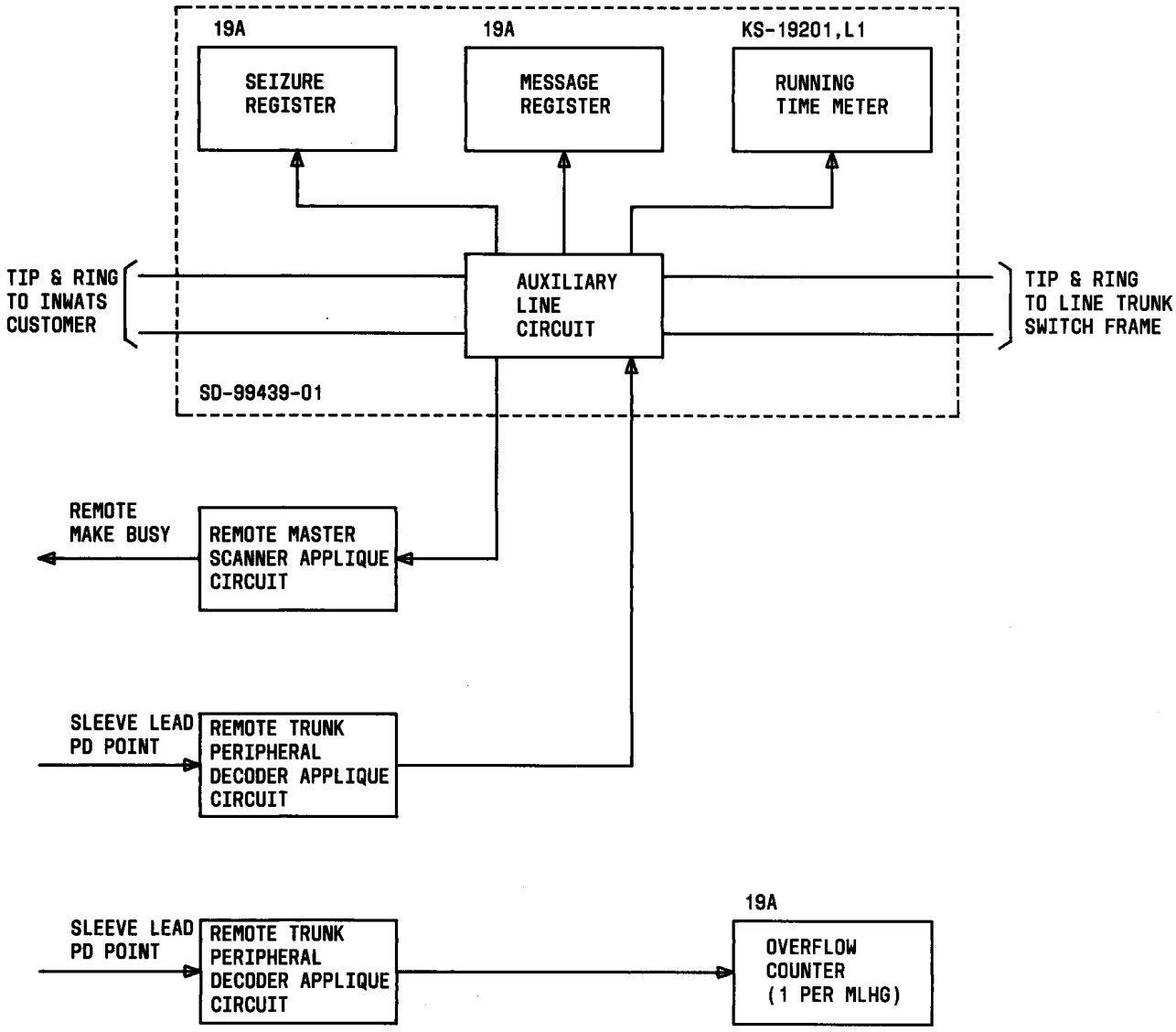

Fig. 1—Circuit Arrangements for INWATS

to the calling customer and the group overflow register is incremented.

