MOBILE TELEPHONE SWITCHING OFFICE FEATURE

FEATURE DOCUMENT

2-WIRE 1A "ESS™" SWITCH

"AUTOPLEX™"/SYSTEM 100

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INTRODUCTION

1. GENERAL INFORMATION

SCOPE

1.01 This practice contains information for using the MTSO (Mobile Telephone Switching Office) feature with the 1A ESS switch.

Note: The AMPS System has been officially named the AUTOPLEX System 100. This name, or the shorter version System 100, has been used in this practice. However, where the AMPS name appears due to translations, set cards, parameters, etc., it will continue to be used.

REASON FOR REISSUE

1.02 This practice is reissued to update coverage for the 1AE8A generic program. Since this is a general revision, change arrows have not been used.

FEATURE AVAILABILITY

1.03 The MTSO feature is an optionally loadable feature and is available with the 1AE8A (release 2) generic program.

2. DEFINITION/BACKGROUND

DEFINITION

2.01 The MTSO feature provides mobile telephone service to large numbers of subscribers in a MSA (mobile service area) with transmission quality, availability, and reliability approaching that of wire-line service. Subscribers obtain service from a system operator in a MSA in which they normally expect to place and receive calls. Subscribers may also travel outside this MSA and obtain service from other systems on a roamer basis.

2.02 The following paragraphs provide a brief description of the features existing in release 1 and currently scheduled for release 2.

A. Release 1 Features

2.03 The ***Automatic Message Accounting*** feature automatically records billing information on magnetic tape at the MTSO for later processing by the accounting center. See reference (14) in Part 18 for automatic message accounting details.

2.04 The ***Roamer I Service*** feature provides the capability to set up a call to or from a roaming mobile unit. A roamer is defined as a mobile unit located in a foreign MSA. A land-line customer with Touch-Tone dialing must dial a special roamer access code. Upon receipt of a second dial tone, the 10-digit DN (directory number) of the roamer is dialed. A land-line customer equipped with rotary dial or a coin phone user must be processed through an attendant to complete the call. See reference (12) in Part 18 for roamer service I details.

2.05 The ***Speed Calling*** feature permits the use of 1-digit codes (2 through 9) to dial eight of the frequently called local and/or long distance numbers. Speed calling is implemented by dialing the 1-digit code representing the local and/or long distance number. See reference (6) in Part 18 for speed calling details.

B. Release II Features

MTSO Features

2.06 The ***Call Delivery*** feature is provided in conjunction with the roamer service TLDN (temporary local directory number). The roamer service representative at the host system arranges with the mobile user's home system to forward calls from the home system to the TLDN at the host system. This service can be provided only if the roamer has call forwarding in his home system. See reference (13) in Part 18 for call delivery details.

2.07 The ***Conditional Call Forwarding*** feature redirects a mobile subscribers incoming calls to another destination of the user's choice. Conditional call forwarding redirects an incoming call if the mobile is busy, does not respond to mobile unit paging, or does not answer within a specified time (about 15 seconds). A mobile subscriber may activate conditional call forwarding at any time by dialing the appropriate access code and the desired number from his/her mobile telephone. See reference (8) in Part 18 for conditional call forwarding details.

2.08 The ***Immediate Call Forwarding*** feature redirects a mobile subscriber's incoming calls to another destination of the user's choice. Immediate call forwarding redirects an incoming call immediately, and attempts to signal the mobile subscriber by a short alert. A mobile subscriber may activate immediate call forwarding at any time by dialing the appropriate access code and the desired number from his/her mobile telephone. See reference (7) in Part 18 for immediate call forwarding details.

2.09 The ***Call Waiting*** feature permits a mobile user to detect an incoming call when he/she is already on a call. The mobile user may answer the new call, alternately converse with either party while the other party is held, and at any time disconnect one of the parties and continue talking to the remaining party. The call waiting feature is service order changeable when first introduced. Consequently, per call cancellation, occasional use, and usage-sensitive billing is not provided as part of the initial basic ser-

vice. See reference (10) in Part 18 for call waiting details.

2.10 The ***Data Services*** feature gives the mobile subscriber the ability to make data calls to land locations that use standard telephone modems and get special error protection for the data transmission. a special group of trunks tied to the MTSO and each trunk will have a cellular data modem interconnected back-to-back with a 212A standard telephone modem. See reference (15) in Part 18 for data services details.

2.11 The ***Improved Access to Interexchange Carriers*** feature allows the mobile user to place calls through interexchange/international carriers using either the 950-10XX or 10XXX method. Presubscription to interexchange/international carriers is also supported. See reference (1) in Part 18 for carrier interconnect details.

2.12 The ***Priority Calling*** feature provides as an adjunct to call forwarding. Priority calling allows the customer to be alerted even though his/her calls have been forwarded to another number. In priority calling a TLDN is used as a SDN (second directory number) for a home as well as a roaming subscriber. The SDN can then be used to reach the mobile subscriber when ICF is active on his/her primary directory number. see reference (11) in Part 18 for priority calling details.

2.13 The ***Roamer II Service*** feature provides the roamer with the option of requesting a directory number in the system in which he is roaming. This directory number, referred to as a temporary local (TLDN), is assigned for a period of time specified by the roamer. A land-line customer can then reach the mobile unit directly by dialing the TLDN. The roamer may also have vertical services associated with the TLDN. The roamer service representative at the host system assigns to the TLDN those vertical features requested by the roamer, subject to their availability in the host system. See reference (13) in Part 18 for roamer service II details.

2.14 The ***Remote Cell Site Service*** feature permits a single MTSO to serve two groups of cell sites. These cell sites are arbitrarily called the main cell site group and the remote cell site group. Each of these groups of cell sites serve a distinct CGSA (cellular geographic service area). The service provided to each CGSA must be no different from that which would be provided by two separate MTSOs. A CGSA is defined to be an area that a system operator is authorized to serve and into which another co-channel system may not encroach.

2.15 The ***3-Way Calling*** feature permits a mobile subscriber, during a call, to dial and consult with a third party while the second party is held. The mobile user may either drop the third party and return to the second party, or include both in a 3-way call. If a 3-way call is set up, the subscriber may at any time drop the third party and continue with the second party, or end the call by releasing. (The mobile customer cannot drop out of a 3-way call and leave the other parties connected.) The system will always apply confirmation tone before completing the call. See reference (9) in Part 18 for 3-way calling details.

2.16 The ***Voice Privacy*** feature provides the mobile subscriber call privacy with high quality voice transmission. Since normal calls can be monitored by an FM radio tuned to cellular frequencies, this feature is desirable for communication of private business. See reference (15) in Part 18 for voice privacy details.

Cell Features

2.17 The ***Dynamic Power Control*** feature provides a means of controlling interference by varying power levels. There are two forms of dynamic power control, directed and autonomous. Directed dynamic power control is used by a cell site to control the radiate levels of subscriber units. Autonomous dynamic power control is used by a cell site to control its own radiated levels. In both cases, radiated power levels are controlled dynamically in response to changing signal level conditions at the subscriber unit and cell site. When received signal levels are inadequate, transmitter levels are increased. Conversely, when received levels are more than adequate, transmitter levels are reduced.

2.18 The ***Multiple Cell Generic Capability*** feature provides a multiple cell generic environment in which more than one cell generic is supported at the MTSO. This capability is useful for many reasons. An official and work issue can reside simultaneously, multiple copies can aid in coordinating changes, and different generics may be permantly resident. This feature is highly desirable when Mod 1 and Mod 2 cell sites are mixed in a system since they require different cell generics.

2.19 The ***SAT Detection During High-Order Locates*** feature is utilized in high density situations to remove interference dominated locates. The supervisory audio tone frequency is detected in addition to the voice channel signal strength. This feature reduces the cutoff call rate by at least a factor of two in an interference limited system.

2.20 The ***32-Digit Mobile Dialing Capability*** feature increases the number of digits that can be received from a mobile unit. It is necessary to increase the number of digits from 16 to 32 because of 10XXX dialing with carrier interconnect for international calls, and if 10XXX or IDDD (international direct distance dialing) numbers are allowed as destinations for call forwarding.

Custom Features

2.21 The ***Message Desk Service*** feature allows a mobile subscriber to use a voice storage system where a calling party can leave messages for the subscriber. A call to the message desk service subscriber who is busy or does not answer, is forwarded by the MTSO via a special trunk group to the voice message exchange machine. The calling party can leave a message which the subscriber is able to retrieve at a later time. See reference (16) in Part 18 for message desk service details.

2.22 The ***Roamer Serial Number Announcement*** feature returns a special announcement to an originating roamer that is denied service as a result of a FSN list search. The call is brought up to a voice channel and a special announcement is provided by the MTSO. See reference (13) in Part 18 for roamer serial number announcement details.

2.23 The ***Roamer Serial Number Registration*** feature provides the capability for a positive fraudulent serial number list. An MTSO using the roamer serial number registration feature will have a fraudulent serial number list which contains the serial numbers of roamers which are to be allowed service. See reference (13) in Part 18 for roamer serial number registration details.

BACKGROUND

2.24 The System 100 represents a new concept in mobile system design employing the latest software, hardware, and call processing technology. The hierarchy of the System 100 is illustrated in Fig. 1.

2.25 The System 100 supplies mobile telephone service using a cellular radio plan. The cellular plan divides a metropolitan area into a number of coverage areas or cells. Each cell is assigned a portion of the available radio channels. The channels used in one cell are reusable in spatially separated cells in the same MSA.

2.26 The System 100 consists of a 1A ESS switch as the MTSO and up to 255 cell sites.

2.27 The MTSO may be connected by either wire-line voice or carrier facilities to a distributed array of cell sites which, in turn, communicate via radio voice channels and data paths with ***mobile units***. A message switch and wire-line data links or carrier facilities provide the necessary communication medium for the MTSO and cell sites. A MTSO interconnects with the PSTN (public switched telephone network) through wire-line voice facilities to one or more class 5 central offices. The OSS (Operations support systems) facilitate the operation, administration, and maintenance of the System 100 by the service provider.

2.28 The MTSO is the central controller and coordinator for the System 100. The MTSO switches calls to and from the PSTN, sets up and monitors calls by interfacing with the cell sites, and supervises overall system maintenance and administrative functions.

2.29 The cell site controls the radio environment and provides the interface between the facilities which interconnect with a MTSO and the radio channels assigned to each cell. Each site exchanges and processes information received from a MTSO and a mobile unit to accomplish the following tasks:

- Set up calls.
- Monitor calls to ensure that adequate quality is maintained.
- Cooperate with other system elements in selecting a new voice channel (in another cell or on a different face of the same cell) and moving the call to that channel (i.e., handoff) when a mobile unit has traveled beyond the confines of the initial site's serving area.

- Ensure system reliability by diagnosing, isolating, and correcting internal faults.

2.30 For a detailed description of the System 100 hardware, see reference (3) in Part 18.

DESCRIPTION

3. USER OPERATION

CUSTOMER

A. Mobile Origination

3.01 To originate a call, the user must first turn on the mobile telephone set by placing the vehicle ignition switch to the on or accessory position. If the LOCK indicator remains lighted, the telephone set may be unlocked by dialing the assigned 3-digit unlock code. The user may now dial the called number including the area code, if required. Dialing may be done with the handset in or out of its cradle. The dialed number is shown on the dialed digits display, allowing the user to check for dialing errors before placing the call. Entries on the dialed digits display move from right to left as they are dialed. Up to ten digits are displayed. The entire number can be reviewed by depressing the NMBR key. If an error is made in dialing, the CLR key must be depressed and the complete number dialed again. After the number is correctly dialed, the SEND key must be depressed to place the call. If the handset has not been lifted from its cradle, the called party answer is heard on the telephone set speaker. In order to talk, the caller must remove the handset from the cradle.

B. Termination of Call

3.02 If a call fails to complete, a fast busy signal may be received indicating that either the MTSO or the telephone company did not process the call. In this case, the call should be terminated and attempted again (depress END, then SEND). If an alternating tone intercept signal is received indicating a dialing error, the call should be terminated (depress END) and redialed. An active call may be terminated at any time by returning the handset to its cradle or by depressing the END key.

3.03 While preorigination dialing permits the user to dial a number into memory at any time before placing the call, even during another conversation, the user should not pause more than 2 minutes during dialing. If a delay longer than 2 minutes occurs, all previously dialed digits are cleared from memory when the next digit is dialed. This digit starts a new sequence. That is, if the user believes a pause longer than 2 minutes has occurred between dialed digits, the user should depress the CLR key and redial the entire number.

CELLULAR SERVICE PROVIDER

A. MTSO/Cell Site/Mobile Unit Interface Call Processing Functions

3.04 These functions are MTSO and cell site actions which require information to be transferred across the MTSO/cell site and cell site/mobile unit interfaces. Typically, these functions are performed during call setup, call release, voice channel selection, invocation of vertical services, flash, etc. The MTSO/cell site/mobile unit functions are as follows:

(a) ***Mobile Unit Origination:*** This function provides the capability to process a mobile unit request to originate a call.

(b) ***Mobile Unit Termination:*** This function provides the capability to process an incoming call from a zone office or from another mobile unit to a mobile unit.

(c) ***Release:*** This function provides the capability to process a disconnect or release request from the mobile unit or zone office.

(d) ***Handoff:*** This function provides the capability to direct a mobile unit to a new voice channel and switching path through the MTSO during a call.

(e) ***Mobile Unit Flash and Customer Service Request:*** This function provides the capability to process a mobile unit flash or request for customer services.

(f) ***Land Data Link Control:*** This function provides the capability to transmit data across the MTSO/cell site data interface.

(g) ***Radio Data Link Control:*** This function provides the capability to transmit data across the cell site/mobile unit data interface consistent with cellular system technical standards.

B. Mobile Telephone Switching System/Operator Interface Call Processing Functions

3.05 These functions are MTSO and operator system actions which require information to be transferred across the MTSO/operation position interface. Typically, these functions are performed whenever an operator-assisted call is received for or placed by the mobile unit, or the operator position is signaled by the mobile unit. The information transmitted across the MTSO/zone office interface associated with operator assistance consists of 0+ calls, 0- calls, and flashes. Access is provided to public switched network operators via a zone office. Capability is provided to recall operators after the operator completes a call.

C. Internal Call Processing Functions

3.06 These functions are MTSO and cell site actions which do not require the transfer of information across system interfaces. Typically, these functions are performed during any of the various stages of a call (i.e., setup, tear down, handoff, etc.). The internal call processing functions are as follows:

(a) ***Paging:*** This function provides the capability to determine cell sites involved in paging and to format and control page messages. Mobile units are paged globally at all designated paging cell sites associated with a MTSO.

(b) ***Roamer Functions:*** These functions provide the capability to set up a call to or from a roaming mobile unit. This includes the ability to establish direct access using end-to-end Touch-Tone service signaling as well as call handling by a System 100 attendant for originating parties without Touch-Tone service signaling. The System 100 attendant is a station associated with the MTSO but is not located at the MTSO.

(c) ***Multiple NPA (Numbering Plan Area) Functions:*** These functions provide the capability to serve multiple NPAs within a MSA.

(d) ***Fraud Prevention:*** This function provides the capability to verify serial numbers for home mobile and roamer units, to scan both an invalid serial number list and a valid roamer service list (permissible exchanges) for roaming mobile units, and to record possible fraudulent calls.

(e) ***Digit Interpretation:*** This function provides the capability to decode and analyze dialed digits received from a mobile unit. This includes IDDD (international direct distance dialing) capability.

(f) ***Incomplete Call Treatment:*** This function provides the capability to dispose of a call which cannot be completed or which has been abnormally terminated. This includes the use of appropriate announcements and tones.

(g) ***Routing:*** This function provides the capability to route a call originated by a mobile unit to the zone office or to another mobile unit. The selection of an outgoing zone office is based upon the called number. Alternate routing is available.

(h) ***Screening and Class-of-Service:*** These functions provide the capability to handle calls to or from mobile units with a class of service that requires screening to determine the manner in which a call should be completed. Capability is provided to deny calls to or from mobile units.

(i) ***Overload:*** This function provides the capability to detect and control system overload conditions.

4. SYSTEM OPERATION

HARDWARE

A. I/O (Input/Output) Processor Frame

4.01 The MTSO feature uses the existing 1A ESS switch I/O processor to provide a 2-way interface between the using system I/O devices and the MTSO central control. An I/O processor consists of a DMAC (direct memory access controller), an IOMP (I/O microprocessor) community with up to eight LIU (line interface units), and a fanout board with up to eight PC (peripheral controllers). For historical reasons, these units can be referred to by other names. The DMAC is referred to as an IOUS (I/O unit selector). The fanout board is referred to as an IOMP (the I/O microprocessor community is IOMP 0 and the fanout is IOMP 1). The LIU and PC are referred to as IOUC (I/O unit controller). The DMAC provides a supervisory and control processing interface for data exchanged between the 1A ESS switch processor and the microprocessor communities. The fanout board is simply a buffer, since the micropro-

cessor is in the PC. The LIU is used for low-speed TTY channels. The PC is used for high-speed synchronous data links. For the MTSO feature, the PC implements the BX.25 level 2 synchronous link protocol.

4.02 For System 100 usage, each data link to a cell must be on a different I/O frame and power bus. The I/O frames are powered by two buses. Bus 0 powers IOUS 0 while bus 1 powers IOUS 1. Therefore, each pair of data links to a cell will link through an IOUS 0 and IOUS 1 on different I/O frames.

4.03 The I/O processor frame is a 1-bay frame, 2 feet 2 inches wide and 7 feet high. Figure 2 is a front-view illustration of an I/O processor frame equipped with 3B I/O processor growth units. An I/O processor frame may be partially or fully equipped. A fully equipped I/O processor frame contains:

(a) Two I/O processor bus units, J5A006DA-1

(b) Two I/O processors, each consisting of:

(1) One I/O processor logic unit, J5A006DB-1

(2) One I/O processor growth unit, J1C130AB-1.

(c) One I/O filter unit, J5A006DC-1.

Note that an I/O processor is not assigned a J code. The I/O processor units are merely a grouping of equipment.

4.04 A block diagram of the I/O processor frame, as used for the MTSO feature, is shown in Fig. 3. Each I/O processor frame contains two DMACs which is the main interface to the peripheral bus for each set of channels. Each DMAC contains a microprocessor and a growth unit or fanout. The microprocessor connects through LIUs to the channels used for TTY links, while the fanout connects through PCs to the channels which can be used as System 100 cell data links. Each TTY channel may have up to three ports or three simultaneous users on that channel.

B. MTSO/Cell Site Data Links

4.05 Two dedicated data links carry call processing and control information between the MTSO and each cell site. One dedicated data link carries call processing information, and the other dedicated data link carries control and maintenance information. Should one data link fail, the other data link can pick up the failed link's responsibility. The data links can be divided into three basic sections. These sections are the I/O processor hardware at the MTSO, the RS449 standard interface at the cell site, and the transmission facilities connecting both ends.

4.06 The RS449 standard interface can work at many different speeds and is the cell site interface for any data links provided for the MTSO feature. Currently, the cell site MTSO data links are provided for 9.6 kb/s operation.

4.07 The data transmission channels are supplied by a local carrier. Required data terminal equipment may be owned by System 100, or may be supplied by a local carrier. All transmission equipment supplied by the local carrier must conform to the System 100 specifications.

C. Cell Site Trunks

4.08 Voice-grade trunks that are connected between the MTSO and cell sites are referred to as cell site trunks. The trunk circuit used for this application is the SD-1A236-05. The cell site transmission facilities may be metallic, radio, or carrier. The cell site trunk circuits (SD-1A236-05) required for the MTSO feature will be obtained from AT&T as part of the MTSO equipment order.

D. Loop-Around Trunks

4.09 On mobile-to-mobile calls within the same MTSO, the connection is made entirely within the System 100 network by connecting two cell site trunks together at the MTSO through a loop-around trunk circuit. The SD-1A236-05 trunk circuit is used in the loop-around trunk application.

E. Cell Site Hardware

4.10 The voice frequency attenuators (4 dB pads) should be removed from all loop-around trunks in the MTSO. This is recommended regardless of the generic program issue or features installed. Most MTSOs were engineered with NJ01061F-1 units mounted on the distributing frame. These units are able to accept up to 96 KS-21265 plug-in attenuators.

4.11 For a detailed description of the cell site hardware, see reference (3) in Part 18.

OFFICE DATA STRUCTURES

A. Translations

4.11 The System 100 translations data base consists of data which is either office dependent or cell site dependent and which is resident in the MTSO and the cell site. The cell site data base has a master copy residing in the MTSO.

4.12 The System 100 translations data consists of three major categories: (1) modified existing 1A ESS switch translators, (2) System 100 MTSO-only translators which exist only at the MTSO, and (3) System 100 cell site master translators which contain the master copy of the System 100 data resident at each cell.

4.13 The three categories of System 100 translators are listed below.

(a) Modified existing 1A ESS switch translators are as follows:

(1) Directory number translator

(2) Line equipment number translator

(3) Trunk group number translator auxiliary block

(4) Trunk group number translator auxiliary block for loop-around trunks

(5) Trunk network number to trunk group number translator auxiliary block for loop-around trunks

(6) Trunk group number supplementary table translator

(7) Trunk network number to trunk group number translator auxiliary block for cell site trunks

(8) Pseudo route index expansion table for PRI 045, 057, 058, 059, 060, and 061

(9) Route index expansion table for RI131.

(b) The System 100 MTSO-only translators are as follows:

(1) The directory number to serial number translator

(2) Cell site translator

(3) Cell site trunking translator

(4) The AMPS miscellaneous information translator

(5) Input/output processor KCODE to cell site channel number translator

(6) Input/output processor member number translator

(7) Cell dialup channel translator.

(c) The System 100 cell site master translators are as follows:

(1) Cell master status translator

(2) Cell master equipage translator

(3) Cell master location translator.

Modified Existing 1A ESS Switch Translators

4.14 The MTSO feature uses an abbreviated code (type 2 entry) except when call forwarding is used for the given DN. When call forwarding is used, an auxiliary block entry is required. See reference (7) and (8) in Part 18 for call forwarding details. Each mobile is assigned a PLEN (pseudo line equipment number). The PLEN is used to describe a line which is not equipped in the MTSO. Item 7 in word 1 of the abbreviated code expansion table (Fig. 4) is set to indicate a mobile DN. The terminating major classes used for the MTSO feature is 4FIND and 4FDT83.

4.15 Figure 5 displays how mobile DNs are randomly assigned from the DNs of their zone offices. Translations required to route a call from the MTSO to a DN that is assigned to its zone office is shown in Fig. 4. To avoid rapid depletion of NGNs at the MTSO, a common NGN is assigned to NXX, D4 combinations assigned at the zone office. Each NGN assigned at the MTSO has a route index associated with it. This route index is directed to a trunk group

routed to the proper zone office. The route index must reside in the DN head table entry for this NGN (Fig. 4). The translation layout for the NOC-NGN translator is shown in Fig. 5 with an example of a common NGN assignment. The example assumes that zone 1 has the ZZZ exchange, the MTSO has DNs 222-5000 through 222-5999, and that NOC 1 represents NXX222. In the left hand side of the NOC-NGN table, all bits are set to indicate that this is a common NGN.

4.16 The MTSO feature uses an abbreviated code (type 2 entry) for LEN (line equipment number) translations (Fig. 6) without speed calling. When speed calling (one digit only) is used, an auxiliary block entry is required. Item 7 in word 2 of the abbreviated code expansion table is set to indicate a mobile LEN. The originating major classes used for the MTSO feature are 4FDENO, 4FIND, and 4FMAN.

4.17 The TGN (trunk group number) auxiliary block for trunks connected to the cell site is shown in Fig. 7. Trunk groups with trunks between the MTSO and the cell site may have TGTYPE (trunk group type) equal to 6. When TGTYPE is equal to 6, TU (trunk usage), a field of the trunk class code will always be 2, indicating 2-way trunks. For some MTSO offices, System 100 must have the ability to use/assign cell site trunk groups with trunk group type 13 and a trunk class code defining 1-way trunks. Three fields are defined in the auxiliary block for the MTSO feature. These fields are the CSN (cell site number), the antenna face (ANT), and the SG (server group). Item ANT is the antenna face, ranging from 0 through 3. Antenna 0 represents the omni directional antenna. Antennas 1 through 3 represent directional antennas and are numbered clockwise from antenna 1. Item SG is the server group. Server group 0 is the primary server group, or preferred set of radios, the mobile is to be served on. Server group 1 only exists for dual cells. All cell site trunks (SD-1A236, circuit program index [CPI] 21) have scan point 0 assigned a TPI (trunk program index) of 0 and scan point 1 assigned a TPI of 57.