3.08 If the calling customer goes on-hook while ringing is being applied, the sleeve lead PD point is released to deactivate the auxiliary line circuit. Normal call processing routines then disconnect the call.

3.09 When the INWATS customer answers, relay actions internal to the auxiliary line circuit start the running time meter, increment the message register, and provide current through the remote master scanner applique circuit to saturate the ferrod in the master scanner. Normal call processing routines disconnect the ringing circuits and establish the talking path.

3.10 If the called customer is the first to go on-hook, relay action internal to the auxiliary line circuit stops the timing meter. The on-hook is detected at the incoming trunk circuit and normal call processing routines disconnect the call. When the line is idled, the sleeve lead PD point is released which deactivates the auxiliary line circuit causing

the remote master scanner applique circuit to be released.

3.11 If the calling customer is the first to go on-hook, the on-hook is detected at the incoming trunk circuit and normal call processing routines disconnect the call. When the line is idled, the sleeve lead PD point is released. Relay action in the auxiliary line circuit stops the timing meter.

3.12 If the called customer still remains off-hook, relay actions in the auxiliary line circuit continue to maintain current through the remote master scanner applique circuit to saturate the master scanner ferrod. This allows the No. 2 ESS to busy the line to any further calls until the called customer goes on-hook.

Software Data Structures

3.13 The translations involved in the INWATS feature are shown in Figure 3. The incoming trunk groups handling the INWATS calls normally receive five digits. The scan point number (SPN) is translated in the scan point number translator. This translation provides the TEN, member and group, and other information pertaining to the trunk group.

3.14 The incoming digit translation code (IDXLN) and initial digit auxiliary information (IDAUX) in the trunk group data direct the initial translation to be performed on the first digit. The one-digit translation contains the normalized office code (NOC) (a route index between 00 and 05) which is reserved for INWATS calls.

3.15 This NOC and the next four digits received point to the number group table and hundreds group table in the 4-digit translator. Since the INWATS lines are members of a huntable MLHG, the hundreds group table word is used to locate a MLHG hunting expansion in the general purpose expansion tables. The MLHG number in this expansion is used to locate the MLHG group data in the MLHG translator.

3.16 The MLHG originating subtranslator and the associated MLHG terminal list and group status block contain the group data and the busy/idle status of the MLHG.

3.17 Since each line assigned to the INWATS customer requires a sleeve lead PD point, a translation of the TEN is required. The TEN is used to locate a 4-word special MLHG expansion in the general purpose expansion tables.

FEATURE ATTRIBUTES

4. APPLICABILITY

4.01 INWATS is provided on a per-customer service group basis. Each customer service group is assigned in translations as a MLHG.

5. LIMITATIONS AND RESTRICTIONS

5.01 The following limitations apply to INWATS:

- One of the six NOCs and an unassigned office code must be assigned to allow blocking of non-INWATS calls to INWATS lines.
- A number group table and a hundreds group table must be assigned for INWATS directory numbers.
- Lines are assigned as "denied originating" lines because of restrictions provided by existing interstate and most intrastate INWATS tariffs.
- At least 10 percent spare members (never less than 2) should be provided to allow for growth and to expand a customer's service during peaked busy seasons.
- The No. 2 ESS may have a maximum of 255 MLHGs with up to 256 members per group.
- Bell System policy and tariffs specifically prohibit the provision of any type of traffic control device which can be used by the INWATS customer to regulate the volume of incoming traffic to the customer group. Therefore, the MLHG night stop, stop hunt, and standard remote make-busy features should not be assigned to INWATS customers.
- The ferrod in the master scanner which is controlled by the remote master scanner applique circuit connected to each auxiliary line circuit is assigned as if it is connected to a remote make-busy key which controls only one line. A maximum of seven remote master scanner applique circuits can be

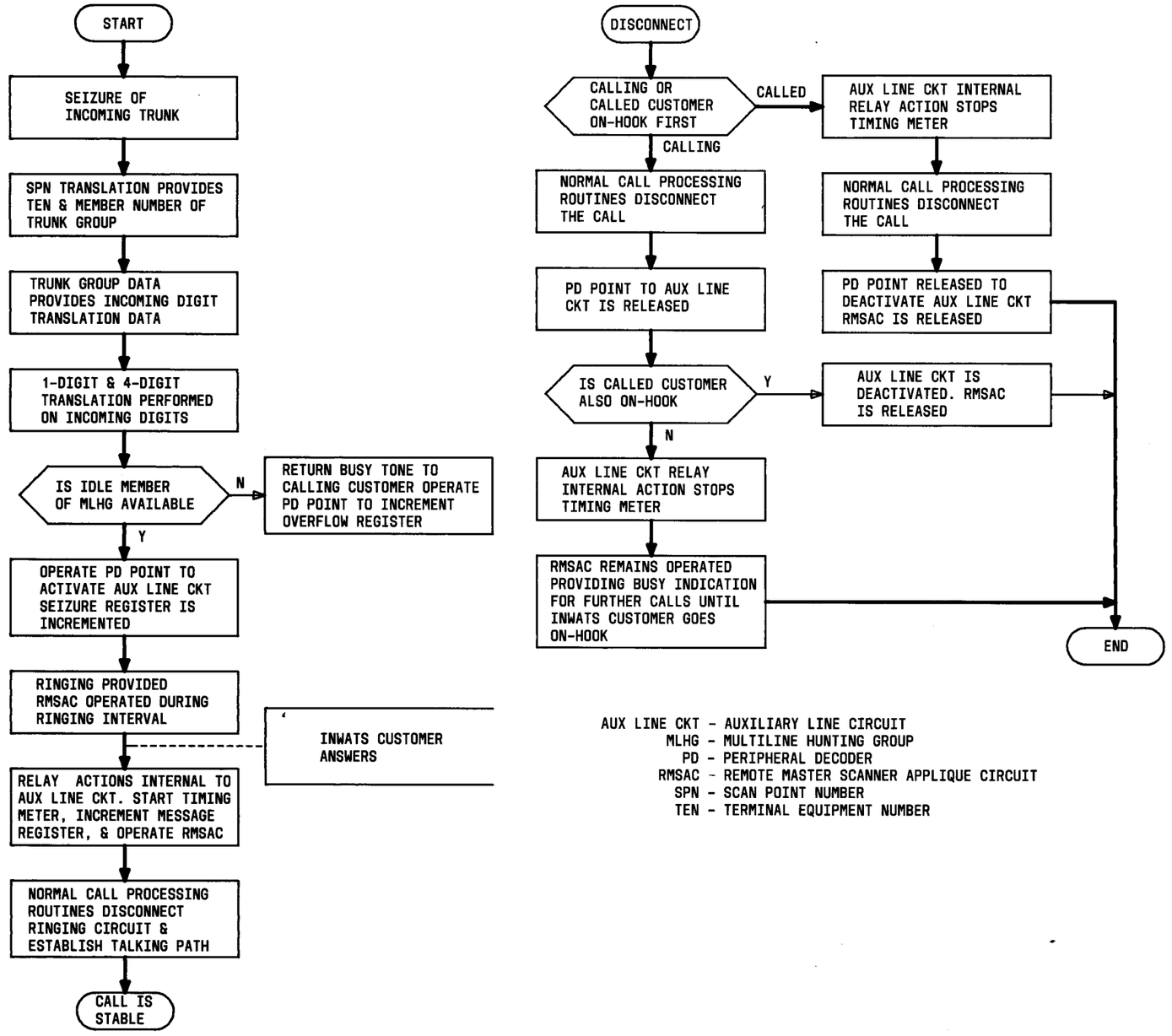

Fig. 2—INWATS Feature Operation

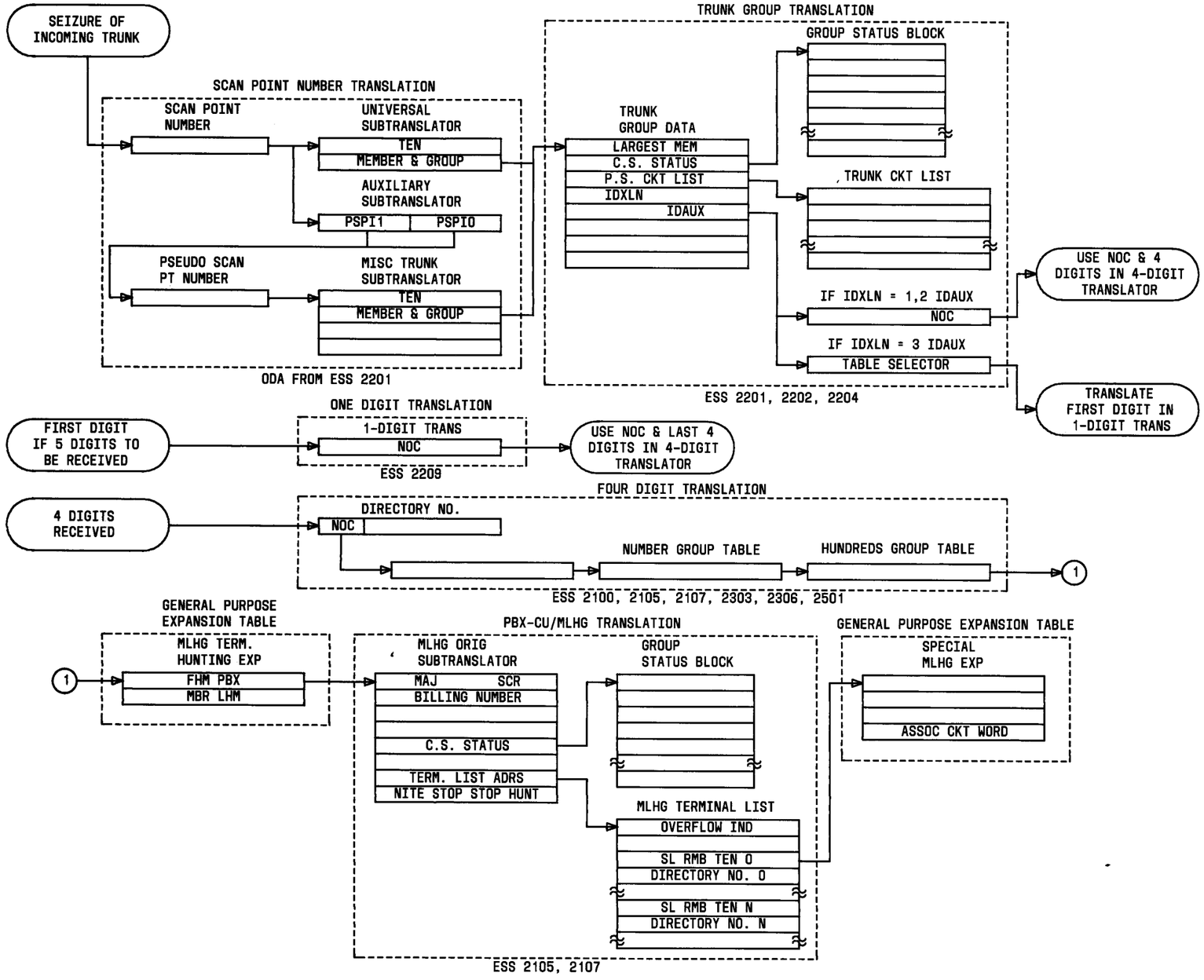

Fig. 3—INWATS Translations

assigned to a MLHG. Therefore more than one MLHG may be required to satisfy a large customer. This allows the line to be busied in call store if the INWATS customer goes off-hook when not actually answering a call.