4.18 Trunk groups with trunks between the MTSO and the cellular mobile radio office must have TGTYPE equal to 6, trunk class code equal to 2, with an originating class of 27.

4.19 Trunk groups consisting of MTSO loop-around trunks are required to have TGTYPE equal to 2. Trunk usage must be 2, indicating 2-way trunks. Refer to Fig. 8 for a layout of the trunk group number auxiliary block for loop-around trunks.

4.20 The trunk network number-to-trunk group number HILO intraprocessor auxiliary block for loop-around trunks is shown in Fig. 9. This auxiliary block is not impacted by the System 100 feature and is included for information purposes only.

4.21 The MTSO feature uses the type 3 TGN supplementary table translator (Fig. 10) for MTSO loop-around trunks. For the MTSO feature, item 10 in word 0 must be set to 1 to indicate that the optional word is to be built. Item 0 of optional word K must be set to 1 to indicate at the MTSO that this is a MTSO loop-around trunk group. Item 1 of the optional word K must be set to 1 to indicate at the zone office that an MTSO trunk group is being used. In addition, item 2 of the optional work K must be set to 1 to indicate MTSO loop-around trunk groups without attenuation padding.

4.22 The trunk network number to trunk group number auxiliary block for cell site trunks shown in Fig. 11 has the following fields defined for the MTSO feature:

(a) Item VRCHNL indicates the channel number the radio uses to transmit and receive on.

(b) Item VR is the voice radio number within the voice radio functional group. This number is input as a decimal number, ranging from 0 through 7.

(c) Item VRG is the voice radio group, ranging from 0 through 12.

(d) All cell site trunks use TYPE 3 supervision in the trunk class codes.

4.23 The PRI (pseudo route index) expansion tables required for the MTSO feature are shown in Fig. 12. The PRIs required for the MTSO feature, applicable when the 9F164 AMPS common feature package is activated, are as follows:

(a) ***PRI 045:*** This index is used to route to the MTSO loop-around trunks for an intraoffice mobile call.

(b) ***PRI 057—No Page Response:*** The mobile did not respond to a page which means the

mobile is either turned off, not accepting calls, or out of the mobile service area.

(c) ***PRI 058—Incoming Facilities:*** This index is used for routing when problems with facilities occur during a terminating call to a mobile after the mobile has responded to paging and before ring time-out.

(d) ***PRI 059—Mobile Roamer Intercept:*** A roamer (mobile belonging to another service area) is denied service in this mobile service area.

(e) ***PRI 060—Alerting Discontinued:*** The mobile was alerted (ringing) and timed out (mobiles are only allowed to ring for a specified time).

(f) ***PRI 061—No Mobile Service Treatment:*** The mobile DN was unassigned or illegal.

4.24 The fixed route index expansion table required for the MTSO feature is shown in Fig. 13. Route index 131 is assigned for a dedicated group of milliwatt test lines used for a loop-around trunk diagnostic.

System 100 MTSO-Only Translators

4.25 The DN to SN (serial number) translator (Fig. 14) provides the serial number of the mobile, a 32-bit quantity used for identification and security purposes. The 32-bit SN is input as an 11-digit octal number, with the most significant digit limited to a range of 0 through 3 (in order to keep the serial number to 32 bits). The 2-word entry in the DN to SN subtranslator contains the SN of the mobile, the paging channel over which the mobile may be paged, and a flag to indicate how the mobile shall be paged. Each 2-word entry consists of the following:

(a) The 32-bit serial number (broken up into bits 0 through 23 and 24 through 31) is used to uniquely identify a mobile.

(b) The PC (paging channels) indicator indicates which PC set (set of frequencies) the mobile is to be paged on (notifying the mobile for initial setup of a terminating call). A 0 indicates that the mobile is to be paged over the first set; a 1 indicates that the mobile is to be paged over the second set.

(c) The EMIN (extended mobiles identification number) flag indicates whether a long MIN (mobile identification number) or a short MIN is used to page the mobile. A MIN is an encoded form of the DN. A short MIN only encodes the first seven digits of a DN (24 bits), while a long MIN encodes the NPA digits as well (34 bits). When set, it indicates the mobile should be paged with a long MIN.

4.26 The purpose of the cell site translator (Fig. 15) is to store information needed about the cell sites. Each entry in the head table points to another head table for that particular cell site information.

4.27 The cell site trunking translator (Fig. 16) is required for the following purposes:

(a) To determine the voice trunk route index for a set of voice radios serving a specific antenna face and server group

(b) To determine the antenna face and server group which contains a specific cell site voice radio

(c) To determine the trunk network number of the trunk connecting a voice radio to the MTSO.

4.28 The cell site trunking translator head table is indexed by the cell site number. Each entry is an address of an auxiliary block. A second piece of data, the antenna face and server group, is used to index into word 1 through word 8 of the auxiliary block. Word 1 through word 8 of the auxiliary block contains the RI (route index) for the antenna face and server group. There is only one RI allowed per antenna face and server group. The second index into the auxiliary block is the voice radio number at the cell (0 through 95). This indexed data word contains the trunk network number the voice radio is dedicated to and the antenna face and server group the radio belongs to at the cell. Item NO. OF RADIOS in word 0 of the auxiliary block specifies the total number of equipped radios in the cell. Item CELSTAT specifies the state of the cell. The mode of the cell is specified as follows: 00 = unequipped, 01 = illegal, 10 = growth, 11 = equipped.

4.29 The function of the AMPS miscellaneous information translator (Fig. 17) is to provide

miscellaneous information needed for the MTSO feature as follows:

(a) System wide parameters, most of which must be broadcast from the cell to the mobile

(b) A list of paging cell sites, those cell sites which are used to initially access the mobile for a mobile terminating call

(c) A list of other service areas not in this MSA, which are allowed access to this system

(d) An individual list of roamers that are not allowed to access this system (a list of fraudulent serial numbers).

4.30 Each entry in the AMPS miscellaneous information head table (Fig. 17) is unique in its data. The first auxiliary block (AMPS miscellaneous auxiliary block), pointed to from the head table, contains miscellaneous functional capabilities and MSA wide data for System 100 software. The auxiliary block fields are defined as follows:

(a) Item RSV enables the roamer service validation function at the MTSO. This function checks to determine if the roamer is allowed access in this system.

(b) Item LPB enables the long page bundling function at the MTSO. This function puts packages of long pages into a single message before broadcasting to all the paging cell sites.

(c) Item CPA indicates combined paging and access channels.

(d) Item SRN is an indicator sent from the cell to the mobile, indicating to the mobile to send its serial number when accessing the system.

(e) Item DTX allows discontinuously transmitting mobiles (such as hand held portables) to access the system.

(f) Item RCF is an indicator sent from the cell to the mobile to read the control filler word.

(g) Item NWAC indicates that access channels start on a different channel than what is burned into the mobile's read-only memory. When this parameter is set, the fields CMAX and NEWACC should also be initialized.

(h) Item CMAX specifies the maximum number of access channels the mobile must scan. This value is input as a decimal number. When item CPA is initialized, item CMAX ranges from 1 through 21 (CMAX and N must be equal). When item CPA is zeroed, item CMAX ranges from 1 through 128.

(i) Item WRDN specifies the number of words in the auxiliary block.

(j) Item N specifies the number of paging channels the portable has to scan. This value is stored as N-1 to conform to the information sent to the mobile. Value N-1 is input as a decimal number ranging from 1 through 21. This value is internally stored as 0 through 20 by subtracting 1 from the input.

(k) Item NEWACC specifies a setup channel. This value is input as a decimal integer ranging from 1 through 333 if in channel set A, or from 334 through 666 if in channel set B.

(l) Item LOCREQ specifies the location request limit. This is the maximum number of requests a cell will accept for signal strength measurements from other cells whose signal strengths have fallen below their primary signal strength threshold. This limit is used by overload to determine how many requests will be allowed to reach the cell on a per second basis before they are dropped. This limit ranges from 1 through 15 requests. The default value for this field is six requests.

(m) Item SID specifies the 14-bit system identification of the MSA. This value is input as a 5-digit decimal number ranging from 1 through the full range of 14 bits. Bit 0 is used to represent the channel set group, 0 = channel set B, 1 = channel set A.

(n) Item OVRLTI specifies the total time (in seconds) between three successive signal strength measurement pairs taken on a voice radio while a call is in progress during overload conditions. The range for this field is from 1 through 255. The default value for this field is 10.

(o) Item TEVST specifies a threshold used for traffic event recording. There are two traffic counters involved: EVSUCC (This is pegged whenever an event recording message is successfully transmitted) and EVFAIL (This is pegged whenever an event recording message cannot be transmitted.) Whenever EVSUCC equals TEVST, EVFAIL is decremented by one and EVSUCC is zeroed. This field is 8 bits long with a range from 0 to 255.

(p) Item TEVFT also specifies a threshold used for traffic recording. When EVFAIL exceeds TEVFT, a minor alarm is sounded indicating an overload of the output channel. In this case, event recording is stopped. This field is 16 bits long with a range from 0 to 65535.

(q) Item SDT specifies a threshold used to determine if the collected SATs are within the valid spectrum. During location, these SATs are collected from the cells being considered for handoff. This field is 8 bits long ranging from 0 to 255.

(r) Item GCPCF specifies whether dynamic power control is turned off/on at the individual cell sites. Only the rightmost bit is used, the allowable value for the field is 0 or 1.

(s) Item GMPCF specifies whether dynamic power control is turned off/on at the mobiles within the cell site. Only the rightmost bit is used, the allowable value for the field is 0 or 1.

(t) Item DCT specifies a threshold used to determine the number of diversity state changes during a periodic locate interval below which a trending state may be activated. This field is 8 bits long with a range from 0 to 255.

(u) Item SLPV determines the number of locate periods skipped while in a trending state. This field is 8 bits long with a range from 0 to 255.

(v) Item MPCT specifies the mobile process counter threshold. Further action is taken if the number of executions of a specific task within the mobile power adjustment process exceeds this value. This field is 8 bits long with a range from 0 to 255.

(w) Item CPCT specifies the cell site process counter threshold. Further action is taken if the number of executions of a specific task within the cell site power adjustment process exceeds this value. This field is 8 bits long with a range from 0 to 255.

(x) Item FGDIFF specifies the difference in gain (in dB) between the path from the receive-antenna-transmission-line output to the control-frame-radio (setup or locating) receiver input and the path from the receiver-antenna-transmission-line output to the voice-channel-radio receiver input. This field ranges from 0 to 31 dB and is decimal input from 0 to 31 with increments in steps of 1 dB.

4.31 The second auxiliary block (paging cell sites auxiliary block), pointed to from the head table (Fig. 17), contains the list of paging cell sites for this MSA. The first parameter in word 0 contains the number of bytes (8 bits) in the auxiliary block (not including word 0). Word 1 starts with the list of paging cell sites, packed three cell site numbers to a word. The next byte after the last cell on the list contains the total number of paging cell sites (maximum 255). This data is used by the paging process to format a broadcast message to the paging cell sites.

4.32 The function of the IOP K-code to cell site channel number translator (Fig. 18) is to translate the cell site number to a specific data link hardware location, needed by the data link software in order to send messages. Each cell has two data links: a high priority and a low priority link.

4.33 The structure of the IOP K-code to cell site channel number translator is actually two separate tables. The tables are pushed together into one structure in order to save space. Although these two tables are the inverse of each other, they are of different lengths; and hence, the member number and channel number contained in each word are not related to each other.

4.34 The cell site channel number to IOP K-code table is indexed by a 9-bit cell site channel number, 8 bits indicating the cell site number, and a low-order bit indicating the low (1) or high (0) priority data link. Each entry contains the data link member number. Since each cell site requires two data links and the highest numbered cell is 255, the maximum length is 512 entries.

4.35 The IOP K-code to cell site channel number table structure is the opposite of the cell site channel number to IOP K-code table, indexing by the I/O processor member number to obtain the 9-bit channel number. The I/O processor member number field is broken up into five fields, with the hardware configuration represented in Fig. 18. The five fields are as follows:

(a) ***I/O Group:*** The I/O group contains four I/O frames.

(b) ***IOUC (Unit Controller):*** The IOUC controls one data link as shown in Fig. 19. The System 100 data links only use IOUC 10 through 17 of any given IOUS.

(c) ***IOMP (Microprocessor):*** The IOMP controls eight I/O unit controllers. There exists only one IOMP and one fanout as shown in Fig. 19; but for simplicity, the microprocessor which controls the TTY channels is designated IOMP 0 and the fanout for the System 100 data links is designated IOMP 1.

(d) ***IOUS (Unit Selector):*** The IOUS controls two I/O microprocessors.

(e) ***I/O Frame:*** The I/O frame contains two IOUSs.

4.36 The System 100 cell site data links can only exist on IOMP 1; therefore, for the cell site channel number to IOP K-code table, the IOMP field must be set. For the IOP K-code to cell site channel number table, the CHAN field is zeroed when indexed with an IOMP of zero.

4.37 An additional set of requirements is that each data link to a cell be on a different I/O frame.

4.38 Since each I/O processor has the capacity for 16 members (although only 8 members can be System 100 data links), the length of the IOP K-code to cell site channel number table is 16 times the maximum number of I/O processors in the office, for a length of 1024 entries.

4.39 The function of the I/O processor member number translator (Fig. 20) is to store equipage information about each IOUS and its channels (Fig. 19). This translator is a unit-type translator stored in the unit-type head table (master head table + 512). The I/O processor member number subtranslator address is contained in the unit-type head table + 59. The subtranslator is indexed by the IOUS member number which is made up of I/O group number (0 through 7), I/O frame number within the group (0 through 3), and the IOUS within the frame (0 through 1). The first eight entries in the subtranslator are zeroed out (the information about IOUS 0 through 7 is stored in parameters). Any unequipped IOUS has a subtranslator entry of 0. Each equipped entry in the subtranslator is a pointer to an auxiliary block of information whose fields are defined as follows:

(a) Item WRDN specifies the number of words in the auxiliary block.

(b) Item MPO specifies the equipage status of microprocessor 0 (the IOMP). This is a 2-bit field with 00 = unequipped, 01 = growth, 11 = equipped, and 10 a special growth which is not used by the MTSO feature.

(c) Item MP1 specifies the equipage of microprocessor 1 (the fanout). Item MP1 has the same units as item MP0.

(d) Item IOUS specifies the equipage status of the IOUS. Item IOUS has the same units as item MP0.

(e) Item IOUSTYPE specifies the type of IOUS currently being used. This field is always one for the MTSO feature to indicate that this IOUS contains a microprocessor.

(f) Item LDI specifies the hardware LDI number which describes the current hardware version of the IOUS. The current hardware version is represented as a member-type number assigned in the hardware LDI and is changed every time a class A change has occurred in the IOUS. Item LDI is used by the diagnostic controller to determine what set of diagnostics to use for this IOUS.

(g) Item PPADR specifies the pulse point address or the address of the maintenance point needed to talk to the IOUS. Each I/O frame has a pair of GCP (generated control pulses) points starting with IOUS 0, which has the even-numbered pulse point, and IOUS 1, which has the odd-numbered pulse point. The octal address is stored in this field and is input as the pulse source

name. These pulse points must be assigned in the pulse source range PPU030 (octal address 00404001) to pulse source PPU093 (octal address 02001010). Pulse source PPU030 and PPU031 is the first pulse point pair in this range. The pulse source name and octal address is shown in Table A.

(h) Item PTSOURCE specifies the format of the IOUS pulse point source. This item is equal to zero for the MTSO feature.

(i) Eight consecutive scan points are assigned per I/O frame and are grouped as shown in Fig. 21. Items SCNPT and PUBSCNPT are defined as follows:

(1) The supervisory master scanner octal scan point address of the power control switch, item SCNPT, assigned to each IOUS is the address of the first of the two points of the given IOUS. For IOUS 0, SCNPT is the address of the first scan point for IOUS 0. For IOUS 1, SCNPT is the address of the first scan point for IOUS 1. Refer to Fig. 21 for the lead designations.

(2) The supervisory master scanner octal scan point address for each PUB, item PUBSCNPT, is the same for both PUBs of an I/O frame. This field contains the address of the first of two scan points needed for PUB 0 of the frame. The scan point address for PUB 1 is calculated by adding 4 to the PUB 0 address. Refer to Fig. 21 for the lead designations.

(j) Eight CPD (central pulse distributor) points are assigned per I/O frame and are grouped as shown in Fig. 21. Items MDPNT and PUBMDPNT are defined as follows:

(1) The bipolar CPD point address of the CPD points for each IOUS, item MDPNT, is assigned the same as for SCNPT. Refer to Fig. 21 for the lead designations.

(2) The bipolar CPD point address of the CPD points for each PUB, item PUBMDPNT, is the same for both PUBs of an I/O frame and is assigned the same as for PUBSCNPT. Refer to Fig. 21 for lead designations.

(k) Item NMEMN specifies the other I/O member number in the I/O frame. This item consists of the IOUS number within the frame (item 0), the I/O frame number within the group (items 1 and 2), and the I/O group number (items 3 through 5). Item 6 is zeroed.

(l) Item IOFSTMP specifies the I/O frame number stamped on the I/O frame.

(m) Items FRAME, LINE, and GRID in word 8 of the I/O processor member number auxiliary block are zero for the MTSO feature.

(n) Item CPADR specifies a unipolar CPD point. The CPD points are assigned in consecutive order for the entire group of I/O processors (8 through 63). Refer to Fig. 21 for the lead designations.

(o) Item CNTRLPT specifies a CPD point (= 0) for I/O processors 8 through 63.

(p) Items IOC0 through IOC7 specify the equipage fields for I/0 unit controllers 0 through 7. These I/0 unit controllers are for the TTY channels and are always unequipped (= 00) for the MTSO feature.

(q) Item MPOTYPE specifies the type of microprocessor for microprocessor 0. This item is set to 1 to indicate a phase 1 microprocessor for the MTSO feature.

(r) Items IOC8 through IOC15 specify the equipage of I/0 unit controllers 8 through 15. These items are designated the same as item MPO.

(s) Item MP1TYPE specifies the type of microprocessor for microprocessor 1. This item is set to 2 to indicate a phase 2 microprocessor for the MTSO feature.

4.40 Words 12 through 26 of the auxiliary block are zeroed, since the MTSO feature is not using the TTY channels. The rest of the auxiliary block contains information concerning each channel in the IOUS.

4.41 Two words are required in the auxiliary block for each channel equipped in the IOUS. This 2-word block is indexed by the I/0 member number (made up of IOMP [bit 3] and IOUC within the IOMP

[bits 0 through 2]). The fields needed for the cell data link channels are defined as follows:

(a) Item PTO specifies the equipage of port 0 in the same units as item MPO.

(b) Item PT1 specifies the equipage of port 1. Port 1 is always unequipped for the MTSO feature.

(c) Item PT2 specifies the equipage of port 2. Port 2 is always unequipped for the MTSO feature.

(d) Item DSIO specifies the data set indicator for port 0, indicating the type of connection the port has. This field is always set to 2 for the MTSO feature to indicate a private line data set.

(e) Item DSI1 specifies the data set indicator for port 1. This field is zeroed for the MTSO feature.

(f) Item DSI2 specifies the data set indicator for port 2. This field is zeroed for the MTSO feature.

(g) Item AB0 specifies whether port 0 is equipped with answer back (handshaking). This field is zeroed for the MTSO feature to indicate no answer back.

(h) Item AB1 specifies the answer back for port 1. This field is zeroed for the MTSO feature.

(i) Item AB2 specifies the answer back for port 2. This field is zeroed for the MTSO feature.

(j) Item CHNLSPD specifies the channel speed of the channel. This field is 0 to indicate 9.6 kb/s for the MTSO feature.

(k) Item IOCTYPE specifies the type of I/O unit controller on the channel. This field is always set to 7 for the MTSO feature to indicate a TN82 board doing BX.25 level 2 synchronous protocol.

(l) Item FDX specifies whether the channel is half or full duplex. This field is set to 1 for the MTSO feature to indicate full duplex.

(m) Item ACU specifies whether there is an automatic call unit connected to the channel. This field is always zeroed to indicate no call unit for the MTSO feature.

(n) Item DSTYPE specifies the type of data set on the channel. This field is set to either decimal 13 to indicate a 500A data set or decimal 14 to indicate a DATAPHONE® II data set for the MTSO feature.

(o) Item AP specifies whether an application (as opposed to common routines) is controlling this link. This field is always set to indicate application control for the MTSO feature.

(p) Item SC specifies the type of transmission on the channel. A 0 indicates a continuous transmission; 1 indicates a switched carrier or discontinuous transmission. This field is zeroed for the MTSO feature.

4.42 All eight scan points needed per I/O frame are assigned to the even numbered IOUS of the frame. Therefore, the MEMN field of the subtranslator word of the master scanner number translator or the central pulse distributor number translator (Fig. 22) is designated as an even numbered member number for the MTSO feature.

4.43 The function of the cell dialup channel translator (Fig. 23) is to obtain the DN of the dedicated maintenance TTY channel to a cell site. The head table is indexed by a cell site number, and each entry contains the address of a 11-word auxiliary block. The auxiliary block contains the BCD (binary coded decimal) representation of the 7- or 10-digit number as shown. The low-order byte following the last digit contains an end of number indicator (decimal value 15). With the addition of the carrier interconnect feature, additional word types have been added to the auxiliary block. These added word types allow for 7- and 10-digit numbers with the carrier interconnect 10xxx digits and 7 and 10 digits with 1+ dialing and carrier interconnect digits.

System 100 Cell Site Master Translators

4.44 The cell site master translators are those translators which are accessed at the cell site for cell site processing. A master copy of the cell resident data is kept at the MTSO and used for initializing and updating the cell memory. The cell site master translators are defined in paragraphs 4.45 through 4.53.

4.45 The function of the cell master status translator (Fig. 24) is to provide the cell site with in-

formation that the cell site needs to broadcast to the mobile and to provide generic information required for the multicell generic capability. The cell master status translator head table is indexed by the cell site number. Each entry in the head table points to an auxiliary block (if assigned) of a fixed size of two words containing the following data:

(a) The EMIN (extended MIN) item indicates, when set, that the mobile should access the system using a 34-bit MIN.

(b) The WFOM (wait for an overhead message) item indicates, when set, that the mobile must wait to read an overhead message from the cell.

(c) The CMAC (control mobile attenuation code) item indicates the instructions given to the mobile to control the mobile power level during initial accessing of the system. The CMAC value must be input as decimal numbers with the binary representation stored internally in the translator. The value of CMAC ranges from 0 through 7. The mobile-unit transmitter power level for setup and voice channels are given in Fig. 25.

(d) Item MAXBUSY-PGR specifies the number of times a mobile is allowed to find a setup channel busy before giving up with its page response message. The MAXBUSY-PGR value must be input as decimal numbers with the binary representation stored internally in the translator. The value of MAXBUSY-PGR ranges from 0 through 15.

(e) Item MAXBUSY-OTHER is the same as item MAXBUSY-PGR, except that the mobile is attempting to access the system for another reason besides page response (origination or registration, for example).

(f) Item DCC specifies the digital color code of the cell used to uniquely identify a cell during access. The DCC value must be input as decimal numbers with the binary representation stored internally in the translator. The value of DCC ranges from 0 through 3.

(g) Item WRDN is the number of words in the auxiliary block, in this case, two words.

(h) Item MAXSZTR-PGR specifies the number of times a mobile is allowed to try to seize a setup channel before giving up with its page response. The MAXSZTR-PGR value must be input as decimal numbers with the binary representation stored internally in the translator. The value of MAXSZTR-PGR ranges from 0 through 15.

(i) Item MAXSZTR-OTHER is the same as item MAXSZTR-PGR, except that the mobile is attempting to seize a channel with another type of message besides a page response (origination or registration, for example).

(j) Item SCC specifies the SAT (supervisory audio tone) color code of the cell. Item SCC must be input as a frequency and internally represented as a 2-digit binary field as follows:

- 5970 Hz is 00.
- 6000 Hz is 01.
- 6030 Hz is 10.
- Illegal is 11.

(k) Item LOCFCS specifies the location equipped antenna faces at the cell site which are equipped for location measurements. When the LOCFCS item is set, there is more than one antenna face equipped for location.