- The message, seizure, and overflow registers are 5-digit magnetic counters with the capacity to record up to 99,999 registrations in a single recording period.

- The running time meters are 4-digit timers with the capacity to record up to 999.9 hours in a single recording period.

6. COMPATIBILITY AND INTERACTIONS

6.01 The ***Call Waiting*** feature cannot be assigned to a member of the MLHG since it would alter the hunting sequence.

6.02 The ***Call Forwarding*** feature should not be applied to any member of the MLHG.

6.03 Automatic Message Accounting (AMA) recording of INWATS calls is not available with the LO-1 or EF-1 generic programs.

7. COST FACTORS

Program Store

7.01 The following translation words are required:

(a) Four-Digit Translation—a number group table of 100 words and a hundreds group table of 100 words with LO-1 or 101 words with EF-1. The first digit of the hundreds group table represents the band.

(b) General Purpose Expansion—a line 2-word terminating expansion (MLHG hunting expansion) for each customer group and a 4-word originating expansion (special MLHG expansion) for each member.

(c) MLHG Translation—an 8-word MLHG originating subtranslator for each customer service group and two words in the MLHG terminal list for each customer group plus two words for each member.

(d) Line Class Code Table—Each INWATS band requires three words per line class code.

7.02 Since the incoming trunks handle other type calls in addition to INWATS calls, the translation words required for the trunk groups cannot be attributed only to INWATS. The translation words for the trunk groups are included for completeness:

(a) Scan Point Number Translation—a 2-word universal subtranslaton for each trunk if a universal trunk is used, or one word in the auxiliary subtranslator and a 4-word miscellaneous subtranslator if a miscellaneous trunk is used.

(b) Trunk Group Translation—eight words of trunk group data and one word per member in the trunk circuit list. An additional word is required in the trunk circuit list with EF-1 to satisfy carrier group busy translation requirements.

(c) One Digit Translation—one word to provide the NOC.

(d) NOC to BCD Conversion Table—one word to associate the NOC with the office code.

Call Store

7.03 Each trunk group and each customer service group has an associated group status block in call store for group peg, usage, and overflow counts and for busy/idle status. A status block contains a minimum of 5 words and a maximum of 20 words.

Processor Time

7.04 The processor time required to complete an INWATS call is the same as the processor time required to complete a non-INWATS call to a MLHG.

Hardware

7.05 Hardware requirements for each customer service group are listed in Part 10.

8. AVAILABILITY

8.01 The INWATS feature is available with all issues of the LO-1 and EF-1 generic programs.

CONSIDERATIONS FOR INCORPORATION OF FEATURE INTO SYSTEM

9. PLANNING

9.01 Implementation of the INWATS feature in the No. 2 ESS local serving central office requires an overall plan and close operating company interdepartmental coordination to provide both the initial services and an orderly growth.

9.02 Requirements to be considered for INWATS are as follows:

(a) Lines can have an extremely long holding time per call or a high volume of calls with short holding times. The effects of long holding time on the load balance and the high call volume on the equipment and on the incoming trunks must be evaluated.

(b) INWATS customers may have an extremely peaked busy season. Spare members should be provided for each hunting group to allow for growth.

(c) Arrangements must be made to prevent intraoffice and non-INWATS incoming calls from completing to INWATS lines. These calls are blocked by reserving a NOC and an unassigned office code. This office code is not assigned in the 3-digit translations. The allocation of program store for the assignment of directory numbers must be carefully planned.

(d) The message registers and timing meters require planning to determine the location, the organization to be responsible for the readings, and the procedures and intervals for obtaining readings.

(e) Since INWATS customers are not allowed to regulate incoming traffic, some features normally available to MLHG customers must be prohibited to INWATS customers.

10. HARDWARE

10.01 The following hardware is required to implement INWATS for each customer service group.

(a) A common systems auxiliary line circuit arranged for measured rate INWATS service (SD-99439-01) for each line. The circuit is mounted in the miscellaneous trunk frame.

(b) Two magnetic counters (19A) (a message register and a seizure register) for each line. From one to eight counters can be mounted on a J99235 EF-1 mounting unit which can be mounted in the miscellaneous trunk frame or in a wall-mounted cabinet.

(c) One timing meter (KS-19201,L1) for each line. From one to ten running time meters can be mounted on a J99235 EB-1 mounting unit. A unit can be mounted in the miscellaneous trunk frame or in a wall-mounted cabinet.

(d) Each auxiliary line circuit requires a remote master scanner applique circuit (SD-1A210). A circuit unit (trunk order code 74300) contains eight circuits and occupies a mounting plate in the miscellaneous trunk frame.

(e) One remote trunk peripheral decoder applique circuit (SD-2H130) per line. The circuit unit (trunk order code 72600) contains six circuits and is mounted in the miscellaneous trunk frame. All of the circuits in a unit are controlled by the six consecutive outputs of either the first two or last two buffers of a peripheral decoder.

(f) One remote trunk peripheral decoder applique circuit per customer service group to increment the overflow counter when all members of the customer service group are busy.

(g) One magnetic counter (19A) for each customer service group to count the overflows.

11. DETERMINATION OF QUANTITIES

11.01 The total quantities depend upon the number of customer service groups and lines to be provided by the office.

11.02 The hardware requirements are listed in Part 10, HARDWARE and the software requirements are listed in Part 7, COST FACTORS.

12. ASSIGNMENTS AND RECORDS

Assignment Recommendations and Guidelines

12.01 Careful planning for the assignment of directory numbers is required for INWATS.

The first digit of the hundreds group table represents the customer's band. All calls except INWATS calls are to be prevented from completing to an INWATS line.

Input and Record Keeping

A. Office Data Administration (ODA)

12.02 When an ODA run is required, the following completed forms must be submitted to the appropriate WECo Regional Data Center for processing:

- ESS 2100 Directory Number Table: This form lists the directory number and its related information such as the required MLHG.
- ESS 2105 Multiline Hunting Group Table: This form defines a multiline hunting group. This form includes information that builds portions of the MLHG translator and the 4-digit translator.
- ESS 2107 Supplementary Information Table: This form defines the peripheral decoder for the MLHG, the auxiliary line circuit, and a special billing number, if required.
- ESS 2300 Three- and Six-Digit Translation Table: This form allows calls completed to the office code assigned on ESS 2303 to be given a code group which terminates to a vacant code recorded announcement.
- ESS 2303 Route Index Expansion Table: This form assigns the office code from ESS 2501 to a route index (NOC) and the routing data for calls to be terminated to a vacant code recorded announcement.
- ESS 2304 Code Group Translation Table: This form provides a direct route index for the code group indicated on ESS 2300.
- ESS 2306 Line Class Code Table: This form defines the arrangements of line class codes for INWATS.
- ESS 2501 Office Code Table: This form is used to identify the office code and the hundreds group.

12.03 Since the number of INWATS calls influence the quantities of incoming trunks, the following forms must be submitted for ODA runs requiring changes to these trunks:

- ESS 2201 Trunk Assignment Table: This form provides the associations between scan points, peripheral decoder points, and their central pulse distributor enable points with particular circuits.
- ESS 2202 Trunk Group Table: This form provides the means of establishing a trunk group number for each trunk group and for spare groups.
- ESS 2204 Trunk Feature Table: This form defines the features available to a particular trunk group.
- ESS 2209 Incoming Trunk Digit Translation Table: This form enables calls received over incoming trunks to be directed to one of three translators for final disposition.