(l) Item UPN specifies the last generic update applied to the system. the value of UPN ranges from 1 to 99.

(m) Item GENISS specifies the last load (issue) of the current generic. The value of GENISS ranges from 1 to 15.

(n) Item GENRELS specifies the generic release number. The value of GENRELS ranges from 1 to 9.

(o) Item GENTYPE specifies the generic type and is stored as the octal representation of an ASCII character. The decimal range for this field is from 65 to 90. These are ASCII characters A through Z. This field distinquishes betweem different operational cell generics and is initialized as ASCII character C.

Interpretation of Mobile Attenuation Codes and Mobile Station Power Class

4.46 The CMAC and VMAC (voice mobile attenuation code) indicates the mobile-unit transmitter power level for setup and voice channels, respectively. A CMAC value must be associated with each cell site, and VMAC value must be associated with each face of each site. Classes I, II, and III signify maximum nominal transmitter power levels of 8, 4, and 0dBm, respectively. The MA (Mobile attenuation) is a positive number, defined as the difference in dB between 8dBm and the power level at which a mobile unit of a particular power class (MPC) transmits in response to a particular CMAC or VMAC. Figure 25 shows the value of MA for every possible combination of power class and MA code.

4.47 The function of the cell master equipage translator (Fig. 26) is to provide the cell with initialization information for peripheral equipment and maintenance power and frequency thresholds. The cell master equipage translator head table is indexed by the cell site number. Each entry in the head table points to an auxiliary block containing fields which are set or changed as shown in paragraphs 4.49 through 4.52.

4.48 Some of the fields contained in this auxiliary block involve detailed knowledge about the system (in a geographical or radio coverage sense) and hence would not be set or changed frequently by the personnel normally used for changing the ESS translations data base. These values are determined by a System 100 planning team, a team of experts who finely tune a system into its environment at both installation time and system growth points. The fields which require this type of expert assistance to change or set are referred to as expert assistance fields.

4.49 Normally, expert assistance fields are not in translations, as they are not changed often enough (or at all after installation) to warrant recent change commands. These types of fields are placed into the ESS switch in the form of parameters. In the case of System 100, some of this type of data has to be transmitted to the cell site and changed while the system is running. For simplicity, the only way System 100 can transmit and change this data at the cell site is through recent change. Therefore, any parameters needed at the cell site are put into the cell master translators and the AMPS miscellaneous information translator at the MTSO.

4.50 The fields contained in the auxiliary block are defined as follows:

(a) Item WRDN specifies the number of words in the auxiliary block.

(b) Item RSSIBD specifies the RSSI (received signal strength indicator) branch correlation difference threshold. This is the threshold used to indicate the minimum difference in signal strengths (in microvolts) received from the two diversities (two leads on an antenna) before one diversity is definitely chosen as having the stronger signal. This is an expert assistance field, input as a decimal number.

(c) Item RVDT is the reverse voice data time-out or the time limit (0 through 255 seconds) waited for a data message on the reverse channel (the channel used by the mobile to communicate back to the cell site). This is input as a decimal number.

(d) Item AAST is used in conjunction with item AAFT to generate an autonomous error report. When the number of successful access attempts exceeds this value, the success and failure counters are both zeroed. This is an expert assistance field and ranges from 0 through 255.

(e) Item AAFT is used in conjunction with item AAST to generate an autonomous error report. When the number of access attempt failures exceeds this value, an error report is generated. This is an expert assistance field and ranges from 0 through 255.

(f) Item UBCHRT specifies the power threshold of an incoming signal before it is allowed to be processed as a message (this eliminates interference noise which may look like a message). This value is input as a decimal integer, ranging from 0 through 127, determined by taking the integer part of the equation V/.03906, where V is the voltage measured in volts, ranging from 0 through 10 (at V = 10 use 255). This is an expert assistance field.

(g) Item SIL specifies the maximum expected co-channel interference on a voice channel. This

is an expert assistance field and ranges from 0 through 127, determined by the equation (INTERF + 130/.7812), where INTERF is the interference level in dBm.

(h) Item DDTSU specifies the dotting detection threshold for the setup radio transmission. This threshold is the number of received bits needed to determine whether a signal is being received. This is an expert assistance field, input as a decimal integer.

(i) Item DDTVR is the same as item DDTSU, except that this field is for the voice radio transmission.

(j) Item VRLTI specifies the total time (in seconds) between three successive signal strength measurement pairs taken on a voice radio while a call is in progress. The default for this field is 5 and is derived from the formula (16 × .1024) × 3, where 16 × .1024 (seconds) is the interval for one measurement pair. This is an expert assistance field and ranges from 1 through 255. Note that although the range for this field is through 255, it is unlikely this will ever be reached.

(k) Items SU0, SU1, SU2, and SU3 specify the status fields for setup radios 0 through 3 (00 = unequipped, 11 = equipped, 10 = growth, and 01 is an illegal designation).

(l) Item SUCHNL1 specifies the setup channel number for setup radio 1. This field is input as a decimal digit ranging from 1 through 333 if in channel group A, and 334 through 666 if in channel group B. All setup and voice channel numbers are determined by System 100 engineering.

(m) Item SUCHNL2 specifies the setup channel number for setup radio 2.

(n) Items LC0 and LC1 specify the status fields for location radios 0 and 1, respectively. These fields have the same designations as SU0.

(o) Item SUCHNL3 specifies the setup channel number for setup radio 3.

(p) Item RF specifies the status field for the test radio. This field has the same designations as SU0.

(q) Items RG0 and RG1 specify the status fields for reference generator 0 and 1. These fields have the same designations as SU0.

(r) Item MI specifies the status for the measuring instruments. This field has the same designations as SU0.

(s) Item AL specifies the status of the alarm interface. This field has the same designations as SU0.

(t) Item XVSU0 specifies the transmitter output value for setup radio 0, ranging from 250,000 through 4 million microvolts. This is an expert assistance field, set at installation and growth, and input as a decimal digit.

(u) Items XVSU1, XVSU2, and XVSU3 specify the transmitter output values for setup radios 1 through 3, respectively, set the same as for XVSU0.

(v) Items SUTRL0, SUTRL1, SUTRL2, and SUTRL3 specify the return loss (in microvolts) that should be measured by the test receiver for an output signal from an individual setup radio transmitter that is reflected from the antenna cable system. This is an expert assistance field, ranging from 250,000 through 4 million microvolts.

(w) Item BOGSU specifies the bog threshold for the setup radio functional tests. This field indicates the number of times the setup radio functional test fails to complete (or is bogged down) before the craftsperson is notified (via a TTY message sent from the cell). This is an expert assistance field and the data is input as a decimal number.

(x) Item BOGLC specifies the bog threshold for the location radio functional test. This field is defined the same as item BOGSU.

(y) Item BOGRD specifies the bog threshold for the routine diagnostics. This field is defined the same as item BOGSU.

(z) Item SUFTI specifies the setup radio functional test interval or the interval, in seconds, between performance of the setup radio functional test. This is an expert assistance field and the data

is input as a decimal number ranging up to 86,400 seconds.

(aa) Item LCFTI specifies the location radio functional test interval. This field is defined the same as item SUFTI.

(bb) Item TODRD specifies the time-of-day for routing diagnostics to be performed at the cell. The time-of-day is indicated by seconds from midnight. This is an expert assistance field and the data is input as a decimal number ranging up to 86,400 seconds.

(cc) Words 19 through 30 of the auxiliary block contain the address for the voice radio functional group auxiliary block. Each entry in the auxiliary block is indexed by the voice radio frame number (ranging from 0 through 5) and the voice radio functional group within the frame (0 or 1).

(dd) Item VRPO specifies the voice radio output power 0 (primary server group power). Each antenna may have up to two power levels, although it may not be the same as another antenna. This value is input in decimal microvolts, with the same range as XVSU0. This is an expert assistance field and is determined at installation and growth points.

(ee) Item VRP1 specifies the voice radio output power 1 (secondary server group power).

(ff) Item ANTS is used by diagnostics to determine whether diagnostic tests should be performed on an antenna. Item ANTS can be either 0 or 1, where a 0 means no diagnostic tests are performed and 1 means diagnostic tests are performed.

(gg) Item TRL specifies the return loss value (in microvolts) that should be measured by the test receiver for an output signal from a voice radio transmitter that is reflected from the antenna and antenna cable system. This is an expert assistance field with a range from 250,000 through 4 million microvolts.

(hh) Item REPL specifies a diagnostic constant that represents the RSSI value in dBm of signal level that should be measured on a voice radio receiver for a signal injected from the test generator. This is an expert assistance field ranging from 0 through 127.

(ii) Item RRL specifies the return loss value in dB that should be measured on a voice radio receiver for a signal injected from the test generator and reflected from the antenna and antenna cable system. This is an expert assistance field ranging from 0 through 127.

(jj) Item RFPC0 specifies the radio frequency power control threshold for server group 0.

(kk) Item RFPC1 specifies the radio frequency power control threshold for server group 1.

4.51 The function of the voice radio functional group auxiliary block is to provide information for the voice radio functional groups at the cell site. The voice radio functional groups are indexed by the functional group number into the cell master equipage translator auxiliary block. The voice radio functional group auxiliary block is indexed by the radio number. The voice radios at the cell site are grouped into hardware units of eight radios, called a voice radio functional group. There is a maximum of two functional groups on a voice radio frame and a maximum of six frames at a cell site. All auxiliary block fields are craft modifiable. The fields contained in the auxiliary block are defined as follows:

(a) Item FSTAT specifies the status of the entire functional group with the same units as SU0.

(b) Item VG determines whether voice group 0 or 1 is being used when a cell is equipped with 16 channels (8 channels/voice group).

(c) Item VRGCT determines whether there are 8 or 16 channels on this voice radio group (0 = 8 channels, 1 = 16 channels).

(d) Item MODEL determines what type of radio equipment is being used (01 = mod 1, 10 = mod 2, 11 = mod 3). A value of 0 is reserved for future use.

(e) Item WRDN specifies the number of words in the auxiliary block.

(f) Item VRCHNL specifies the channel number the radio is transmitting on. The channel num-

bers range from 1 through 312 if in group A, or from 355 through 666 if in group B.

(g) Item STAT specifies the status of the voice radio with the same units as SU0.

(h) Item ANT specifies the antenna number the voice radio is connected to. Voice radios 0 through 3 are connected to one antenna, and voice radios 4 through 7 are connected to another antenna. This field is the same as explained for the ANT field in the TGN auxiliary block (Fig. 7).

(i) Item SG specifies the server group the voice radio is transmitting over on the antenna it is connected to. This field has the same designation as the SG field in the TGN auxiliary block (Fig. 7).

Cell Master Location Translator

4.52 The function of the cell master location translator (Fig. 27) is to provide mobile signal location information to the cell site. The cell master location translator head table is indexed by the cell site number. Each entry in the head table points to an auxiliary block whose fields are defined as follows:

(a) Item WRDN specifies the number of words in the auxiliary block.

(b) Item LASTRY specifies the indicator signifying to the mobile whether or not the call can be redirected to another cell site for alternate access (used when the cell cannot handle the call due to overload conditions) (0 = the mobile may try again, 1 = last try).

(c) Item CTYPE specifies the cell type (0 = single, 1 = dual).

(d) Item SG0 is composed of 3-bit fields needed for server group 0. The bit fields are defined as follows:

(1) Item STYPE specifies the type of server group (0 = omni, 1 = directional).

(2) Item SS specifies the serving face/strongest face indicator. This indicator determines whether the serving logical antenna (face) or the strongest face should be used for obtaining location information (0 = use the serving face, 1 = use the strongest face).

(3) Item S0 specifies the strongest only indicator. When set, this item specifies that only the strongest face should be used for location candidate selection.

(e) Item SG1 contains the same information for server group 1.

(f) Item VCEQP specifies which faces are equipped with voice radios. Each bit in the VCEQP field represents an antenna face and server group (0 through 7) with 0 = not equipped, 1 = equipped.

(g) Item NDSLT specifies the number of times a signal level trigger is ignored during a delayed trigger state. This value is used when a call is in a degraded state (the signal is weak) yet no other cell can handle the call. The signal is below the threshold strength, but the trigger to hand the call to another cell is ignored NDSLT times. The value for NDSLT is input as a decimal digit ranging from 0 through 3.

(h) Item DRL specifies the alternate cell sites the mobile is directed to for alternate cell site access. Each entry is 8 bits (as opposed to the full 10-bit channel number), as this list is used as a group of offsets from the first setup channel in the MSA. If the cell does not have a set of alternate channels, all entries are zero. The directed retry channel offset list is input as a list of alternate cell sites. The value of FIRSTCHAN is dependent upon various factors, one of them being which channel set is being used (channel set A = channels 1 through 333, channel set B = channels 334 through 666). This can be determined by checking bit 0 of the SID field in the AMPS miscellaneous information translator (Fig. 17), where 1 = channel set A, and 0 = channel set B. There are two base formulas for calculating these offsets, dependent upon which channel set is being used. The formulas are as follows:

For channel set A, offset = (FIRSTCHAN — INCHAN) — 1

For channel set B, offset = (INCHAN — FIRSTCHAN) + 1 where INCHAN is the channel to which the mobile is to be redirected.

There are three conditions that determine the value of FIRSTCHAN:

(1) The first condition exists if the CPA bit in the AMPS miscellaneous auxiliary block is set (when set, this indicates that combined paging and access is allowed). For channel set A, FIRSTCHAN is equal to 333; for channel set B, FIRSTCHAN is equal to 334.

(2) The second condition exists if CPA = 0 and NWAC = 0 (a bit in the AMPS miscellaneous auxiliary block indicating whether access channels start on a different channel than what is burned into the mobile's memory). If NWAC is equal to 0, this indicates that the setup channels follow immediately after the paging channels. For channel set A, FIRSTCHAN = 333 — N, where N is the number of paging channels the mobile has to scan (N-1 field in the AMPS miscellaneous auxiliary block plus 1). For channel set B, FIRSTCHAN = 334 + N.

(3) The third condition exists when CPA = 0 and NWAC = 1 (indicating that access channels start on a different channel than what is burned into the mobile's memory). For both channel sets, FIRSTCHAN is equal to NEWACC. NEWACC is the field in the AMPS miscellaneous auxiliary block, indicating the starting channel number of the new set of access channels.

4.53 The rest of the auxiliary block is a list of pointers to the cell site neighbor auxiliary block and is indexed by antenna face (0 through 3) and server group (0 through 1). Refer to Table B for the indexing scheme. The cell site neighbor auxiliary block contains a list of information needed for every cell site neighbor (a cell which may take over the call the current cell is handling). The fields contained in this auxiliary block are defined as follows:

(a) Item PRIM specifies the primary signal strength threshold (used to compare with the measured signal strength of the mobile radio), input as a decimal integer ranging from 0 through 127. Decimal integer 0 is — 130 dBm, 127 is — 30 dBm, with the rest of the integers evenly distributed across the numerical range.

(b) Item SCND specifies the secondary signal strength threshold with units the same as PRIM.

(c) Item CNDLST specifies the minimum number of location candidates (cells to give the call to) allowed on the list, which is sent to the MTSO for possible handoff. This value is input as a decimal digit ranging from 0 through 3.

(d) Item INTP specifies the interference signal strength protection threshold used to determine if a signal is really being received on a channel or whether noise is being received. This field has the same units as PRIM.

(e) Item ACC specifies the access signal strength threshold used to measure the mobile radio signal strength upon access to the system. This field has the same units as PRIM.

(f) Item VMAC specifies the voice mobile attenuation code used to tell the mobile what power level to transmit on the voice channel of the call. This value is input as a decimal digit ranging from 0 through 7, represented the same as for CMAC in the cell master status translator (Fig. 24).

(g) Item GINGHBR specifies the number of group 1 neighbors. These cells are the preferred cells for handoff. These cell site neighbors are the first neighbors on the neighbor list (starting in the next word), with group 2 neighbors listed afterwards. Each cell site face may have up to 12 cell site neighbors (group 1 plus group 2).

(h) Item DPCI is the dynamic power control indicator. The dynamic power control indicator, when set, indicates that the dynamic power control feature is allowed and words 2 through 8 contain information for dynamic power control. If the dynamic power control indicator is not set, words 2 through 8 will be part of the neighbor cell site list (depending on the number of neighbors) and will not contain dynamic power control information.

(i) Item SGPAID indicates which power amplifier currently is used by the server group. This field is 2 bits long: 0 indicating a 12-watt programmable amplifier is in use, 1 indicating a 45-watt nonprogrammable amplifier, and 2 indicating a 45-watt programmable amplifier.

(j) Item STF specifies a speed trending flag. The speed trending flag controls the ability of the system to use speed trending to reduce real-time processing. When set (=1), speed trending is used.

(k) Item HSTC specifies the high signal strength for the cell site. When the power level that a cell site is transmitting at is higher than this value, the cell site will be attenuated. This field ranges from 0 (−30 dBm) to 127 (−130 dBm), evenly distributed throughout the numerical range.

(l) Item LSTC specifies the low level signal strength for the cell site. When the power level that a cell site is transmitting at is lower than this value, the cell site's power level will be boosted. This field has the same units as HSTM.

(m) Item NMAL specifies the maximum number of 4 dB steps that a mobile is allowed to attenuate below its normal value. This field is 4 bits long with a range from 0 to 15.

(n) Item NCAL specifies the maximum number of 4 dB steps that a cell site is allowed to attenuate below its normal value. This field is 4 bits long with a range from 0 to 15.

(o) Item HSTM specifies the high signal strength for the mobile. When the power level that a mobile is transmitting at is higher than this value, the mobile will be attenuated. This field ranges from 0 (−30 dBm) to 127 (−130 dBm) evenly distributed throughout the numerical range.

(p) Item LSTM specifies the low signal strength for the mobile. When the power level that is transmitting at is lower than this value, the mobile's power level will be boosted. This field has the same units as HSTM.

(q) Item MPDIF specifies a value in dB equal to the total gain ahead of a cell site voice radio receiver on the specific face minus the power that could be radiated on the specific cell site transmit antenna face if it were equipped with a programmable high power RF amplifier set for 0 dB attenuation plus the power that could be radiated by a class-I mobile with 0 dB (i.e., +36 dBm).

(r) Item CPCF specifies whether dynamic power control is turned off/on at the individual cell sites. Only the rightmost bit is used, the allowable value for the field is 0 or 1.

(s) Item MPCF specifies whether dynamic power control is turned off/on at the mobiles within the cell site. Only the rightmost bit is used, the allowable value for the field is 0 or 1.

(t) Item HIGH specifies the voice channel selection high threshold. This threshold is used during voice channel selection process. This threshold is set above the normal signal strength that would be allowed for a cell to hand off to, so if during the location process, a neighbor returns a signal strength of HIGH or above, the neighbor is not added to the candidate list. This field ranges from 0 to 127.

(u) Item NCS specifies the cell site number of the neighbor.

(v) Item NANT specifies a 4-bit field, indicating which of the antennas of the neighbor cell site are neighbor antennas. Bit 0 represents the neighbor omnidirectional antenna, with bits 1, 2, and 3 representing the neighbor directional antenna. Either the omni bit or one or more of the directional bits may be set. (If the neighbor is a dual cell, with one server group omnidirectional and the other directional, only one server group may be represented per neighbor entry. This means that a neighbor dual cell may be represented twice in this list, if both of the server groups are neighbors.)

(w) Item NSG specifies the neighbor server group (0 is primary, 1 is secondary).

(x) Item NSBGRP specifies the subgroup number for the neighbor cell. Each of the neighbor groups, as discussed in the GINGHBR field, may be further subdivided into three subgroups. The NSBGRP field is input as a decimal digit ranging from 0 through 2. The neighbors must be in numerical order according to subgroup number, ordered from group 1, subgroup 0 to group 2, subgroup 2.

B. Parameters/Call Store

4.54 A typical parameter word and duplicate call store layout is shown in Fig. 28. All of the duplicated call store memory defined by Fig. 28 must be contiguous in a single call store block. Parameter words and associated duplicate call store area are defined in paragraphs 4.56 through 4.87.

4.55 Parameter word QG2ASPMA contains the call store address of a 30-word scratch pad memory area. This block is built whenever set card 9F164 is activated and is used as a scratch area.

4.56 Parameter word QP2PMA contains the call store address of a 340-word paging message area. This block is built whenever set card 9F165 is activated and is used as a paging message storage area.

4.57 Parameter word QG2AIOUCAW contains the call store address of a 64-word area used for I/O unit controller activity words. This block is built whenever set card 9F164 is activated.

4.58 Parameter word QG2ADLQS contains the call store address of a 32-word area used for the data link queue status. This block is built whenever set card 9F164 is activated.

4.59 Parameter word QG2ADLS contains the call store address of the data link status table whose size is 16 × CELL + 1. Set card CELL is defined in Table C. This block is built when set card 9F164 is activated.

4.60 Parameter word QG2CDCT contains the call store address of a 64-word area used for the cell download control table. This block is built whenever set card 9F164 is activated.

4.61 Parameter word QG2AMSA contains the call store address of an 89-word area used for the temporary message storage area. This block is built whenever set card 9F164 is activated.

4.62 Parameter word QG2AIOMPW contains the call store address of an 8-word area used for the I/O microprocessor activity words. This block is built whenever set card 9F164 is activated.

4.63 Parameter word QG2CIT contains the call store address of the cell initialization table block whose size is (16 × CELL +1). Set card CELL is defined in Table C. This block is built whenever set card 9F164 is activated.

4.64 Parameter word QM2ACCT contains the call store address of the cell-to-channel, channel-to-cell table area whose size is 1 + CELL. Set card CELL is defined in Table C. This block is built whenever set card 9F163 is activated.

4.65 Parameter word QP2ARBT contains the call store address of the roamer busy table area whose size is 2 × NRMR. Set card NRMR defines the number of roamer mobile units allowed to access the system. The value of set card NRMR is submitted by the telephone company. If there is no value available, a value of 500 should be used. This block is built whenever set card 9F165 is activated.

4.66 Parameter word QG2AMMR contains the call store address of the mobile message register block whose size is MAX(9100,2 × [91 × CELL|). Set card CELL is defined in Table C. This block is built whenever set card 9F164 is activated.

4.67 Parameter word QM2ACTBRW contains the call store address of a 256-word area used for cell test bus resource words. This block is built whenever set card 9F163 is activated.

4.68 Parameter word QG2DLMB contains the call store address of the 200-word data link maintenance block. This block is built whenever set card 9F164 is activated.

4.69 Parameter word QG2ACTUDB contains the call store address of the 116-word cell translation update data block. This block is built whenever set card 9F164 is activated.

4.70 Parameter word QG2ACOS contains the call store address of the 64-word cell overload status table. This table is built whenever set card 9F164 is activated.

4.71 Parameter word QG2CELL contains the call store address of the call store area for set card CELL, whose size is equal to the value of set card CELL. This block is built whenever set card 9F164 is activated.

4.72 Parameter word XL2AIOUSLMP contains the call store address of the 16-word expanded IOP data block. This block is built when set card 9PAR04 is activated.

4.73 Parameter word QG2CSVPU contains the call store address of the 20-word cell site voice path usage table. This table is built whenever set card 9F164 is activated.

4.74 Parameter word QG2CSARRAY contains the call store address of the 85-word AMPS

equipped cell site table. This table is built whenever set card 9F164 is activated.

4.75 Parameter word QG2VCSA contains the call store address of the 50-word AMPS voice channel selection measurement table. This table is built whenever set card 9F164 is activated.

4.76 Parameter word QG2PLA contains the call store address of the 456-word AMPS active power level measurement table. This table is built whenever set card 9F164 is activated.

4.77 Parameter word QG2CSTABLE contains the call store address of the 256-word AMPS special studies traffic measurements call store table. This table is built whenever set card 9F164 is activated.

4.78 Parameter word QG2DLHOLD contains the call store address of the data link traffic measurement holding area for AMPS usage whose size is 8 × CELL. Set card CELL is defined in Table C. This block is built whenever set card 9F164 is activated.

4.79 Parameter word QG2DLCOL contains the call store address of the data link traffic measurement collection for AMPS usage whose size is 8 × CELL. Set card CELL is defined in Table C. This block is built whenever set card 9F164 is activated.

4.80 Parameter word OM2AMPSMTCE contains the call store address of the 12-word diagnostic scheduler maintenance block for AMPS usage. This block is built whenever set card 9F163 is activated.