12.04 The No. 2 ESS Translation Guide, TG-2H, contains the details for completing the ESS forms.

B. Recent Change Messages

12.05 The following RC messages affect various aspects of the INWATS feature:

- A RC:CRI—change the route index on a given code index
- A RC:DIG—assign an existing 3- or 6-digit code to a new code index
- A RC:MLH—change the translation data associated with the MLH group or member
- A RC:RI—add a new route index, or change or remove an existing one
- A RC:TRK—change the TEN of a member of a group, or move a member of a group to another group

12.06 The corresponding A VY messages can be used to verify the A RC messages.

C. Record Keeping

12.07 The translation administration record forms reflecting the INWATS feature are returned to the operating company after each ODA run is made.

12.08 A record of all recent change messages must be maintained in addition to the ESS-R forms.

13. NEW INSTALLATION AND GROWTH

13.01 The procedures for providing the INWATS feature are shown in Figure 4.

14. TESTING

14.01 The INWATS translations should be verified by checking the office records and using the A VY input messages which correspond to those listed in 12.05.

14.02 The correct initial operation of the feature can be tested as follows:

(a) Place a call from the trunk test frame (or equivalent) from the office which outpulses digits to the local serving central office. The call should be completed to the TEN of the first member. INWATS lines can also be accessed from telephones in the central office or from the trunk test panel by assigning a unique line class code and appropriate entries in the 3-digit translation and the screening tables to gain access to the special INWATS NOC.

(b) Make the first member busy with the M L:RMV input message.

(c) Continue steps (a) and (b) until all members of the group have been checked.

(d) Place one more call to check for overflow.

(e) Restore all lines to service with the M L:RST input message.

(f) All running time meters and message registration circuits should be checked for proper operation.

15. MEASUREMENTS

15.01 Each trunk group and each multiline hunting group in the No. 2 ESS office has a set of four traffic registers assigned to it. These registers include peg, usage, overflow, and maintenance busy counts. These counts are collected continuously. The registers can be read when a TTY printout is requested or when traffic data is automatically printed out in accordance with an assigned schedule in the Traffic Work Table. Reference 9 in Part 19 provides additional information pertaining to these measurements.

15.02 Hardware is provided with each INWATS line/group to provide elapsed time, the number of attempted calls (optional), the number of completed calls, and the number of overflows.

16. CHARGING

16.01 The charge to the customer is a function of the service arrangement, the service area or "band," and the number of lines. The timing meter and message registration circuit readings provide the data necessary to determine proper billing.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

17.01 The following list identifies terms and abbreviations used in this feature document:

- Customer Service Group—A group of INWATS lines representing the same service area (band) and assigned to a given customer for the purpose of completing a given call.

- Local Serving Central Office—Office which provides the INWATS lines to the INWATS customer. It is desirable, but not necessary, to serve the customer from the same office which provides the local service.

- Multiline Hunting Group (MLHG)—A group of lines which are searched in sequence for an idle member when a particular directory number is called.

- Office Data Administration (ODA) Run—Mechanism by which translation information may be assembled or changed