4.81 Parameter word OG2CSCAN contains the call store address of the 128-word cell site voice path scan traffic measurement table. This table is built whenever set card 9F164 is activated.

4.82 Parameter word OG2VCSABUF contains the call store address of the 64-word traffic measurement output buffer table. This table is built whenever set card 9F164 is activated.

4.83 Parameter word OM2ACDUT contains the call store address of the 256-word AMPS cell dialup channel table. This table is built whenever set card 9F163 is activated.

4.84 Parameter word B6AMPS contains the call store address of a 50-word area used for comment traffic registers for AMPS. This block is built whenever set card 9F165 is activated.

4.85 Parameter word OP2MCGVT contains the call store address of the 64-word AMPS multicell generic version table. This table is built whenever set card 9F164 is activated.

4.86 Parameter word OP2MCGCT contains the call store address of the 32-word AMPS multicell generic control table. This table is built whenever set card 9F164 is activated.

4.87 Parameter word QM2ACSTSW (Fig. 29) contains the unduplicated call store address of the cell site trunk state word head table whose size is variable from one to the value of CELL. Set card CELL is defined in Table C. The size of the cell site trunk state words area, pointed to from the cell site trunk state word head table, is fixed at 96 words. These blocks are built whenever set card 9F163 is activated.

4.88 Call store pointer QG2AHHT points to a 12-word call store area containing the message hopper table entries which are built when set card 9F164 is activated. These entries are defined as follows:

(a) ***Page Response Hopper:*** The page response hopper block requires 96 words. Eight page response hoppers are required.

(b) ***Mobile Origination Hopper:*** This call store block is used to temporarily store mobile unit origination messages from the cell site. The size of the mobile origination hopper block is 475 words.

(c) ***General Call Processing Hoppers:*** The size of the general call processing hopper area is MAX(1200,8 × GCPH × 9F164). Set card GCPH specifies the number of call processing hoppers to be used for general use and is defined in Table C.

(d) ***Mobile Maintenance Hopper:*** This call store block is used to temporarily store maintenance messages from the cell site. The size of the mobile maintenance hopper block is MAX(1000,20 × CELL × 9F164). Set card CELL specifies the

number of mobile maintenance hopper entries and is defined in Table C.

(e) ***Administrative Hopper Area:*** The size of the administrative hopper area is MAX(1000,20 × CELL × 9F164). Set card CELL specifies the number of administrative hopper entries and is defined in Table C.

(f) ***Long Maintenance Message Hopper:*** The size of the long maintenance message hopper is MAX(890,89 × CELL/8 × 9F164). Set card LMMH specifies the number of long maintenance message hopper entries and is defined in Table C.

4.89 Three types of registers are associated with the MTSO feature and are defined below. The zeroing code for these registers is two. These registers are built whenever set card 9F165 is activated.

(a) ***Mobile Call Register:*** The mobile call register is a 32-word register which contains calling information for each mobile call. The number of mobile call registers is defined by set card NMCR.

(b) ***Mobile Originating Register:*** The mobile originating register is a 22-word register used to hold transient information during the origination phase of a mobile radio originated call. The number of mobile originating registers is defined by set card NMOR.

(c) ***Mobile Hand-off Register:*** The mobile hand-off register is a 12-word register used to hold information during the hand-off phase of a mobile call. The number of mobile hand-off registers is defined by set card NMHR.

FEATURE OPERATION

4.90 Feature operation for the MTSO feature includes the following network routing, basic call sequence, and call processing steps.

A. Network Routing

4.91 Mobile-originated calls into the land telephone network are outpulsed from the MTSO using MFS (multifrequency signaling). The MTSO selects and seizes the outgoing trunk to the zone office. The MTSO begins outpulsing the called digits after the zone office sends a start-pulse or wink signal. ▶The wink is a battery reversal on the trunk.◀ Answer and disconnect supervision signals are returned from the zone office to the MTSO, allowing charging records to be made.

4.92 On land-to-mobile calls, the zone office outpulses the called mobile's telephone number to the MTSO using MFS. The MTSO returns answer and disconnect supervision signals back to the zone office.

4.93 The MTSO routes calls within the primary system into the wire-line network. The simplest call routing is the mobile-to-mobile call in the same MSA. The MTSO receives the dialed digits from the calling mobile, determines that the called number is another mobile, and completes the connection to that called mobile (Fig. 30). None of the zone offices are involved.

4.94 On direct-dialed, mobile-to-land calls, the MTSO routes the call into the land telephone network through one of the zone offices. Routing tables stored in the MTSO provide the association between the called number and the proper zone office to be used. ▶For standard calls, the DN of the calling mobile does not influence the routing. Exceptions to this would be operator assistance, emergency service, and repair service.◀

4.95 Land subscribers can directly dial calls to mobiles. Since mobile DNs are assigned from those available in local exchanges, there is a correspondence between each mobile and a particular zone office. The land telephone network directs calls to the zone office serving the exchange of the called number without knowing the call is to a mobile. Upon receiving such a call, the zone office connects that call to a direct trunk to the MTSO which, in turn, completes the connection to the mobile. ▶The network routing for a land-to-mobile call is similar to the mobile-to-land call (Fig. 30).◀

4.96 Operator-assisted and service calls (e.g., repair service) can also be dialed from a mobile. The MTSO does not have direct trunks to operator or service bureau positions. Instead, it makes use of those services already available in the zone offices. ▶On mobile-to-land/mobile-operator-assisted calls, the MTSO routes the call to a zone office which connects the call to operator and service position trunks [Fig. 30(c)].◀

B. Call Sequence

4.97 Call sequence within the System 100 primary system is determined by which one of the following call configurations is initiated:

- Mobile-completed calls
- Mobile-originated calls
- Handoff
- Disconnect.

4.98 Mobile-completed call sequence and each associated channel path configuration includes six major steps.

(a) ***Paging:*** From the calling party's zone office, the call is routed by standard wire-line network routing procedures to the home MTSO of the mobile unit. ▸The MTSO collects the digits, converts them to the mobile's identification number, performs standard checks on the DN, and checks busy/idle status of the mobile unit. The MTSO then sends audible ringing to the calling party and instructs the cell sites to page the mobile over the forward setup channels (sometimes called paging channels). There is a sufficient number of paging cell sites to ensure that the paging message is broadcast over the entire MSA [Fig. 31(a)].◂

(b) ***Cell Site Selection:*** The mobile unit, after recognizing its page and using parameters derived from the overhead word message, scans the setup channels used for access in the MSA and selects the strongest one. The selected channel will probably be associated with a nearby cell site (usually the nearest cell site) [Fig. 31(b)].

(c) ***Page Response:*** The mobile replies to the cell site it selected over the reverse setup channel (sometimes called access channel). The selected cell site then reports the page reply to the MTSO over its dedicated cell site data link [Fig. 31(c)]. ▸If the cell site is equipped with directional antenna, then the cell site will perform a directional locate and send information regarding which antenna face the call is to be serviced on along with page response to the MTSO.◂

(d) ***Channel Designation:*** The MTSO selects an idle voice channel (and associated cell site trunk) to the cell site that handled the page response and informs the cell site of its choice over the appropriate data link. The serving cell site, in turn, informs the mobile of its channel designation over the forward setup channel. ▸The mobile tunes to the channel designation and detects the SAT (supervisory audio tone) that is continuously transmitted from the cell site. The mobile unit, acting as a transponder, then transmits the same SAT over the designated voice channel to the cell site. The cell site interprets the returned SAT as successful voice channel communication [Fig. 31(d)].

(e) ***Alerting:*** On recognizing the returned SAT, the serving cell site transmits an alert order data message over the voice channel to the mobile unit which, in turn, signals the customer that they have an incoming call. When the mobile unit receives the alert order, it transmits ST (signaling tone) to the serving cell site. The cell site interprets the ST as successful alerting [Fig. 31(e)].

(f) ***Talking:*** When the customer answers, the cell site recognizes removal of signaling tone by the mobile unit and sends an answer message to the MTSO over the cell site data link. The MTSO removes the audible ringing circuit and establishes the talking connection so that conversation can begin [Fig. 31(f)].◂

4.99 Mobile-originated call sequence and each channel path configuration includes six major steps.

(a) ▸***Preorigination:*** Using preorigination dialing procedures, the customer enters the dialed digits into the mobile units memory and depresses SEND key to initiate the call [Fig. 32(a)].◂

(b) ***Cell Site Selection:*** The mobile unit seizes a reverse setup channel, usually from the nearest cell site. This is a process similar to that described previously for the mobile-completed call [Fig. 32(b)].

(c) ▸***Origination:*** The stored digits, along with the MIN and service number (if requested) are transmitted over the reverse setup channel selected by the mobile.◂ The selected cell site associated with this setup channel receives this information and relays it to the MTSO over its cell

site data link. ▸If the cell site is equipped with directional antenna, the cell site action is similar to that described previously for page response during the mobile-completed call [Fig. 32(c)].

(d) ***Channel Designations:*** The MTSO determines routing and charging information at this time by analyzing the dialed digits. If the MIN, serial number, or dialed digits are invalid, the call is terminated by the MTSO. As with the mobile-completed call, the MTSO now designates a voice channel and establishes voice communication with the mobile through the cell site [Fig. 32(d)].

(e) ***Digit Outpulsing:*** When the cell site detects the returned SAT, it transmits a voice channel confirmation message to the MTSO.◂ The MTSO then completes the call through the wire-line network using standard digit outpulsing techniques [Fig. 32(e)].

(f) ***Talking:*** When outpulsing is completed, the MTSO establishes a talking connection. Communication between customers takes place when the called party answers [Fig. 32(f)].

4.100 Hand-off call sequence and each channel path configuration includes three major steps.

(a) ▸***New Channel Preparation:*** The serving cell site, working with its group 1 and group 2 neighbor lists, combines locating information from surrounding cell sites with its own and assembles a handoff list of cell site/antenna faces on which to service the call. The handoff list is then transmitted to the MTSO by the serving cell site. The MTSO analyzes the data and decides that a handoff to a new voice channel is to be attempted. The MTSO then selects an idle voice channel (and an associated cell site trunk) based on the priority in the handoff list. It then sends a message to the cell site associated with the new voice channel. That cell site (for an intercell or intracell handoff) turns on the selected voice channel and transmits SAT [Fig. 33(a)].

(b) ***Mobile Handoff Command:*** The MTSO sends a message to the serving cell site containing the new voice channel identity. The serving cell site, in turn, transmits this information to the mobile unit over the forward voice channel by a blank-and-burst data message [Fig. 33(b)].

(c) ***Channel/Path Reconfiguration:*** The mobile unit transmits a brief burst of ST, turns off its transmitter, tunes to the new voice channel, and transmits the received SAT. The original serving cell site, on recognizing the ST burst, sends a handoff confirmation message to the MTSO. The MTSO reconfigures its switching network, connecting the other party with the appropriate cell site trunk to the new voice channel. The cell site with the new channel (even for an intracell handoff), upon recognizing the returned SAT over the new channel, sends a voice channel confirmation message to the MTSO. The MTSO interprets this message as a successful handoff [Fig. 33(c)].◂

4.101 The call sequence and each channel path configuration for mobile-initiated and system-initiated disconnect includes three major steps each.

(a) The mobile-initiated disconnect actions occurring when the mobile party goes on-hook are:

(1) ***Release:*** The mobile unit transmits ST and turns off its transmitter. The ST is received by the cell site, which times the ST and determines that a release has occurred [Fig. 34(a)].

(2) ▸***Cell Site Transmitter Shutdown:*** In response to the release message, the cell site will shut down its own transmitter associated with the call. It then sends a release message to the MTSO over the cell site data link [Fig. 34(b)].

(3) ***Idle:*** As the final action in the call, the MTSO idles all switching office resources associated with the call and sends any necessary disconnect signals through the wire-line network. All equipment used on this call may now be used on subsequent calls [Fig. 34(c)].◂

(b) The system-initiated disconnect actions occurring when the land party goes on-hook are:

(1) ▸***Release:*** The MTSO receives a disconnect message from the wire-line network. The MSTO sends a release order message to the serving cell site. The cell site transmits this

order to the mobile unit over the voice channel. The mobile confirms receipt of the message by invoking the same release sequence as with a mobile-initiated disconnect [Fig. 35(a)].

(2) ***Cell Site Transmitter Shutdown:*** The cell site response to the mobile units ST is the same as the mobile-initiated disconnect [Fig. 35(b)].

(3) ***Idle:*** In response to the release message from the cell site, the MTSO idles all switching office resources associated with the call [Fig. 35(c)].

C. Call Processing Steps

4.102 The call processing sequence performed by the system elements are for land- or mobile-originated calls. The sequence of these calls is given in Fig. 36 and 37, respectively.

CHARACTERISTICS

5. FEATURE ASSIGNMENT

5.01 Not applicable.

6. LIMITATIONS

6.01 Frequency assignments for a Mobile Phone System in a given area are grouped into two channel groups, A and B, each containing 333 channel pairs (transmit and receive). A minimum of 21 channel pairs in each group is used for system access and control, which leaves a maximum of 312 channel pairs for voice radio assignment. Channel group A consists of frequencies in the 870- through 880-MHz band for cell site transmission (with a corresponding cell site receiving frequency from 825- through 835-MHz band). Group B consists of frequencies in the 880- through 890-MHz band for cell site transmission (cell site receiving frequency from 835- through 845-MHz band). Each channel pair is spaced 30 kHz apart, with channel pair number 1 designated as the frequency pair 870.030 MHz and 825.030 MHz for cell site transmit and receive, respectively. Therefore, channel numbers would range from 1 to 312 if the system is operating in group A and 355 to 666 if in group B (channels 313 through 333 in group A and channels 334 through 354 in group B are used for access and control frequencies).

6.02 Unique office codes must exist within the mobile service area.

7. INTERACTIONS

7.01 Not applicable.

8. RESTRICTION CAPABILITY

8.01 Not applicable.

INCORPORATION INTO SYSTEM

9. INSTALLATION/ADDITION/DELETION

9.01 Figure 38 illustrates the procedure for adding the MTSO feature. Refer to Part 13 for testing information.

9.02 Table C contains a summation of the set cards required by the MTSO feature. Both the maximum range and the typical values for a MTSO office are given where available. Feature group and feature package set cards are shown in Table D.

10. HARDWARE REQUIREMENTS

A. Input/Output (I/O) Processor Frame

10.01 A MTSO may be equipped with a maximum of 32 I/O processor frames. Each I/O processor frame contains two selectors. Each of the I/O selectors (0 through 63) can be equipped with up to 16 data links (8 for data links and 8 for TTY links). The two data links provided for a given cell site are required to be on different I/O processor frames for reliability. The number of I/O processor frames required is determined by the number of cell sites equipped. A maximum of 255 cell sites may be equipped with two data links each. The I/O processor frames are connected to the 1A processor by duplicated PUB (peripheral unit bus) interfaces.

10.02 Eight supervisory master scanner points are required for each I/O processor frame. The first two scan points are the scan points for the peripheral bus 0, the next two scan points are for bus 1, the next two scan points are for IOUS 0 on the frame, and the last two scan points are for IOUS 1. The scan points are assigned in groups of eight consecutive points, starting on an even boundary, representing the four I/O processor frames of an I/O group.

10.03 Eight central pulse distributor points are required for each I/O processor frame. The eight central pulse distributor points represent the I/O processor frame as detailed in paragraph 10.02.

10.04 Each I/O processor frame requires a pair of GCP (generated control pulse) points, starting with IOUS 0 having the even numbered pulse point and IOUS 1 having the odd-numbered pulse point. These pulse points must be assigned in the pulse source range PPU030 to pulse source PPU093. Pulse points PPU030 and PPU031 are the first pulse point pair in this range.

B. Cell Site MTSO Data Links

10.05 Two cell site MTSO data links are required for each cell site equipped. The number of cell sites equipped can be estimated from the maximum number of users and the average number of users per cell site. The average number of users per cell site depends on the spectrum available. The data required to determine the number of cell sites is presented in Table E.

C. Trunk Circuit SD-1A236-05

10.06 Voice grade trunks that are connected between the MTSO and cell sites utilize SD-1A236-05 trunk circuits. Since one of these trunk circuits is required per voice trunk, the number of these trunk circuits required may be determined from Table F. A maximum of 96 trunk circuits may be assigned to a trunk group. Each antenna face can have one trunk group.

10.07 The SD-1A236-05 (J1A088CB-1, trunk circuit, trunk order code 02107) has one network appearance and is mounted on the miscellaneous trunk frame. The trunk circuit is equipped with two scan points and five signal distributor points. Scan point 0 is assigned TPI 0 and scan point 1 is assigned TPI 57. The trunk circuit is assigned a CPI of 21 and uses multifrequency pulsing and E&M supervision.

10.08 Loop-around trunk circuits are used in the MTSO to connect two cell site trunks together for mobile-to-mobile calls within the same MTSO. The SD-1A236-05 trunk circuit is used in this application. The number of trunk circuits required may be determined from Table F.

D. Program Store

10.09 Nine 256K program store modules (J5A010A-1) are required for System 100 release 2. This is an increase of one module over the eight modules required for release 1.

E. APS Generic

10.10 The loading of the AP2 generic (release 2) will cause deactivation of the third APS disk drive (cold spare) which is no longer required. This drive can therefore be removed or utilized as one of the two additional drives required to support the multicell generic capability.

F. Hardware Changes (Release 2)

10.11 Hardware changes are required to the MTSO to provide maintenance capabilities for System 100. Two lamp/keys are added on the master control center control and display frame. One lamp/key is located on the overload subgroup of the traffic panel. The second lamp/key is located on the equipment status panel. When the MTSO interfaces with the ACC (AMPS control center), the lamp/key located on the equipment status panel is remoted via the RAI (remote access interface) circuit and E2A telemetry to the ACC. The following CRIs (circuit revision instructions) provide detailed instructions to modify the existing equipment in the MTSO.

- CRI 5A014-01-25 PPI Circuit
- CRI 5A029-01-10 C and D Circuit
- CRI 5A030-01-9 SSL Circuit
- CRI 5A050-01-11 RAI Circuit.

11. SOFTWARE REQUIREMENTS

MEMORY

A. Fixed

11.01 Sixty-six parameter words are required in the ***Base Generic Program (Program Store and Attached Processor System)*** for the MTSO feature.

B. Conditional

11.02 The following conditional memory is required for the MTSO feature.

(a) ***Optionally Loaded Feature Groups (Program Store and Attached Processor System):*** Feature groups that must be loaded to provide the MTSO feature are summarized in Table D.

(b) ***Unduplicated Call Store and Attached Processor System:*** The unduplicated call store and Attached Processor System requirements are as follows:

(1) The size of the cell site trunk state word head table is defined by set card CELL.

(2) Set card CELL is defined in Table C.

(c) ***Duplicated Call Store:*** The duplicated call store requirements are as follows:

(1) ***Scratch Pad Memory Area (ASPMA):*** Thirty words are required.

(2) ***Paging Message Area (PMA):*** This area requires 340 words.

(3) ***Input/Output Unit Controller Activity Words (AIOPAW):*** Sixty-four words are required.

(4) ***Data Link Queue Status (ADLQS):*** Thirty-two words are required.

(5) ***Data Link Status Table (ADLS):*** The size of this table is equal to 16 × CELL + 1.

(6) ***Cell Download Control Table (CDCT):*** Sixty-four words are required.

(7) ***Temporary Message Storage Area:*** Eighty-nine words are required.

(8) ***Input/Output Microprocessor Activity Words:*** Eight words are required.

(9) ***Cell Initialization Table Block (CIT):*** The size of this block is equal to [16 × (CELL + 1)]. Set card CELL is defined in Table C.

(10) ***Cell-to-Channel/Channel-to-Cell Table (ACCT):*** The size of this block is equal to 1 + CELL.

(11) ***Roamer Busy Table (ARBT):*** The size of this table is equal to 2 × NRMR. The value of set card NRMR is submitted by the telephone company. If there is no value available, a value of 500 should be used.

(12) ***Mobile Message Register Block (AMMR):*** The size of this block is equal to (9100,2 × [91 × CELL]). There is a minimum of 100 mobile message registers. Each register requires 91 words.

(13) ***Cell Test Bus Resource Words (ACTBRW):*** This area requires 256 words.

(14) ***Data Link Maintenance Block (DLMB):*** This block requires 200 words.

(15) ***Cell Translation Update Data Block (ACTUDB):*** This block requires 116 words.

(16) ***Cell Overload Status Table (ACOS):*** This table requires 64 words.

(17) ***Set Card CELL:*** The number of words required for this area is equal to the value of set card CELL.

(18) ***Expanded IOP Data Block (AIOUSLMP):*** Sixteen words are required.

(19) ***Cell Site Voice Path Usage Table (CSUPU):*** Twenty words are required for the cell site voice path usage table.

(20) ***AMPS Equipped Cell Site Table (CSARRAY):*** Eighty-five words are required for the AMPS equipped cell site table.

(21) ***AMPS Voice Channel Selection Measurement Table (VCSA):*** Fifty words are required for the AMPS voice channel selection measurement table.

(22) ***AMPS Active Power Level Measurement Table (PLA):*** This table requires 456 words.

(23) ***AMPS Special Studies Traffic Measurements Call Store Table (CSTABLE):*** This table requires 256 words.

(24) ***Data Link Traffic Measurement Holding Area for AMPS Usage (DLHOLD):*** The size of this holding area is 8 × CELL. Set card CELL is defined in Table C.

(25) ***Data Link Traffic Measurement Collection for AMPS Usage (DLCOL):*** The size of this area is 8 × CELL. Set card cell is defined in Table C.

(26) ***Diagnostic Scheduler Maintenance Block for AMPS Usage (AMPSMTCE):*** Twelve words are required for the diagnostic scheduler maintenance block for AMPS usage.

(27) ***Cell Site Voice Path Scan Traffic Measurement Table (CSCAN):*** This table requires 128 words.

(28) ***Traffic Measurement Output Buffer Table (VCSABUF):*** Sixty-four words are required for the traffic measurement output buffer table.

(29) ***AMPS Cell Dialup Channel Table (ACDUT):*** This table requires 256 words.

(30) ***Comment Traffic Registers for AMPS:*** Fifty words are required for the comment traffic registers for AMPS area.

(31) ***Cell Site Trunk State Words (ACTSTW):*** Ninety-six words are required. The number of blocks required is equal to the value of set card CELL. Set card CELL is defined in Table C.

(32) Sixty-four words are required for the AMPS multicell generic version table.

(33) Thirty-two words are required for the AMPS multicell generic control table.

(34) ***Message Hopper Table:*** Twelve words are required.

(35) ***Page Response Hopper (HPGR):*** Ninety-six words are required for the page response hopper. Eight page response hoppers are required.

(36) ***Mobile Origination Hopper (HMOR):*** The mobile origination hopper requires 400 words.

(37) ***General Call Processing Hoppers (MCPG):*** The size of this hopper is equal to MAX(1200,8 × GCPH × 9F164). Set card GCPH is defined in Table C.

(38) ***Mobile Maintenance Hopper (HMM):*** The size of this hopper is equal to MAX(1000,20 × CELL × 9F164). Set card CELL is defined in Table C.

(39) ***Administrative Hopper Area (HADM):*** The size of this hopper area is equal to MAX(1000,20 × CELL × 9F164). Set card CELL is defined in Table C.

(40) ***Long Maintenance Message Hopper (MMHL):*** The size of this hopper is equal to MAX(890,89 × CELL/8 × 9F164). Set card CELL is defined in Table C.

(41) ***Mobile Call Register (MCR):*** Twenty-eight words are required for the mobile call register. Set card NMCR specifies the number of mobile call registers required and is defined in Table C.

(42) ***Mobile Originating Register (MOR):*** Twenty words are required for the mobile originating register. Set card NMOR specifies the number of mobile originating registers required and is defined in Table C.

(43) ***Mobile Hand-Off Register (MHR):*** The mobile hand-off register requires ten words. Set card NMHR specifies the number of mobile hand-off registers required and is defined in Table C.

(44) ***Set Card CELL:*** This specifies the highest member number of the cell sites in

the mobile service area. The calculation for set card CELL is as follows:

Quantity—Number of cells in the mobile service area = N where N = highest cell site member number + projected cell site growth. Cell site growth may be accomplished by either assigning vacant cell site member numbers less than the highest assigned cell site member number, or adding cell site member numbers higher than the highest assigned cell site member number. In either case, the total number of cell sites must stay within the limits of 1 through 255.

(45) ***Set Card NMHR:*** This specifies the number of mobile hand-off registers to be used by the MTSO feature. The calculation for set card NMHR is as follows:

NMHR = P001

(46) ***Set Card GCPH:*** This specifies the number of call processing hoppers to be used for general use. The calculation for set card GCPH is as follows:

GCPH = Max 150

(47) ***Set Card NMCR:*** This set card specifies the number of mobile call registers. The calculation for set card MNCR is as follows:

NMCR = P001

(48) ***Set Card NMOR:*** This set card specifies the number of mobile originating registers. The calculation for set card NMOR is as follows:

NMOR = (NMCR × .1)///1

(49) ***Set Card NRMR:*** This set card specifies the number of roamer units allowed to access the system. The calculation for set card NRMR is as follows:

NRMR = MAX(50, 0.1 × number of BH calls).

C. Variable

11.03 The following ***translations (unduplicated call store and Attached Processor System)*** memory is required for the MTSO feature.

(a) ***Directory Number Subtranslator:*** One word is required for each PLEN.

(b) ***Directory Number Abbreviated Code Expansion Table:*** Four words are required for each PLEN.

(c) ***Line Equipment Number Subtranslator:*** One word is required for each LEN.

(d) ***Line Equipment Number Abbreviated Code Expansion Table:*** Four words are required for each DN.

(e) ***Trunk Group Number Head Table:*** One word is required for each trunk group.

(f) ***Trunk Group Number Auxiliary Block:*** Three words are required per trunk group. A maximum of six trunk groups (one per logical antenna face server group) per cell site may be equipped.

(g) ***Trunk Network Number to Trunk Group Number Auxiliary Block for Loop Around Trunks:*** Three words are required for each TNN (trunk network number). One trunk group with a maximum of 40 loop-around trunk circuits may be equipped.

(h) ***Trunk Network Number to Trunk Group Number Auxiliary Block for Cell Site Trunks:*** Three words are required for each TNN. Additional words are required if carrier group alarm or trunk make busy keys exist. A maximum of six trunk groups per cell may be equipped. Each trunk group may be equipped with a maximum of 96 trunk circuits.

(i) ***Directory Number to Serial Number Head Table:*** This head table requires 128 words.

(j) ***Directory Number to Serial Number Subtranslator:*** This subtranslator requires 2000 words.

(k) ***Cell Site Head Table:*** Five words are required.

(l) ***Cell Site Trunking Translator Head Table:*** This head table requires 256 words. One head table is required per cell site.

(m) ***Cell Site Trunking Translator Auxiliary Block:*** Ten fixed words are required. One additional word is required for each radio equipped at the cell site.

(n) ***Cell Master Status Translator Head Table:*** This head table requires 256 words. One word is required per cell site.

(o) ***Cell Master Status Translator Auxiliary Block:*** Three words are required. One auxiliary block is required per cell site.

(p) ***Cell Master Equipage Translator Head Table:*** This head table requires 256 words. One word is required per cell site.

(q) ***Cell Master Equipage Translator Auxiliary Block:*** Twelve fixed words are required. Additional words are required as follows:

(1) One word is required per functional group to supply the address of the voice radio functional group auxiliary block. The maximum number of words required for this purpose is 12.

(2) Four words are required per physical antenna face (0 through 3). The maximum number of words required for this purpose is 16.

(r) ***Voice Radio Functional Group Auxiliary Block:*** One fixed word is required. One additional word is required for each radio equipped up to a total of eight radios. One auxiliary block is required per functional group.

(s) ***Cell Master Location Translator Head Table:*** This head table requires 256 words. One word is required per cell site.

(t) ***Cell Master Location Translator Auxiliary Block:*** Four fixed words are required. One additional word is required per antenna server group to supply the address of the cell site neighbor auxiliary block. The maximum number of words required for this purpose is eight.

(u) ***Cell Site Neighbor Auxiliary Block:*** Ten fixed words are required. One additional word is required for each cell site neighbor. The maximum number of words used for this purpose is 12.

(v) ***AMPS Miscellaneous Information Head Table:*** Five words are required.

(w) ***AMPS Miscellaneous Auxiliary Block:*** Eight words are required.

(x) ***Paging Cell Sites Auxiliary Block:*** Two fixed words are required. Additional words are required to store the paging cell numbers (three paging cell numbers per word). The maximum number of words used for this purpose is 85.

(y) ***Roamer Service List Auxiliary Block:*** Two fixed words are required plus one word for each roamer. The maximum number of roamers is 300.

(z) ***Fraudulent Serial Number Auxiliary Block:*** This auxiliary block requires 2002 words.

(aa) ***Cell Dialup Channel Translator Head Table:*** This head table requires a maximum of 257 words. One word is required per cell site.

(bb) ***Cell Dialup Channel Translator Auxiliary Block:*** Four words are required. One auxiliary block is required per cell site.

(cc) ***IOP K-Code to Cell Site Channel Number Translator:*** Two fixed words are required. Additional words required are as follows:

(1) ***IOP K-Code to Cell Site Channel Number Table:*** This table requires 1024 words.

(2) ***Cell Site Channel Number to IOP K-Code Table:*** A maximum of 512 words is required. The number of words required is determined by the number of channels assigned. One word is required per channel.

(dd) ***I/O Processor Member Number Subtranslator:*** Sixty-five words are required.

(ee) ***I/O Processor Member Number Auxiliary Block:*** Forty-five words are required. One auxiliary block is required per I/O frame.

(ff) ***Normalized Office Code to Number Group Number Translator:*** This translator requires 321 words.

REAL TIME IMPACT

11.04 Not applicable.

12. DATA ASSIGNMENTS AND RECORDS

TRANSLATION FORMS

12.01 The following ESS translation forms, detailed in reference (13) in Part 18, are applicable to the MTSO feature:

- ESS 1101—Directory Number Record
- ESS 1102—Line Equipment Record
- ESS 1107—Supplementary Information Record/Centrex Group Supplementary Information Record
- ESS 1202—Trunk Group Record
- ESS 1204—Trunk Class Code Record
- ESS 1216—Trunk Group Supplementary Record
- ESS 1219—Combined Miscellaneous Trunk Frame Record
- ESS 1222—TNN and TGN Miscellaneous Information Record
- ESS 1303—Trunk and Service Circuit Route Index Record
- ESS 1400—Traffic Register Assignment Record
- ESS 1500A—Head Table Capacity Record
- ESS 1501—Office Code Record
- ESS 1502—Abbreviated Class Code Record
- ESS 15051/2—Automatic Trunk Testing Table Record
- ESS 1900—Cell Site Trunking Record
- ESS 1902—Cell Site Location and Status Record
- ESS 1903A/B—Cell Site Equipage Record and Cell Site Voice Radio Functional Group Record
- ESS 1905—Roamer Service Record
- ESS 1906—AMPS Miscellaneous and Fraudulent Serial Number Record.

RECENT CHANGES

12.02 The following RC (recent change) messages are affected by the MTSO feature. See references (1), (2), (3), and (10) in Part 18 for details.

MESSAGE	FUNCTION
RC:MOBL	This message is required to modify DN and LEN translations and to build data in the DN/SN translator. Abbreviated codes are used for LEN translations without speed calling, and also for DN translations if call forwarding is not used for the given DN.
RC:TG	Trunk groups with trunks between the MTSO and the cell site are to have trunk group type (keyword TYP) equal to 13 for 1-way trunks or equal to 6 for 2-way trunks. Trunk usage, a field of the TCC (trunk class code), must always be 0 or 1-way trunks or 2 for 2-way trunks, indicating 2-way outgoing trunks. The following keywords are added to the RC:TG message for cell site trunk groups. Keyword SGANT a specifies the server group or set of radios (in an antenna) on which the mobile is to be served (0 = primary, 1 = secondary). Keyword SGANT b specifies the antenna number (0 through 3). Antenna 0 represents an omnidirectional antenna. Antennas 1 through 3 represent

MESSAGE	FUNCTION
	directional antennas. Keyword CSN specifies the cell site number. Trunk groups, consisting of MTSO loop-around trunks, are required to have trunk group type (keyword TYP) equal to 2. Trunk usage is equal to 2, indicating 2-way trunks. Keyword LATG specifies the loop-around trunk group.
RC:TGMEM	The TNN-TGN auxiliary block requires two added fields for the MTSO feature. The radio at the cell site transmits over a specific channel. To set up and control the voice path, the radio number and channel number are required. Keyword CHN specifies the channel number (1 through 312 for group A or 355 through 666 for group B) the radio is using to transmit and receive on. Keyword RADN specifies the radio number.
RC:AMI	This message builds the AMPS miscellaneous auxiliary block. The auxiliary block contains miscellaneous functional capabilities and MSA wide data for AMPS software. The auxiliary block is pointed to by the AMPS miscellaneous information head table.
RC:PCS	This message builds the paging cell sites auxiliary block. The auxiliary block contains the list of paging cell sites for this MSA. The auxiliary block is pointed to by the AMPS miscellaneous information head table.
RC:RSL	This message builds the roamer service list auxiliary block. The auxiliary block contains the encoded NPAs or encoded NPA-NXXs of roamers who are allowed access to the system. The auxiliary block is pointed to by the AMPS miscellaneous information head table.
RC:FSN	This message builds the fraudulent serial number auxiliary block. The auxiliary block contains the serial numbers of roamers who are denied access to the system. The auxiliary block is pointed to by the AMPS miscellaneous information head table.
RC:CST	This message builds the cell site trunking translator. This translator is required to assign a route index to an antenna face and server group. The route index provides the necessary trunking information for the call.
RC:IOP	This message builds the K-code number to cell channel number translation information. The function of this translator is to translate the antenna face and server group to a specific data link hardware location, needed by the data link software in order to send messages.
RC:MSTAT	This message builds the cell master status translation information. This information describes the interface between the cell and the mobile. A master copy of this data is kept at the MTSO and is sent to the cell when the cell is in a phase and/or MTSO request (RC). This is to ensure that the cell has up-to-date information.
RC:CELEQ	The master equipage translator provides the cell with initialization information for peripheral equipment and maintenance power and frequency thresholds. Two RC messages are necessary to build and insert data

MESSAGE	FUNCTION
	in this translator. The RC:CELEQ message builds information relating to each cell site in the auxiliary block. The RC:VRAD message builds information relating to the voice radio functional groups at the cell site in the voice radio functional group auxiliary block.
RC:MLOC	This message builds the cell master location translator. This translator is used to identify neighbors of a cell. Information needed for cell handoff is contained in this translator.
RC:CDU	This message builds the cell dialup translations. The cell dialup translator is used to obtain the DN of the dedicated maintenance TTY channel to a cell site so that cell maintenance can be done remotely from the MTSO.

13. TESTING

13.01 The TTY input and output messages given in references (14), (18), and (20) in Part 18 can be used to verify translation data for the MTSO feature. The messages are:

(a) The existing VF:TNNSVY input message is changed for System 100 to allow a search for loop-around trunks. System response is a TR14 output message which includes the System 100 optional words information.

(b) The VFY:TKGN input message requests the system to verify one trunk group number or all trunk group number translations. System response is a TR10 message which includes the following System 100 TGN data:

- AMPS server group
- Antenna number
- Cell site number.

(c) The VFY-TNN message requests the system to verify a TNN translation of all TNNs on a trunk switch frame. System response is a TR14 message containing the TNN data.

(d) The VF:AMPS input message initiates a search of the System 100 translators for specified data and, if that data is located which satisfies the input parameters, that data is output. System response is one or more of the following messages:

(1) A TR122 message printing the SN and DN for the MTSO feature when keywords DN or SN are input

(2) A TR123 message printing the system-wide parameters, which are broadcast from the cell to the mobile for the System 100 feature when keyword MISC is input

(3) A TR124 message printing a single (or list) of paging cell(s), or roamers which are allowed access to the system when keywords PAGE or NPA/NXX are input

(4) A TR125 message printing a list of fraudulent SNs when keyword FSN is input

(5) A TR126 message printing a specific data link hardware location from the logical cell site number and vice-versa when keywords IOPKC or CSN/PRI are input

(6) A TR127 message printing information for the cell site to broadcast to the mobile when keywords CSN/MSTAT are input

(7) A TR128 message printing the cell site trunking information when keywords CSN/RADN are input

(8) A TR129 message printing the DN (including 1 + dialing indication) of the dedicated maintenance TTY channel to a cell site and the CI 10xxx field, when keywords CSN/CDU are input

(9) A TR130 message printing all cell site numbers having the EMIN and/or WFOM bits set when keywords CSN, EMIN/WFOM and, optionally, LIST are input.

(10) A TR131 message printing the results of a search of the voice radio functional group auxiliary block of the cell master equipage auxiliary block of the input CSN for the voice radio number that:

- Has a particular status (STAT) and/or;
- Is associated with a particular SG and antenna face (SGANT) and/or;
- Transmits and receives on a certain frequency channel (VRCH) at a cell.

(11) A TR132 message printing one of the following in response to keywords CSN, ANT, and, optionally, LIST:

- A count and list of the (assigned) antenna face(s) followed by the four auxiliary words associated with the antenna face(s).
- A count of assigned antenna faces found.

(12) A TR133 message printing data about neighbors of a cell in response to keywords CSN, SGANT, and GRP. The TR133 message is printed only if the DPCI (dynamic power control indicator) is not set. If DPCI is set, a TR133A message is printed. The TR133 message gives a list of the data found in the first two words of the cell site neighbor auxiliary block plus one of the following:

- If CSN, SGANT, and GRP (without data) are input, all the neighbors (group 1 and group 2) of the cell site, SG, and antenna face.
- If CSN, SGANT and GRP = 1 are input, all group 1 neighbors of the cell site, SG, and antenna face.
- If CSN, SGANT and GRP = 2 are input, all group 2 neighbors of the cell site, SG, and antenna face.

(13) A TR133A message printing the same output as the TR133 message if the DPCI bit is set. In addition to the TR133 output, the following fields are printed:

- Cell Site Power Control Flag (CPCF)
- Mobile Power Control Flag (MPCF)
- High Signal Strength for the Mobile (HSTM)
- High Signal Strength for the Cell Site (HSTC)
- Low Signal Strength for the Mobile (LSTM)
- Low Signal Strength for the Cell Site (LSTC)
- Voice Channel Selection High Threshold (HIGH)
- Maximum Power Differential (MPDIF)
- Number of Mobile Attenuaton Levels (NMAL)
- Number of Cell Site Attenuation Levels (NCAL)
- Server Group Power Amplifier Identifier (SGPAID)
- Speed Trending Flag (STF).

(14) A TR134 message printing the CSN when keywords CSN and RETRY are entered. The CSN is followed by the data from the first word of the cell master location translator plus the directed retry list. The six DRL fields which contain the CSNs that the mobile is redirected to is retrieved from the cell master location translator of the input CSN, or range of CSNs.

(15) A TR135 message printing a list of words 1 through 11 of the IOMTRANS auxiliary block for that IOUS if keyword IOUS only is input. If keywords IOUS and CHAN are both input, in addition to the above data output, the TR135 output message prints out the two data words associated with each requested channel (CHAN).

(16) A TR139 message printing the cell equipage translator contents when keywords CSN and EQUIP are input.

14. OTHER PLANNING TOPICS

14.01 Not applicable.

ADMINISTRATION

15. MEASUREMENTS

15.01 For detailed information concerning traffic measurements unique to the MTSO feature, see reference (6) in Part 18.

16. CHARGING

AUTOMATIC MESSAGE ACCOUNTING

16.01 For detailed information as to how and when charging applies, see reference (5) in Part 18.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

17.01 The following terms are defined as they apply to this feature.

Access Channel—A setup channel used by a mobile unit to access a system to obtain service.

Cell—A geographical region within which calls are expected to be served by a particular cell site.

Cell Site—An installation containing the radio and control equipment necessary to complete the talking path to the mobile unit.

Cell Site Face—A distinct sector covered by an antenna pattern at a cell site.

Cell Site Trunk—Provides a voice communication path from MTSO to cell site. Each trunk is physically connected from the MTSO switching network to a voice radio at a cell site (also called voice trunks).

Channel—Refers to a pair of frequencies used for mobile communication. One is used for cell-site-to-mobile transmission while the other is used for mobile-to-cell-site transmission.

Channel Assignment—(1) The process of specifying which voice channels are to be used at each cell site face in a MSA (mobile service area), (2) a channel(s) so assigned.

Channel Designation—The process of instructing a mobile unit to tune to a selected channel.

Channel Set—A group of channels which will generally be assigned collectively to a cell site.

Data Link—A voice frequency signaling path for transmitting data messages between a switch unit and control unit. For System 100, the components of a data link include the IOP (input/output processor) hardware at the MTSO, the DLI (data link interface) and CSC (cell site controller) hardware at the cell site, and the transmission facilities connecting both ends.

Data Link Interface—An interface, at a cell site, between the transmission facilities and the CSC.

Data Link Pair—Two dedicated transmission paths, 0 or 1, connecting data sets between a MTSO and a cell site.

Data Set—Equipment for performing the conversion of signals between data processors or terminals (usually digital) into signals suitable for transmission over data link pairs and for control of the connection.

Forward Setup Channel—A setup channel used from a cell site to a mobile unit.

Forward Voice Channel—A voice channel used from a cell site to a mobile unit.

Home Mobile Unit—A mobile unit which operates in the MSA from which service is subscribed.

Home Mobile Service Area—The MSA from which the mobile unit subscribes service.

Mobile-Originated Call—A call originating from a mobile unit.

Mobile-Terminated Call—A call completed to a mobile unit (also referred to as land-originated call).

Mobile Service Area—A basic coverage region in which System 100 is made available.

Omnidirectional Antenna—A radio antenna that transmits and receives energy equally well in all azimuthal directions.

Paging—The process in which the MTSO, via cell sites, sends a data stream over paging channels

throughout a mobile service area informing mobile units when they are receiving calls from the network.

Paging Channel—A forward setup channel which is used to page mobile units and send orders.

Reorder Tone—A low tone interrupted at 120 ipm which indicates that the local switching paths to the called office, or equipment serving the called customer, are busy or that no toll circuit is available. This signal may also indicate a condition such as a timed-out sender or unassigned code dialed.

Reverse Control Channel—The control channel used from a mobile unit to a cell site.

Reverse Setup Channel—The setup channel used from a mobile unit to a cell site.

Reverse Voice Channel—The voice channel used from a mobile unit to a cell site.

Roamer—A mobile unit which operates in a mobile service area other than the one from which service is subscribed.

Signaling Tone—A 10-kHz tone transmitted by a mobile unit on a voice channel to: (1) confirm orders, (2) signal flash requests, and (3) signal release requests.

Voice Channel—A radio frequency channel on which a voice conversation occurs and on which brief digital messages may be sent from a cell site to a mobile unit or from a mobile unit to a cell site.

Voice Channel Selection—The process by which one of the channels assigned to a cell site face is chosen for a particular call.

Zone Office—A class 5 telephone switching office which provides System 100 access to the public switched telephone network.

18. REFERENCES

18.01 The following documentation contains information related to or affected by the MTSO feature.

(1) 231-090-120—Carrier Interconnect—Feature Document

(2) 231-090-219—Remote Office Test Line and Processor Controlled Interrogator—Feature Document (Issue 4 or later)

(3) 231-200-005—Mobile Telephone Switching Office, Cell Site, and Mobile Unit—Description—AUTOPLEX System 100

(4) 231-218-301—Recent Change Formats and Implementation—Description and Procedures—AUTOPLEX System 100

(5) 231-290-604—Traffic Measurements—Feature Document—AUTOPLEX System 100

(6) 231-290-606—Speed Calling—Feature Document—AUTOPLEX System 100

(7) 231-290-607—Immediate Call Forwarding—Feature Document—AUTOPLEX System 100

(8) 231-290-608—Conditional Call Forwarding—Feature Document—AUTOPLEX System 100

(9) 231-290-609—Three-Way Calling—Feature Document—AUTOPLEX System 100

(10) 231-290-610—Call Waiting—Feature Document—AUTOPLEX System 100

(11) 231-290-611—Priority Calling—Feature Document—AUTOPLEX System 100

(12) 231-290-615—Roamer I—Feature Document—AUTOPLEX System 100

(13) 231-290-616—Roamer II—Feature Document—AUTOPLEX System 100

(14) 231-290-620—Automatic Message Accounting—Feature Document—AUTOPLEX System 100

(15) 231-290-621—Data Privacy—Feature Document—AUTOPLEX System 100

(16) 231-290-622—Message Desk Service—Feature Document—AUTOPLEX System 100

(17) 401-200-100—Cell Site Description—AUTOPLEX System 100.

(18) Input Message Manual IM-6A001

(19) Output Message Manual OM-6A001

(20) Translation Guide TG-1A

(21) Office Parameter Specification PA-6A001

(22) Parameter Guide PG-1A

(23) Translation Output Configuration PA-6A002.