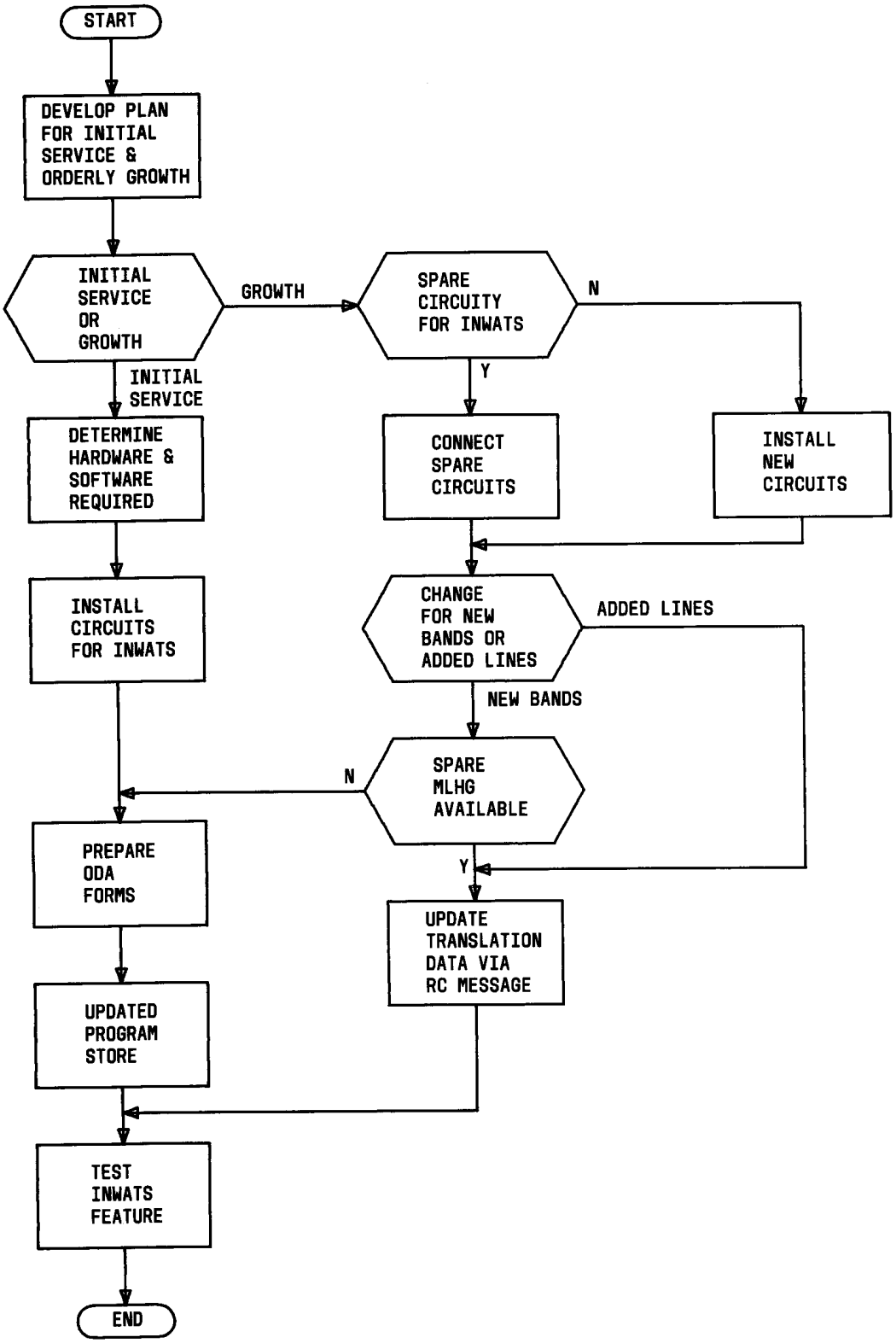

Fig. 4—Procedures for Providing the INWATS Feature

for a No. 2 ESS. Information from the ESS input forms is inputted into the regional ODA computer, assembled, then sent back to the No. 2 ESS.

- Recent Change (RC) Messages—Mechanism for making changes to information in the program store. These changes are accomplished via TTY input messages and are stored in the recent change area of call store until some later time when the program store can be updated.

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 WATS features:

(1) Common Systems Auxiliary Line Circuit Arranged for Measured Rate INWATS Service CD-99439-01 and SD-99439-01

(2) Dial Facilities Management Practices—Division F, Section 5

(3) Federal Communications Commission Tariff 259

(4) Input Message Manual, IM-2H200

(5) Multiline Hunting Feature—FD 232-190-125

(6) Notes on Distance Dialing—Section 9

(7) Office Data Tables Layout Specification No. 2 ESS PA-2H200

(8) Output Message Manual, OM-2H200

(9) Traffic and Plant Measurements No. 2 and 2B Electronic Switching System—Section 232-120-301

(10) Traffic Facilities Practices—Division D, Section 12-g (6)

(11) Translation Guide, TG-2H

(12) Trunk and Service Circuit Engineering Specification J2H031A-1