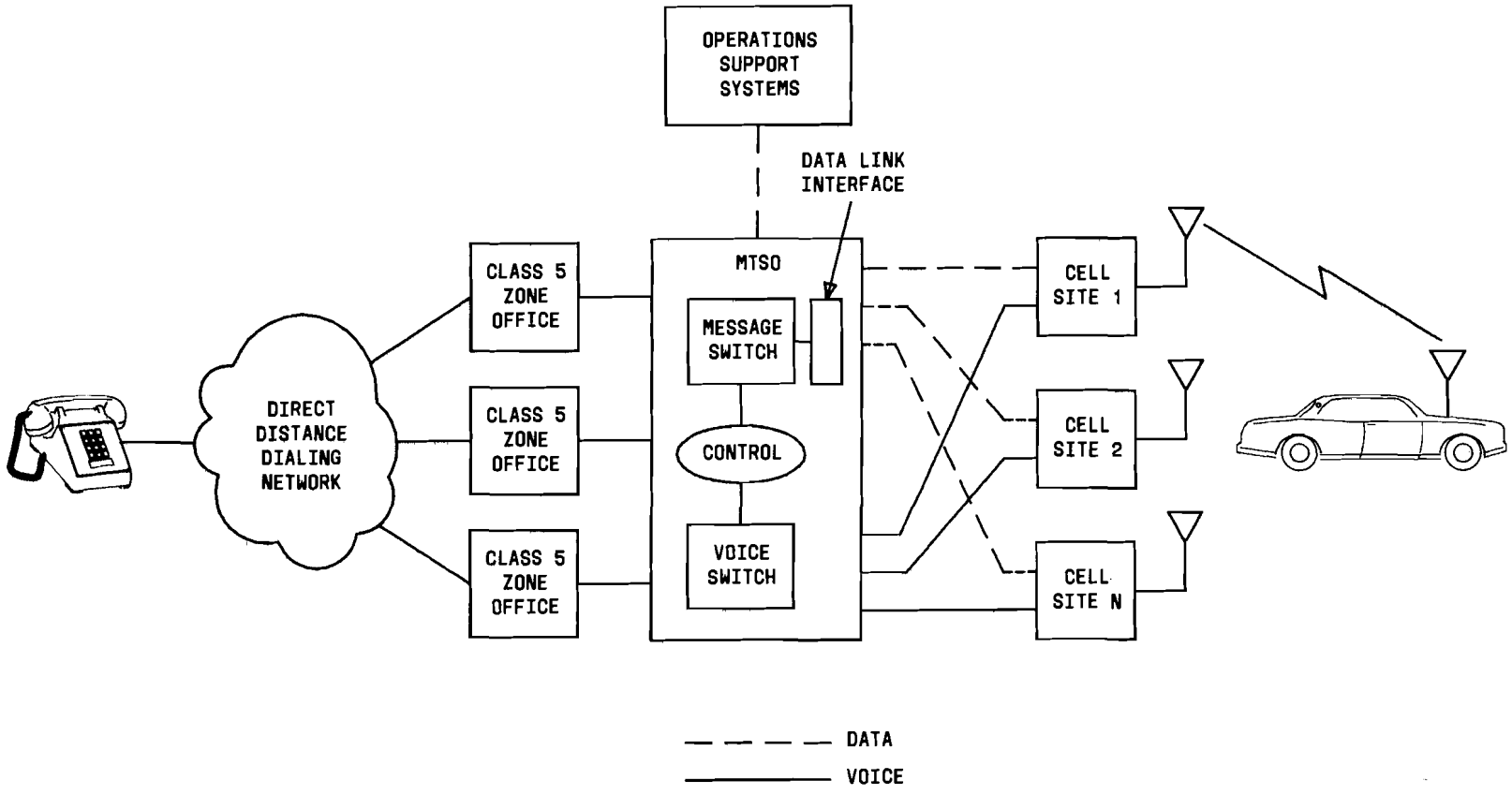


Fig. 1—AUTOPLEX System 100 Hierarchy

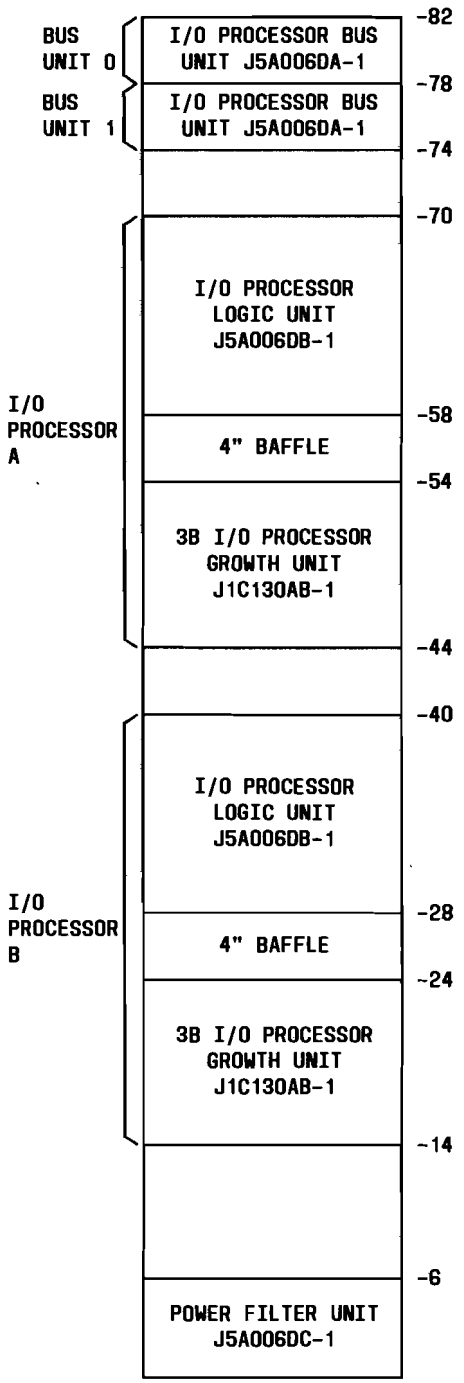


Fig. 2—I/O Processor Frame J5A006D-1 (Equipped With 3B I/O Growth)—Front View

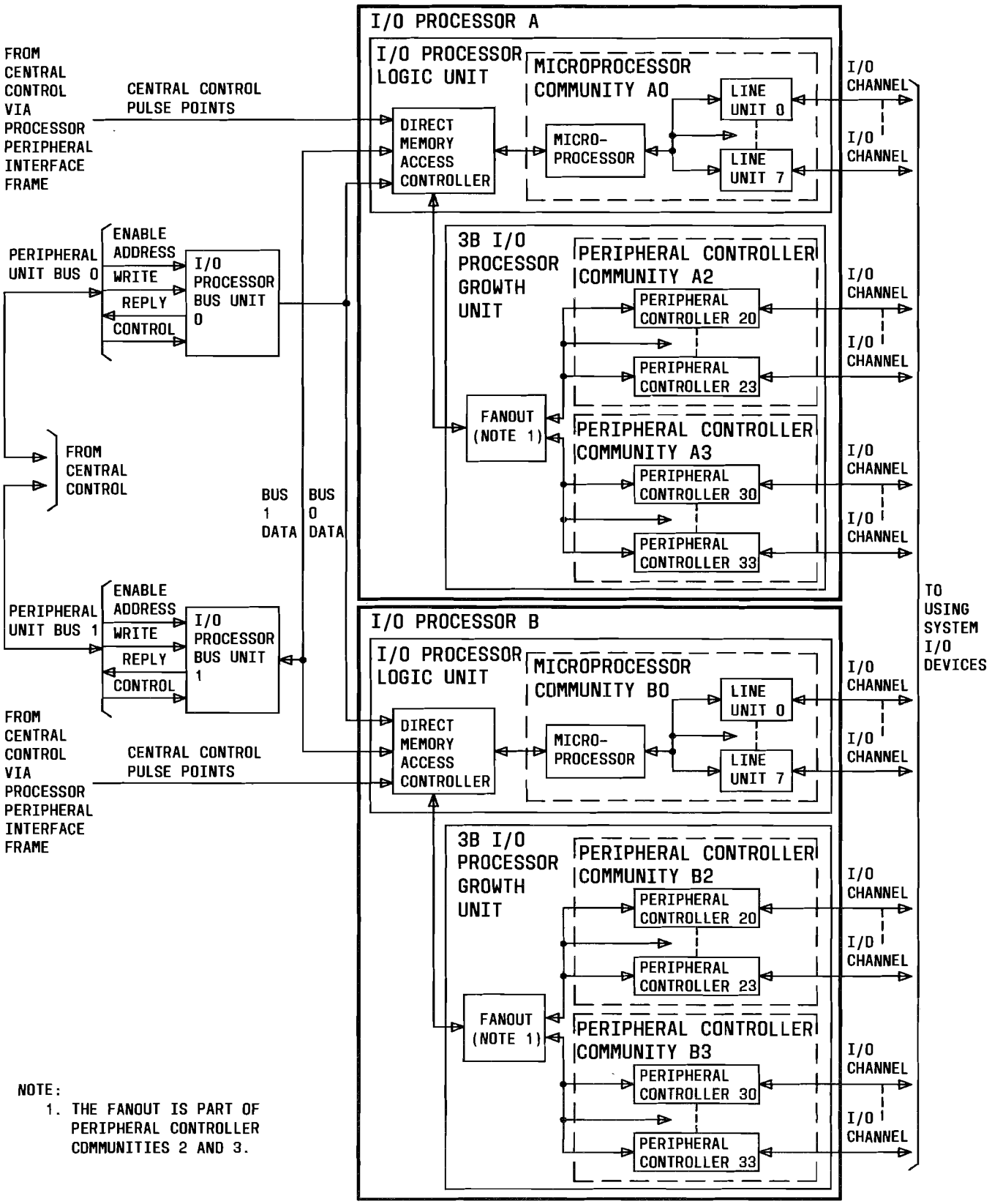


Fig. 3—I/O Processor Frame (Equipped With 3B Processor Growth Units)—Block Diagram

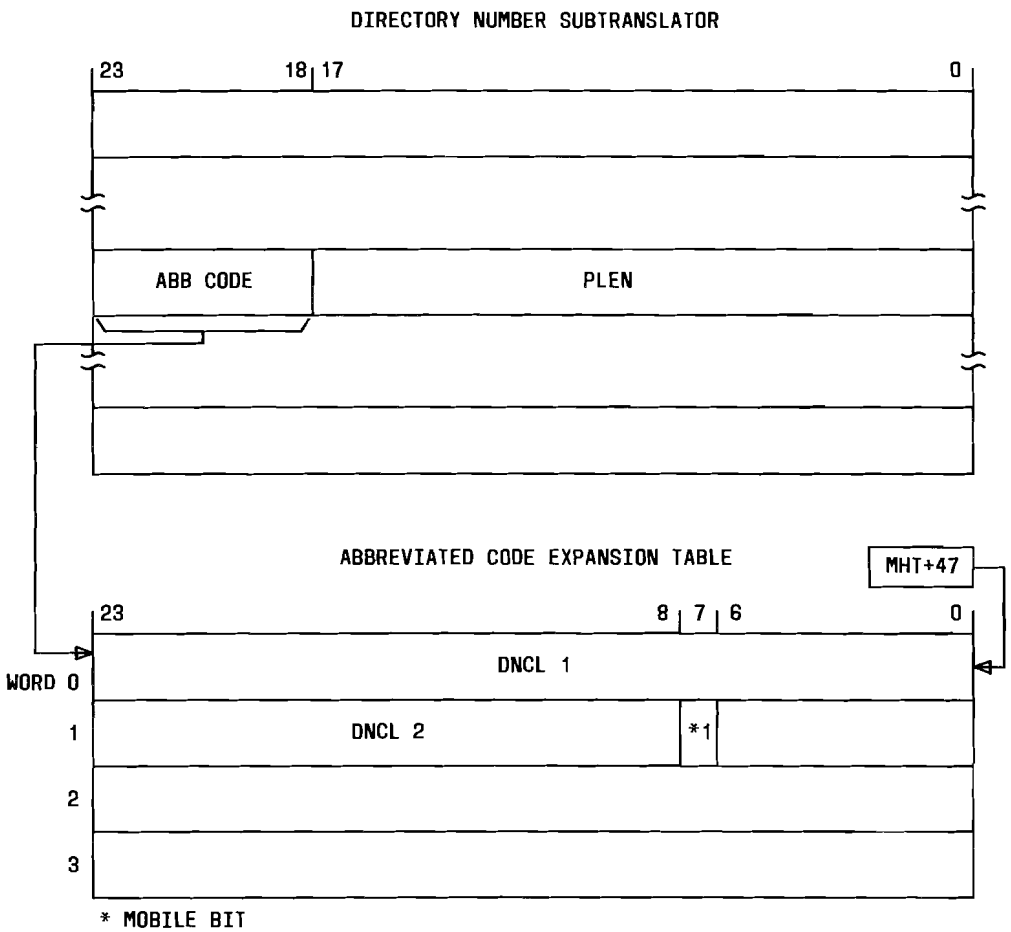
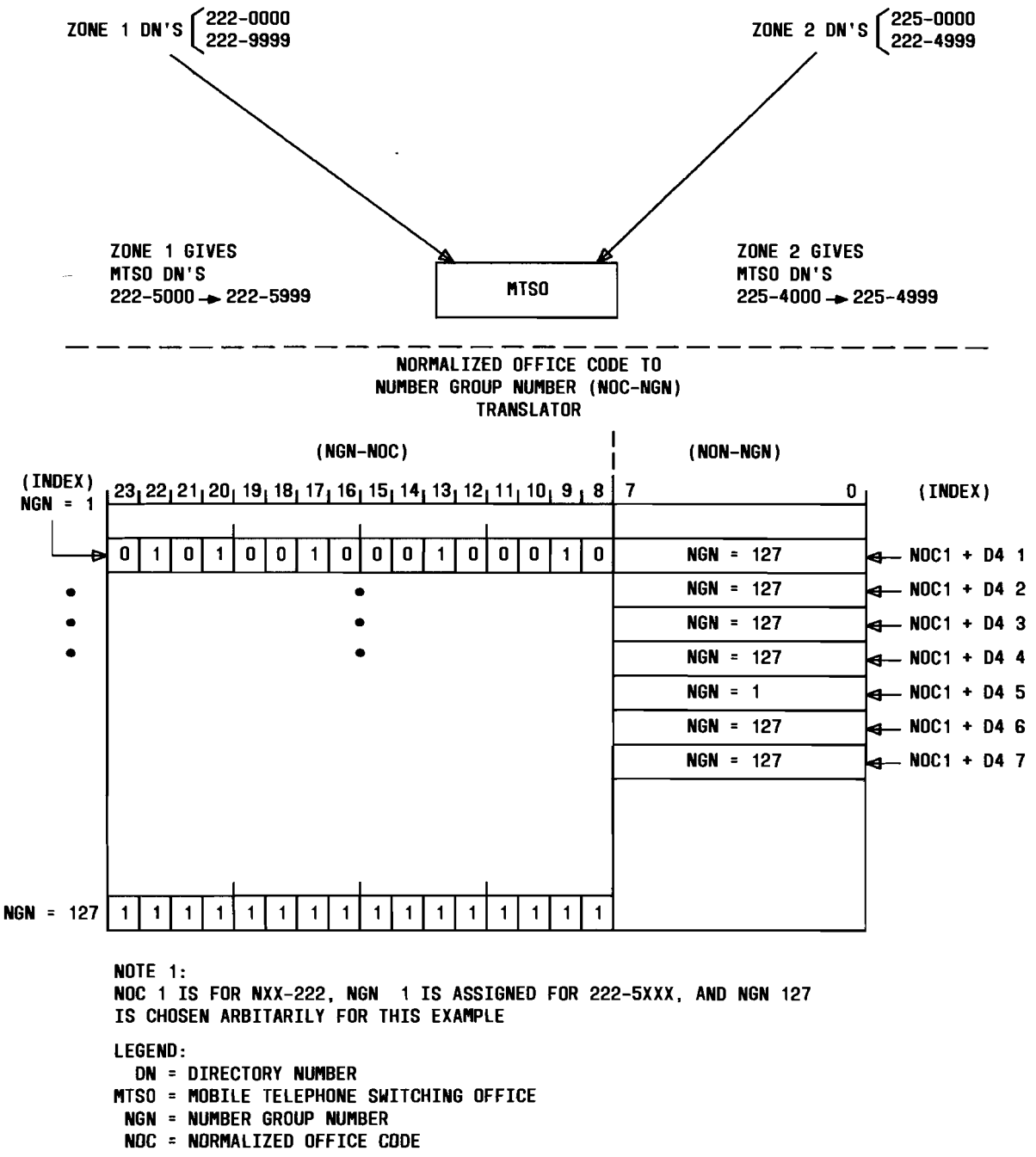


Fig. 4—Directory Number Translator



NOTE 1:
NOC 1 IS FOR NXX-222, NGN 1 IS ASSIGNED FOR 222-5XXX, AND NGN 127 IS CHOSEN ARBITARILY FOR THIS EXAMPLE

LEGEND:
DN = DIRECTORY NUMBER
MTSO = MOBILE TELEPHONE SWITCHING OFFICE
NGN = NUMBER GROUP NUMBER
NOC = NORMALIZED OFFICE CODE

Fig. 5—Example of Mobile DN Assignment

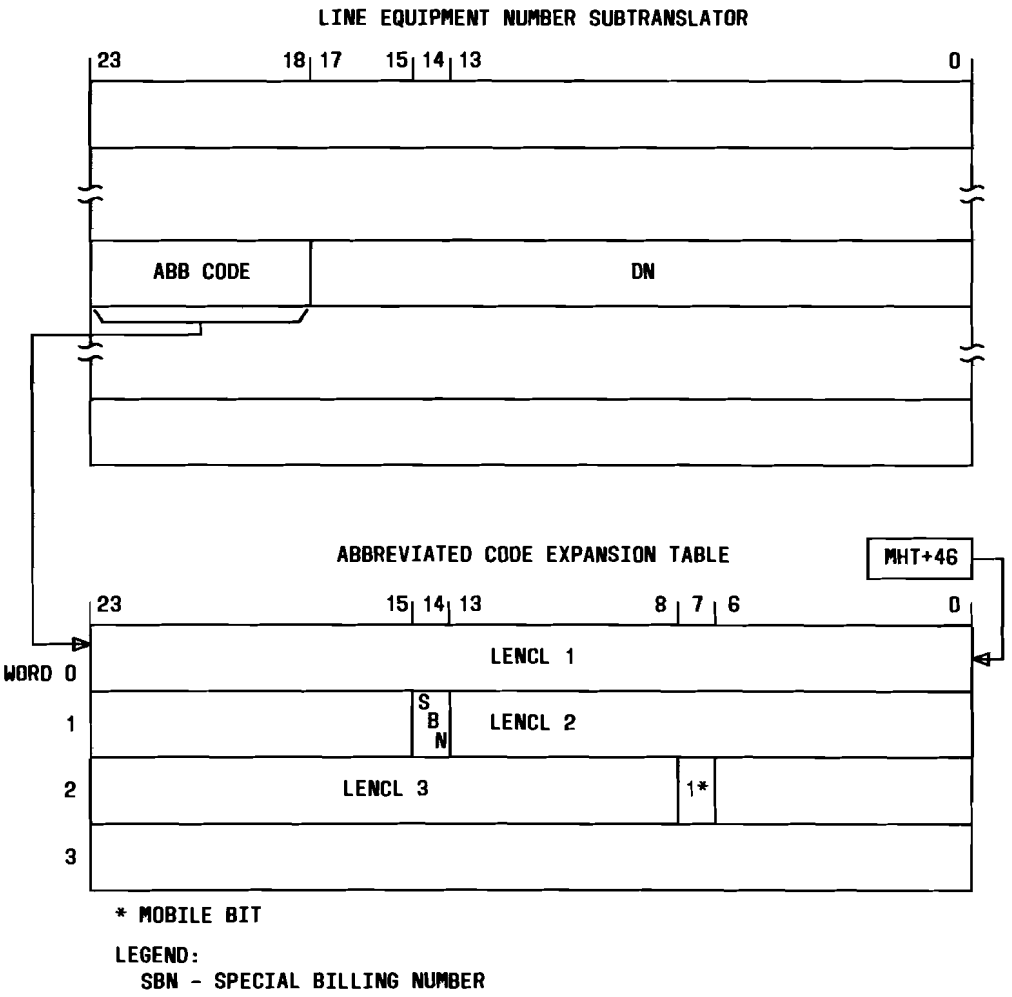
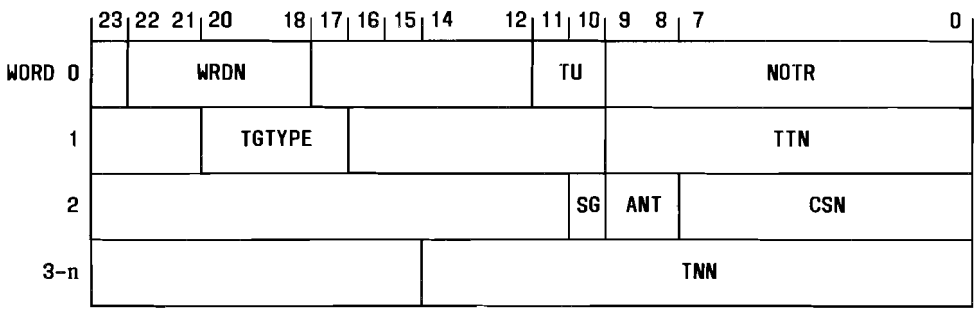
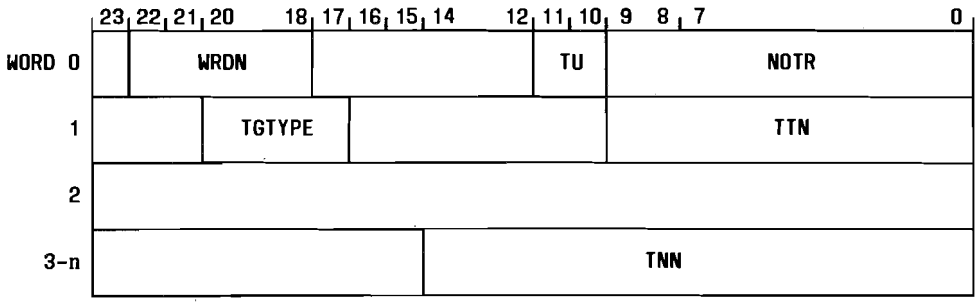


Fig. 6—Line Equipment Number Translator



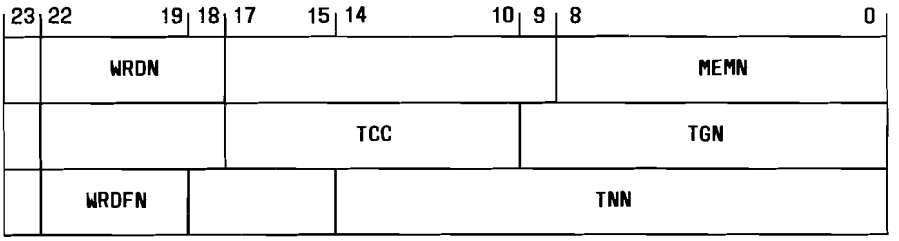
LEGEND:
- ANT - ANTENNA FACE
- CSN - CELL SITE NUMBER (1-255)
- NOTR - NUMBER OF TRUNKS IN GROUP
- SG - SERVER GROUP
- TGTYPE - TRUNK GROUP TYPE=13 FOR ONE-WAY, = 6 FOR 2-WAY
- TNN - TRUNK NETWORK NUMBER
- TTN - TEST TABLE NUMBER
- TU - TRUNK USAGE (SET TO 2 FOR TWO-WAY, SET TO 0 OR 2 FOR ONE-WAY)
- WRGN - NUMBER OF WORDS IN AUXILIARY BLOCK

Fig. 7—Trunk Group Number Translator Auxiliary Block



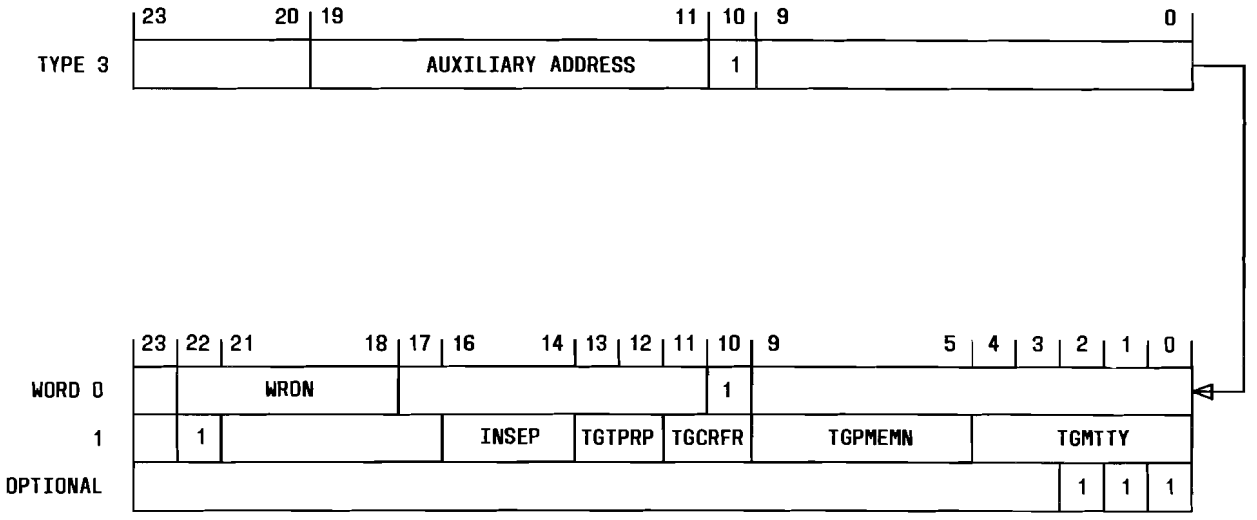
LEGEND:
- NOTR - NUMBER OF TRUNKS IN GROUP
- TGTYPE - TRUNK GROUP TYPE=2
- TNN - TRUNK NETWORK NUMBER
- TTN - TEST TABLE NUMBER
- TU - TRUNK USAGE (SET TO 2 FOR "AUTOPLEX" SYSTEM 100)
- WRGN - NUMBER OF WORDS IN AUXILIARY BLOCK

Fig. 8—Trunk Group Number Translator Auxiliary Block for Loop-Around Trunks



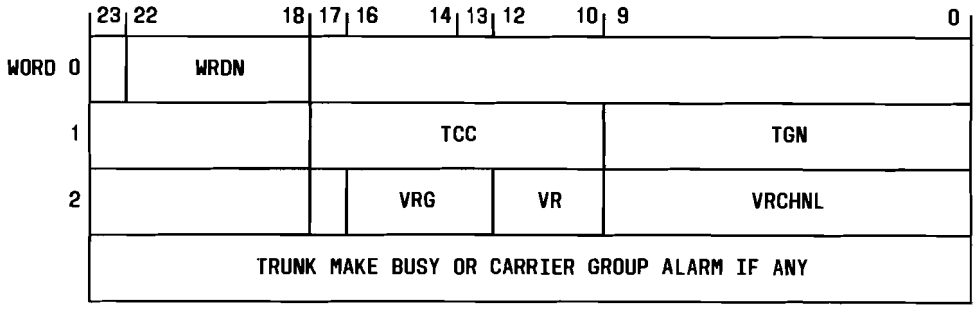
LEGEND:
MEMN - MEMBER NUMBER
TCC - TRUNK CLASS CODE
TGN - TRUNK GROUP NUMBER
TNN - TRUNK NETWORK NUMBER
WRDFN - WORD FUNCTION
WRDN - NUMBER OF WORDS IN AUXILIARY BLOCK

Fig. 9—Trunk Network Number to Trunk Group Number Translator Auxiliary Block for Loop-Around Trunks



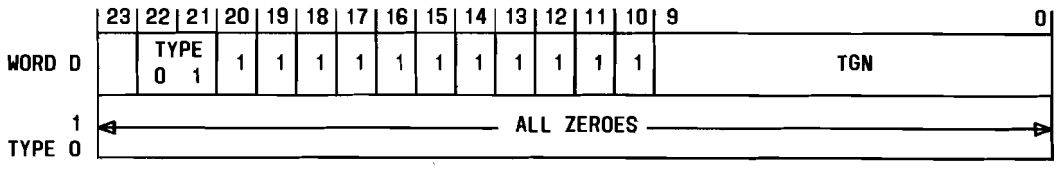
LEGEND:
INSEP - INCOMING SEPARATION OF REVENUE CLASS
TGCRFR - TRUNK GROUP CRAFT FORCE RESPONSIBILITY
TGMTTY - TRUNK GROUP MAINTENANCE TTY CHANNEL
TGPMEMN - TRUNK GROUP TEST PANEL MEMBER NUMBER
TGTPRP - TRUNK GROUP TEST PAD REFERENCE POINT

Fig. 10—Trunk Group Number Supplementary Table Translator



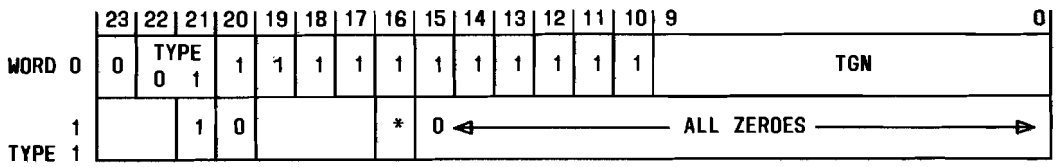
LEGEND:
TCC - TRUNK CLASS CODE
TGN - TRUNK GROUP NUMBER
VR - VOICE RADIO NUMBER
VRCHNL - RADIO CHANNEL NUMBER
VRG - VOICE RADIO GROUP
WRDN - NUMBER OF WORDS IN AUXILIARY BLOCK

Fig. 11—Trunk Network Number to Trunk Group Number Translator Auxiliary Block for Cell Site Trunks



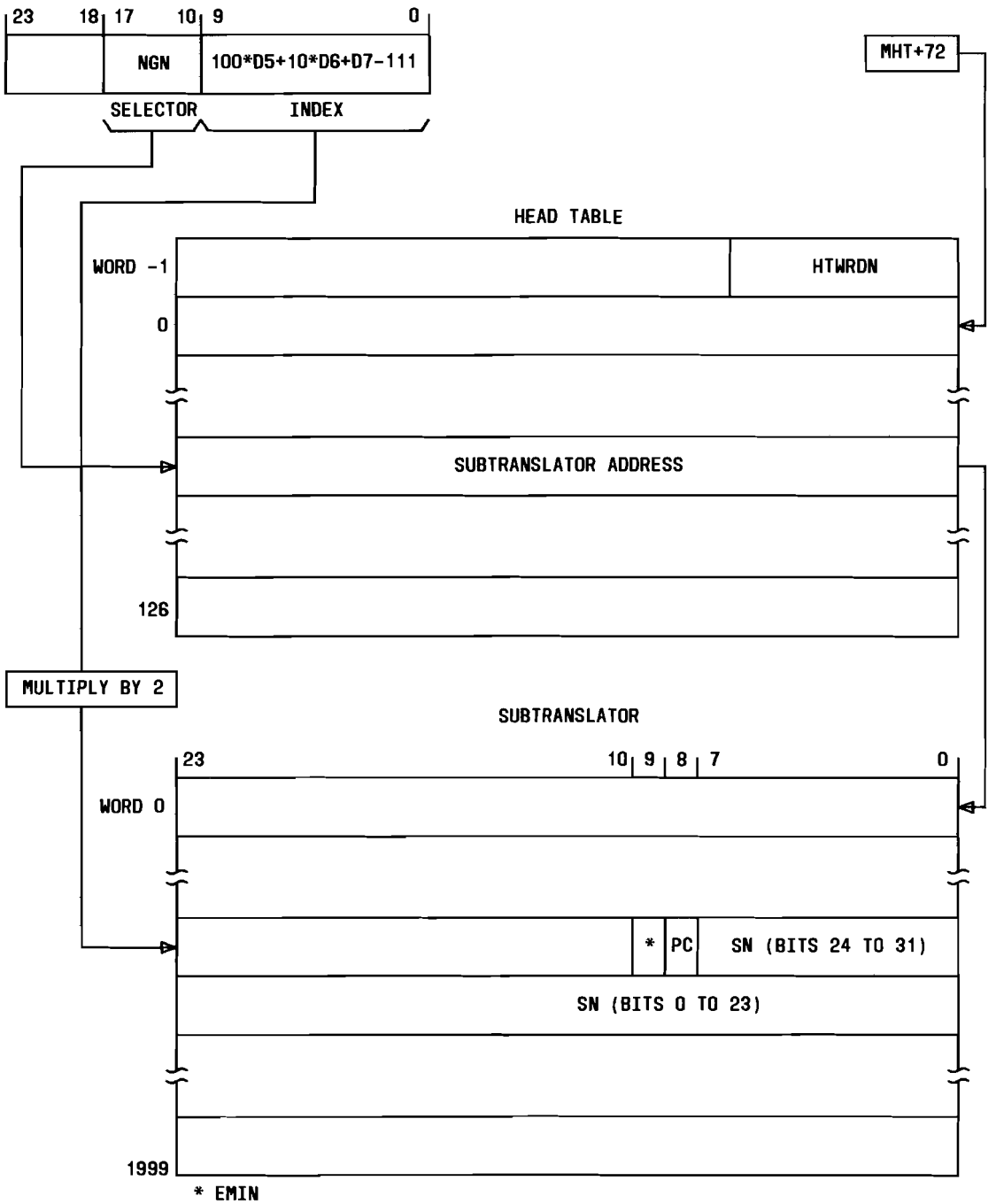
LEGEND:
PRI - PSEUDO ROUTE INDEX
TGN - TRUNK GROUP NUMBER

Fig. 12—Pseudo Route Index Expansion Tables for PRI 045, 057, 058, 059, 060, and 061



*RS
LEGEND:
RI - ROUTE INDEX
RS - RETURN SUPERVISION
TGN - TRUNK GROUP NUMBER

Fig. 13—Route Index Expansion Table for RI 131



* EMIN

LEGEND:
EMIN - EXTENDED MOBILE IDENTIFICATION NUMBER
HTWRDN - HEAD TABLE LENGTH
NGN - NUMBER GROUP NUMBER
PC - PAGING CHANNELS
SN - SERIAL NUMBER

Fig. 14—Directory Number to Serial Number Translator

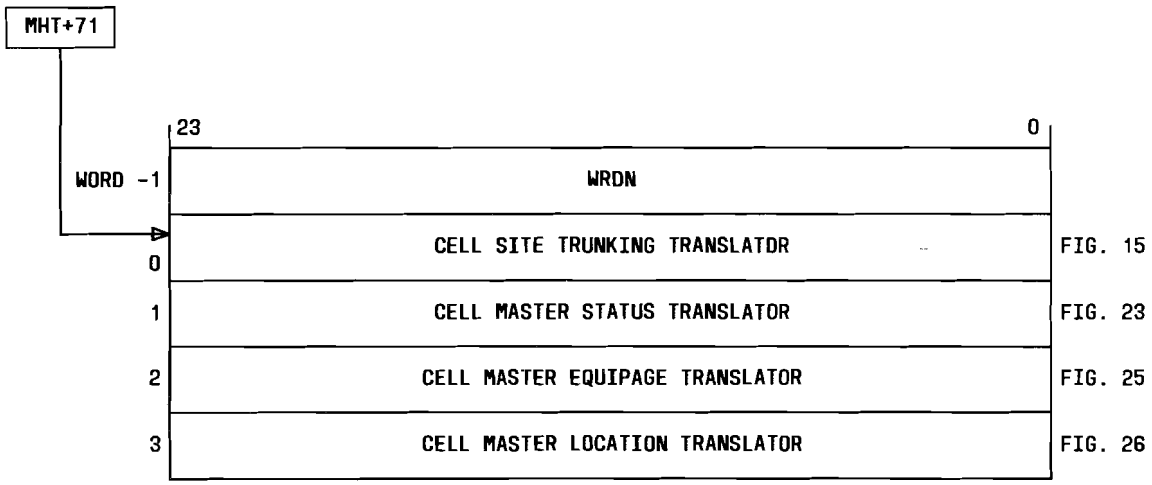
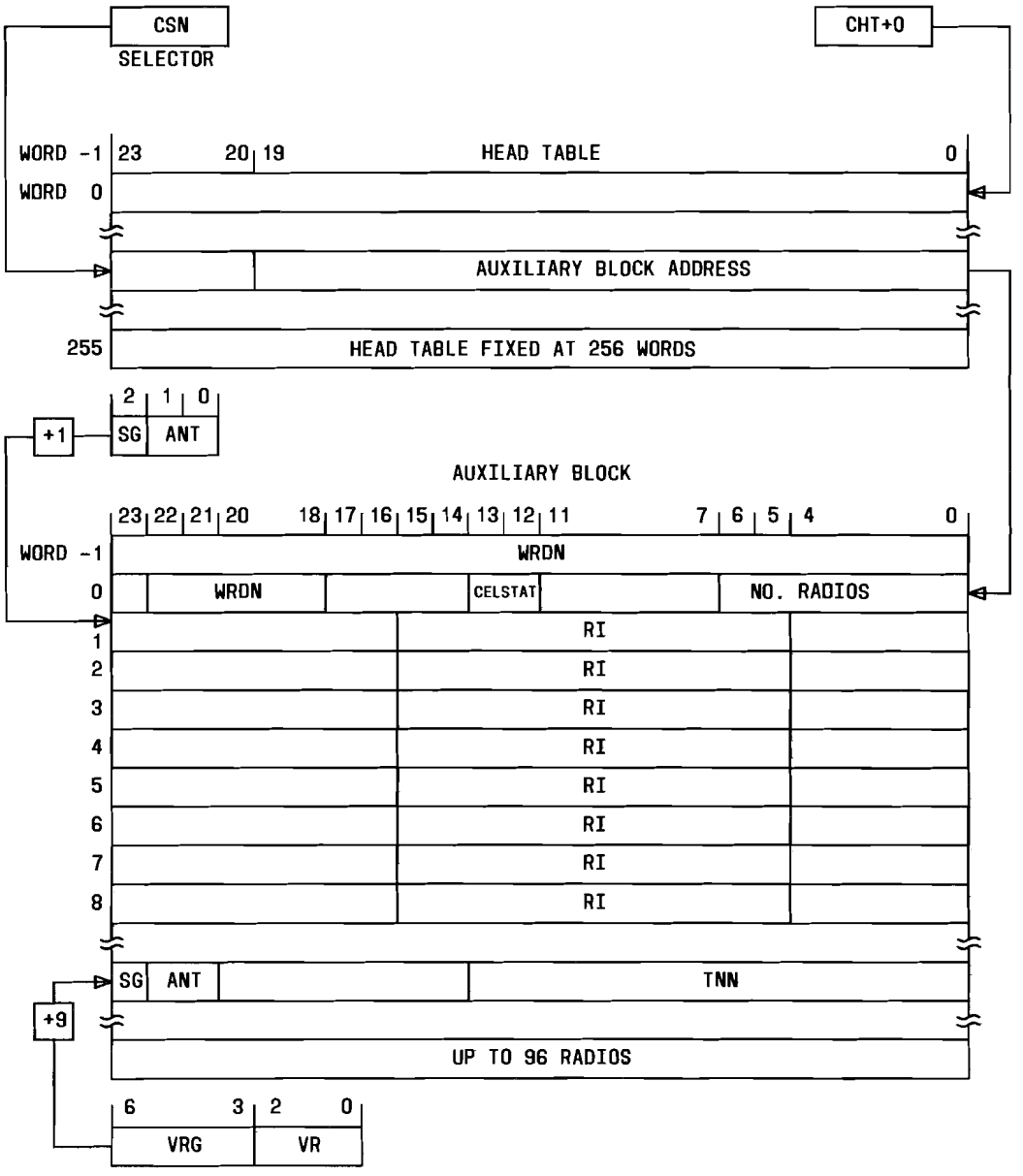


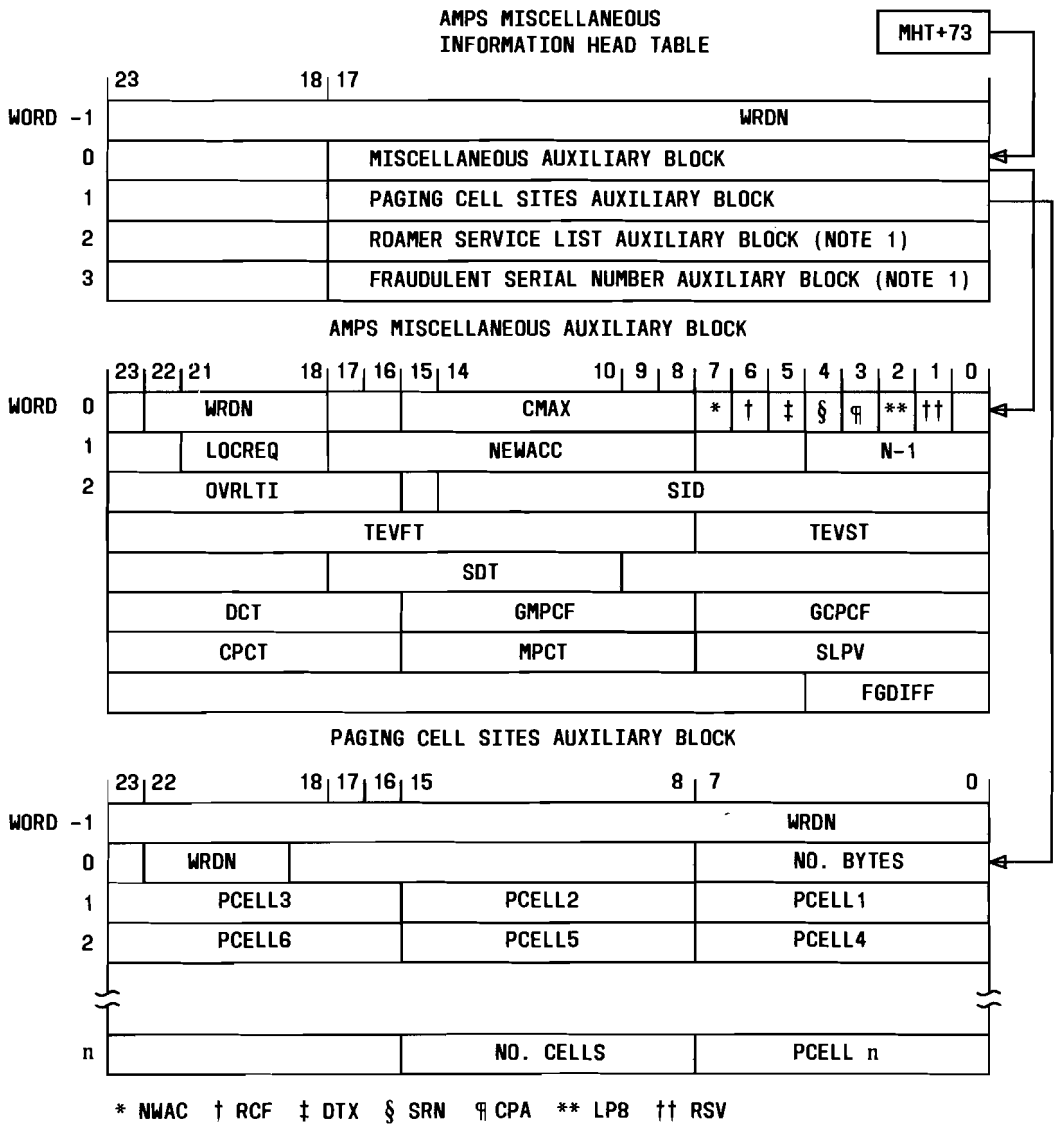
Fig. 15—Cell Site Translator



LEGEND:

ANT - ANTENNA NUMBER
CSN - CELLSITE NUMBER
CELSTAT - CELL STATUS BITS
RI - ROUTE INDEX
SG - SERVER GROUP
TNN - TRUNK NETWORK NUMBER
VR - VOICE RADIO NUMBER
VGR - VOICE RADIO GROUP
WRDN - NUMBER OF WORDS IN AUXILIARY BLOCK

Fig. 16—Cell Site Trunking Translator



* NWAC † RCF ‡ DTX § SRN ¶ CPA ** LP8 †† RSV

NOTE:

1. FOR DETAILS OF THE ROAMER SERVICE LIST AND FRAUDULENT SERIAL NUMBER AUXILIARY BLOCK, REFER TO REFERENCE (13) IN PARTH 18.

Fig. 17—AMPS Miscellaneous Information Translator (Sheet 1 of 2)

LEGEND:

```
     CMAX - MAXIMUM NUMBER OF ACCESS CHANNELS
            THE MOBILE HAS TO SCAN
      CPA - COMBINED PAGING AND ACCESS
     CPCT - CELLSITE PROCESS COUNTER THRESHOLD
      DCT - DIVERSITY COUNTER THRESHOLD
      DTX - DISCONTINUOUS TRANSMISSION
   FGDIFF - FRAME GAIN DIFFERENTIAL
    GCPCF - GLOBAL CELL SITE POWER CONTROL FLAG
    GMPCF - GLOBAL MOBILE POWER CONTROL FLAG
   LOCREQ - LOCATION REQUEST LIMIT
      LPB - LONG PAGE BUNDLING
     MPCT - MOBILE PROCESS COUNTER THRESHOLD
      N-1 - NUMBER OF PAGING CHANNELS THE MOBILE HAS TO SCAN
   NEWACC - NEW ACCESS CHANNEL
NO. BYTES - NUMBER OF BYTES (8 BITS)
NO. CELLS - NUMBER OF CELLS
     NWAC - NEW ACCESS CHANNEL
   OVRLTI - VOICE RADIO LOCATION TIME INTERVAL DURING OVERLOAD
    PCELL - PAGING CELL SITES
      RCF - READ CONTROL FILLER WORD
      RSV - ROAMER SERVICE VALIDATION
      SDT - SAT DETECT THRESHOLD
      SID - SYSTEM IDENTIFICATION NUMBER
     SLPV - SKIP LOCATE PERIOD VALUE
      SRN - SEND SERIAL NUMBER
    TEVFT - TRAFFIC EVENT FAILURE THRESHOLD
    TEVST - TRAFFIC EVENT SUCCESS THRESHOLD
     WRDN - NUMBER OF WORDS IN THE AUXILIARY BLOCK
```

Fig. 17—AMPS Miscellaneous Information Translator (Sheet 2 of 2)

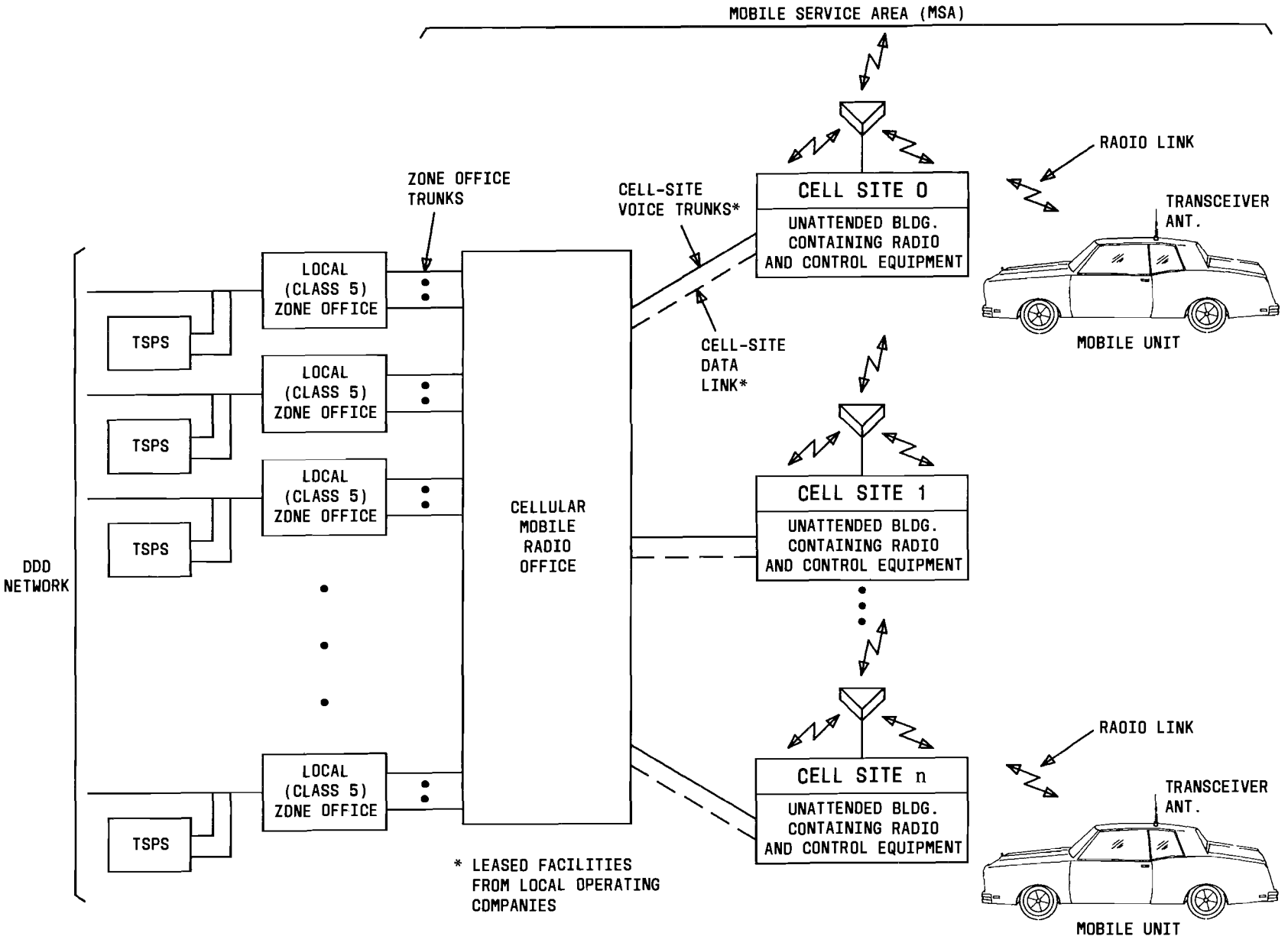
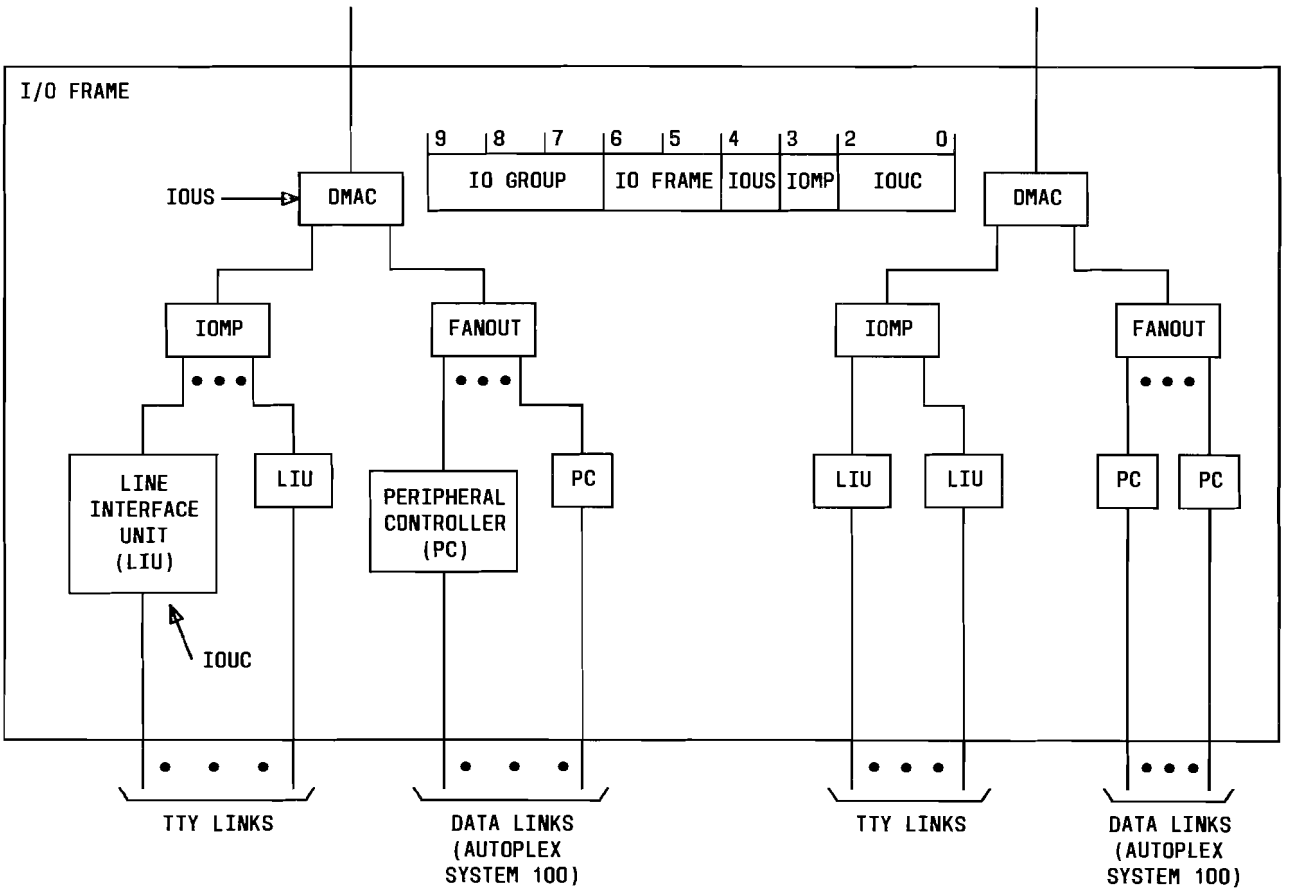


Fig. 18—IOP K-Code to Cell Site Channel Number Translator (Note 1)



NOTE:
1. FOUR I/O FRAMES PER I/O GROUP

LEGEND:
IOMP - INPUT/OUTPUT MICROPROCESSOR
IOUC - INPUT/OUTPUT UNIT CONTROLLER
IOUS - INPUT/OUTPUT UNIT SELECTOR

Fig. 19—I/O Member Configuration (Note 1)

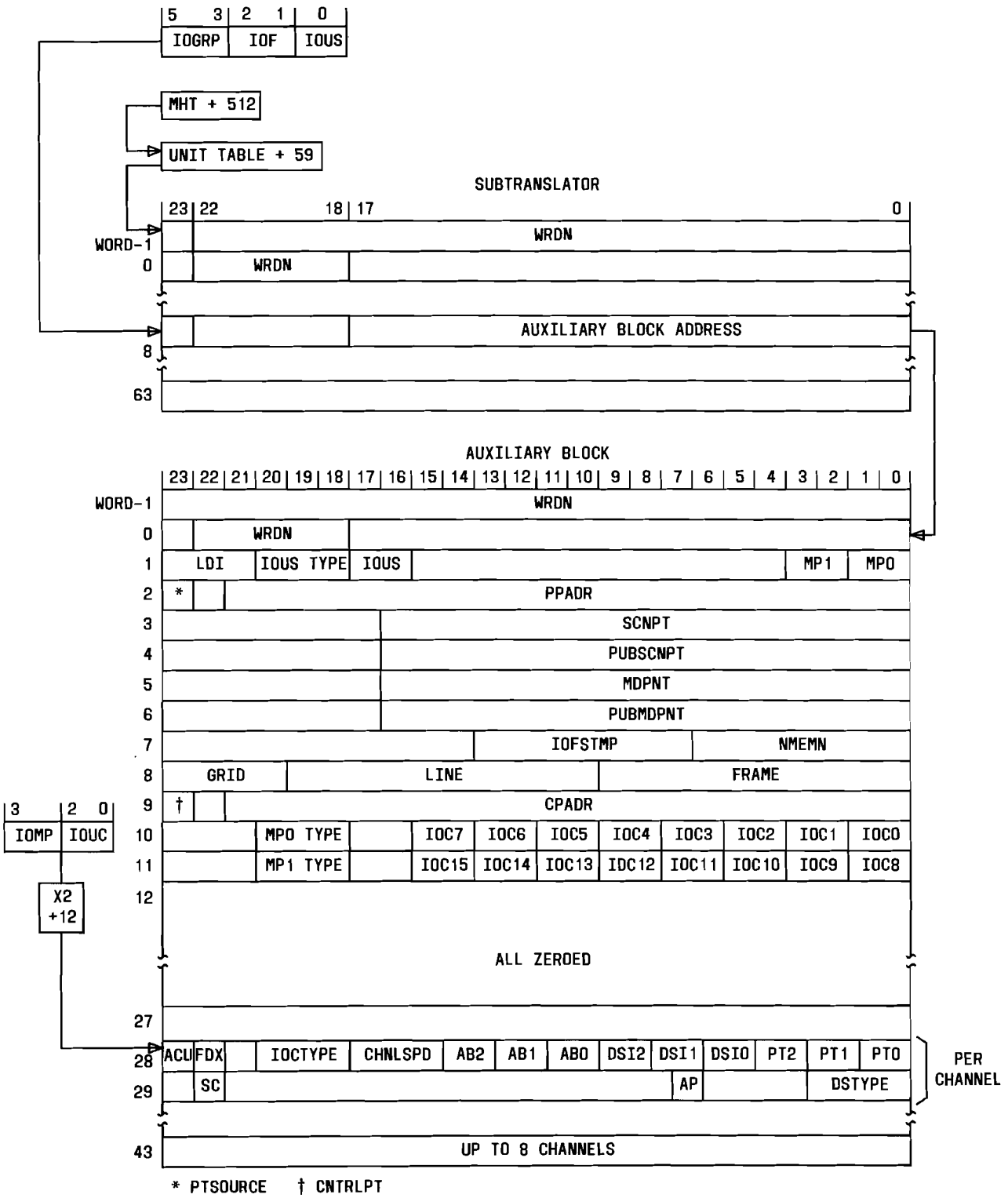


Fig. 20—I/O Processor Member Number Translator (Sheet 1 of 2)

```
LEGEND:
   AB0-AB2 - INDICATES WHETHER PORT 0-2, RESPECTIVELY, IS EQUIPPED WITH ANSWER BACK (HANDSHAKING)=0
       ACU - INDICATES WHETHER AN AUTOMATIC CALL UNIT IS CONNECTED TO THE CHANNEL=0
        AP - INDICATES WHETHER AN APPLICATION IS CONTROLLING THE LINK=1
   CHNLSPD - CHANNEL SPEED OF THE CHANNEL
   CNTRLPT - INDICATES WHETHER THE CONTROL PULSE POINT IN A CC-GCP POINT OR ANOTHER TYPE OF POINT=0 OR 1
     CPADR - CONTROL PULSE POINT OCTAL ADDRESS
   DS0-DS2 - DATA SET INDICATOR FOR PORT 0-2, RESPECTIVELY
    DSTYPE - TYPE OF DATA SET ON THE CHANNEL
       FDX - INDICATES WHETHER THE CHANNEL IS HALF OR FULL DUPLEX=1
   IOCTYPE - TYPE OF I/O CONTROLLER ON THE CHANNEL=7
IOC0-IOC15 - EQUIPPAGE FIELDS FOR I/O UNIT CONTROLLERS 0-15, RESPECTIVELY
     IOGRP - I/O GROUP
       IOF - I/O FRAME
      IOUS - I/O UNIT SELECTORS
  IOUSTYPE - TYPE OF IOUS CURRENTLY BEING USED=001
       LDI - HARDWARE LDI NUMBER
     MDPNT - UNIPOLAR CPD POINT ADDRESS OF THE FIRST OF EIGHT SIGNAL DISTRIBUTOR POINTS NEEDED PER I/O FRAME
   MP0-MP1 - EQUIPPAGE STATUS OF MICROPROCESSOR 1 OR 2, RESPECTIVELY
     NMEMN - OTHER I/O MEMBER NUMBER IN THE I/O FRAME
     PPADR - PULSE POINT ADDRESS
  PTSOURCE - INDICATES THE FORMAT OF THE IOUS PULSE POINT SOURCE=1
   PT0-PT2 - EQUIPPAGE OF PORT 0-2, RESPECTIVELY
  PUBMDPNT - ADDRESS OF THE SET OF SCAN POINTS FOR THE PUB TO THE I/O FRAME
  PUBSCNPT - ADDRESS FOR THE SET OF SCAN POINTS OF THE PUB SERVING THIS FRAME
        SC - TYPE OF TRANSMISSION ON THE CHANNEL=0
     SCNPT - SUPERVISORY MASTER SCANNER OCTAL SCAN POINT ADDRESS OF THE POWER CONTROL SWITCH
             ASSIGNED TO EACH IOUS.
      WRDN - NUMBER OF WORDS IN AUXILIARY BLOCK
```

Fig. 20—I/O Processor Member Number Translator (Sheet 2 of 2)

2 7 6	2 5 4	2 3 2	2 1 0
IOUS B	IPUB 1	IOUS A	IPUB 0

(a) ITEMS SCNPT AND PUBSCNPT SPECIFY THE SCAN POINT ADDRESS OF THE POWER CONTROL SWITCH ASSIGNED TO EACH IOUS AND THE SCAN POINT ADDRESS OF THE PUB (PERIPHERAL UNIT BUS) SERVING THIS FRAME, RESPECTIVELY. THE SCNPT AND PUBSCNPT LEAD DESIGNATIONS ARE AS FOLLOWS:

POINT	LEAD DESIGNATIONS
SC0	OSCBP (POSITIVE LEAD) OSCBN (NEGATIVE LEAD)
SC1	OSCAP OSCAN
SC2	ASCBP ASCBN
SC3	ASCAP ASCAN
SC4	1SCBP 1SCBN
SC5	1SCAP 1SCAN
SC6	BSCAP BSCBN
SC7	BSCAP BSCAN

Fig. 21—I/O Processor Frame Scan Point Assignment and Lead Designations (Sheet 1 of 3)

(b) ITEMS MDPNT AND PUBMDPNT SPECIFY THE BIPOLAR CPD (CENTRAL PULSE DISTRIBUTDR) POINT ADDRESS DF THE SIGNAL DISTRIBUTOR POINTS NEEDED PER IOUS AND THE SET OF BIPOLAR POINTS FOR THE PUB TO I/O FRAME, RESPECTIVELY. THE MDPNT AND PUBMDPNT LEAD DESIGNATIONS ARE AS FOLLOWS:

POINT	LEAD DESIGNATIONS
MD0	0COSP 0COSN
MD1	0CACKP 0CACKN
MD2	ACOSP ACOSN
MD3	ACACKP ACACKN
MD4	1COSP 1COSN
MD5	1CACKP 1CACKN
MD6	BCOSP BCOSN
MD7	BCACKP BCACKN

Fig. 21—I/O Processor Frame Scan Point Assignment and Lead Designations (Sheet 2 of 3)

(c) ITEM CPADR SPECIFIES A UNIPOLAR CPD POINT. THE CPD POINTS ARE ASSIGNED IN CONSECUTIVE ORDER FOR THE ENTIRE GROUP OF I/O PROCESSORS (8-63). THE LEAD DESIGNATIONS ARE AS FOLLOWS:

FOR AN EVEN NUMBERED CPD

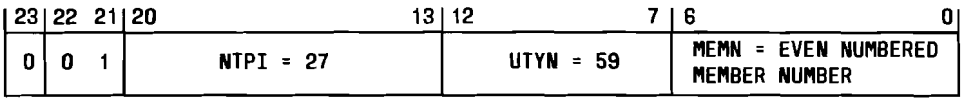
	CPD POINT	LEAD DESIGNATIONS
CONTROL POINTS FOR IOUS A	XXXX N	0GCP1N1
	XXXX P	DGCP1P1
CONTROL POINTS FOR IOUS B	XXXX N	0GCP1N1A
	XXXX P	0GCP1P1A

FOR AN ODD NUMBERED CPD

	CPD POINT	LEAD DESIGNATIONS
CONTROL POINTS FOR IOUS A	XXXX N	1GCP1N1
	XXXX P	1GCP1P1
CONTROL POINTS FOR IOUS B	XXXX N	1GCP1N1A
	XXXX P	1GCP1P1A

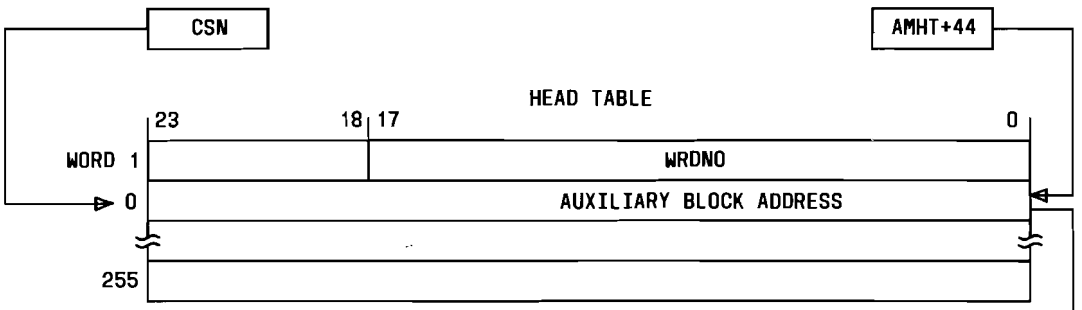
XXXX IS THE 4-DIGIT NUMBER REPRESENTING CPD POINTS IN THE CPD ASSIGNMENT TABLES, REPRESENTING (FROM LEFT TO RIGHT) HALF, GROUP, ROW, AND COLUMN.

Fig. 21—I/O Processor Frame Scan Point Assignment and Lead Designations (Sheet 3 of 3)



LEGEND:
MEMN - MEMBER NUMBER
NTPI - NONTRUNK PROGRAM INDEX
UTYN - UNIT TYPE NUMBER

Fig. 22—Master Scanner Number and Central Pulse Distributor Subtranslator Word



AUXILIARY BLOCK

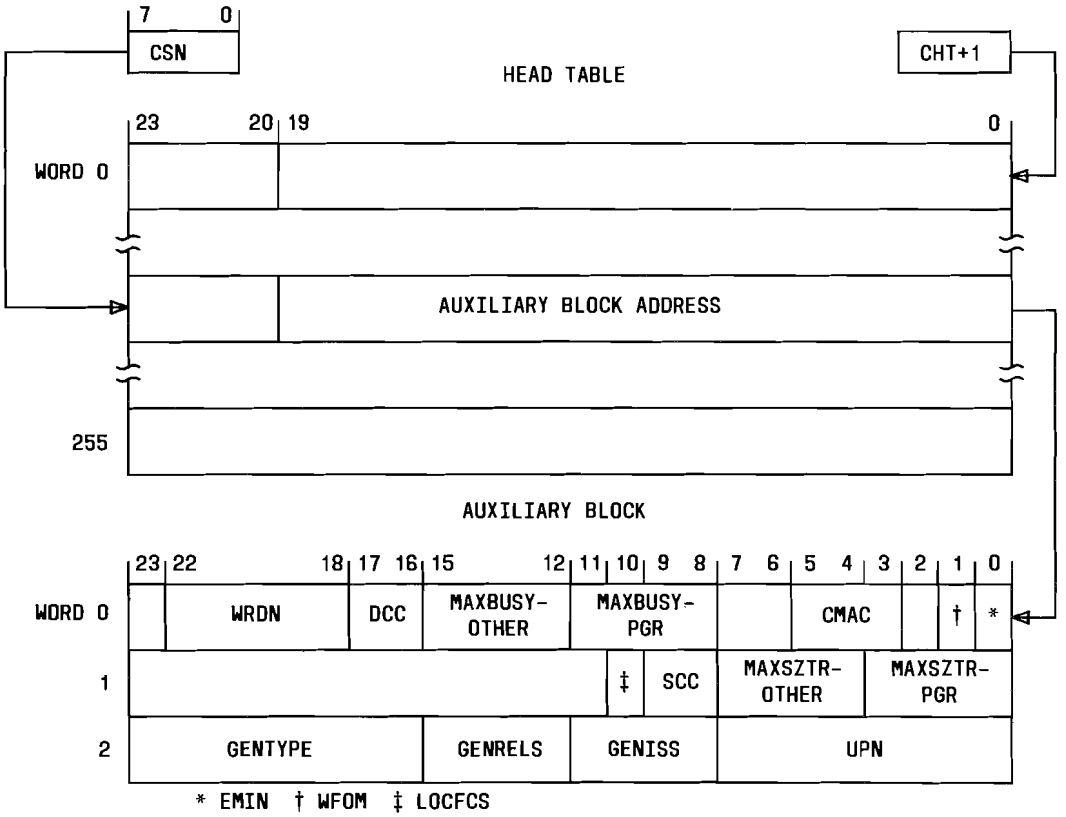
	23 20	19 18	16 15	12 11	8 7	4 3	0
WORD 0	WRDN						
1	D1	D2	D3	D4	D5	D6	
(TYPE 1) 2	D7	EON					
(TYPE 2) 2	D7	D8	EON				
(TYPE 3) 2	D7	D8	D9	D10	EON		
(TYPE 4) 2	D7	D8	D9	D10	D11	EON	
(TYPE 5) 2	D7	D8	D9	D10	D11	D13	
(TYPE 1) 3	EON						
(TYPE 2) 3	D13	DON					
(TYPE 3) 3	D13	D14	D15	EON			
(TYPE 4) 3	D13	D14	D15	D16	EON		

WORD 2 TYPE 1 - 7 DIGIT DN
TYPE 2 - 1+7 DIGIT DN
TYPE 3 - 10 DIGIT DN
TYPE 4 - 1+10 DIGIT DN
TYPE 5 - 10XXX+ (MUST HAVE WORD 3 WITH THIS TYPE)

WORD 3 TYPE 1 - 10XXX+7 DIGIT DN
TYPE 2 - 10XXX+17 DIGIT DN
TYPE 3 - 10XXX+10 DIGIT DN
TYPE 4 - 10XXX+1++10 DIGIT DN
(ZEROS ARE STORED AS ZEROS)

LEGEND:
CSN - CELL SITE NUMBER
CSN - END OF NUMBER INDICATOR
WRDN - NUMBER OF WORDS IN AUXILIARY BLOCK
HRDNO - LENGTH OF HEAD TABLE

Fig. 23—Cell Dialup Channel Translator



LEGEND:

CMAC - CONTROL MOBILE ATTENUATION CODE
DCC - DIGITAL COLOR CODE
EMIN - EXTENDED MOBILE IDENTIFICATION NUMBER
GENISS - GENERIC ISSUE
GENRELS - GENERIC RELEASE NUMBER
GENTYPE - GENERIC TYPE
LOCFCS - LOCATION EQUIPPED FACES
MAXBUSY-OTHER - SAME AS MAXBUSY-PGR, EXCEPT THAT THE MOBILE IS ATTEMPTING TO ACCESS THE SYSTEM FOR ANOTHER REASON BESIDES PAGE RESPONSE
MAXSZTR-OTHER - SAME AS MAXSZTR-PGR, EXCEPT THAT THE MOBILE IS ATTEMPTING TO SEIZE A CHANNEL WITH ANOTHER TYPE OF MESSAGE BESIDE A PAGE RESPONSE
MAXBUSY-PGR - NUMBER OF TIMES A MOBILE IS ALLOWED TO FIND A SETUP CHANNEL BUSY BEFORE GIVING UP WITH ITS PAGE RESPONSE MESSAGE
MAXSZTR-PGR - NUMBER OF TIMES A MOBILE IS ALLOWED TO TRY TO SEIZE A SETUP CHANNEL BEFORE GIVING UP WITH ITS PAGE RESPONSE
SCC - SAT COLOR CODE
UPN - UPDATE NUMBER
WFOM - WAIT FOR OVERHEAD MESSAGE
WRDN - NUMBER OF WORDS IN THE AUXILIARY BLOCK

Fig. 24—Cell Master Status Translator

MOBILE ATTENUATION CODE	MOBILE-STATION POWER CLASS		
	I	II	III
000	0	4	8
001	4	4	8
010	8	8	8
011	12	12	12
100	16	16	16
101	20	20	20
110	24	24	24
111	28	28	28

Fig. 25—Interpretation of Mobile Attenuation Codes and Mobile Station Power Class

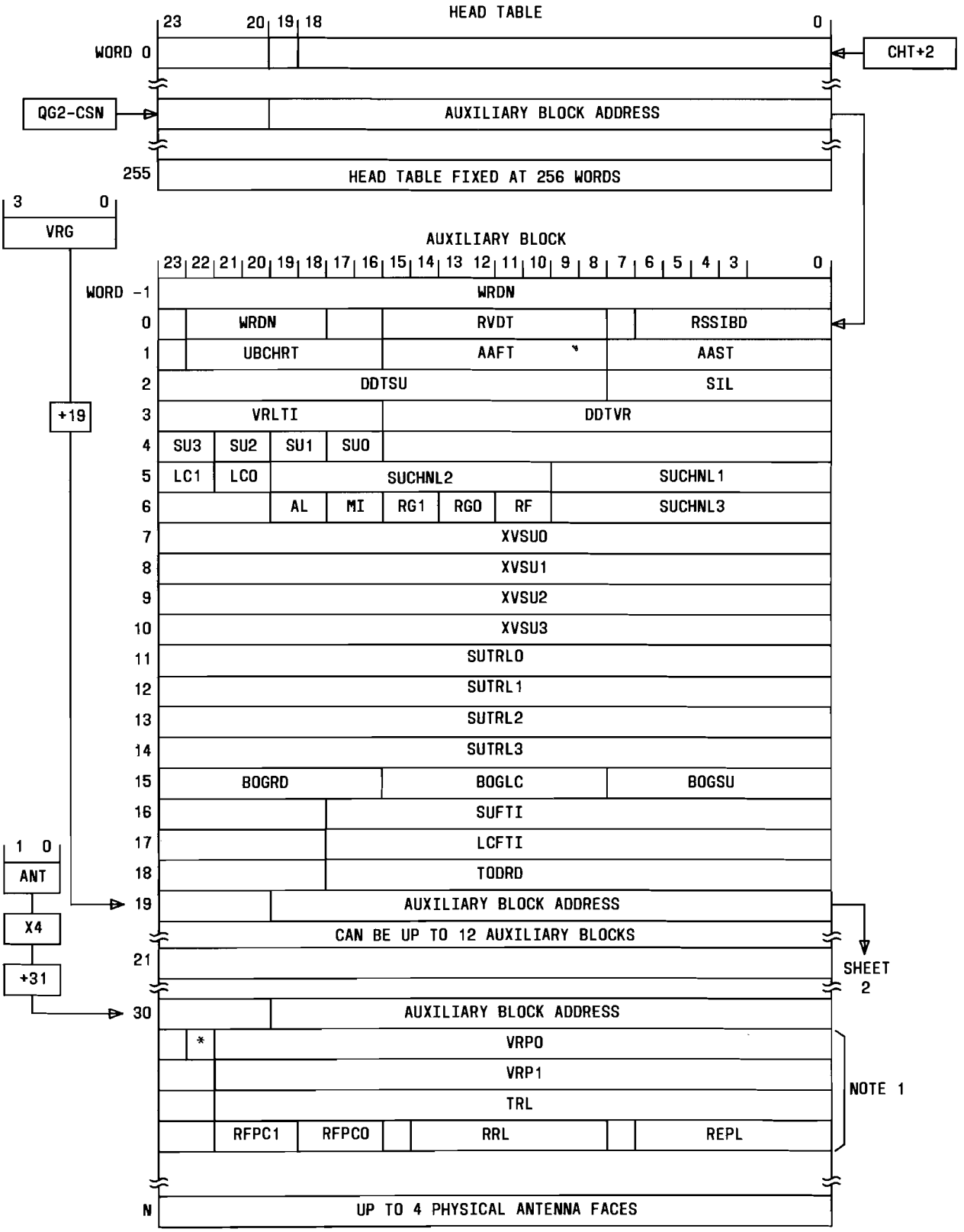
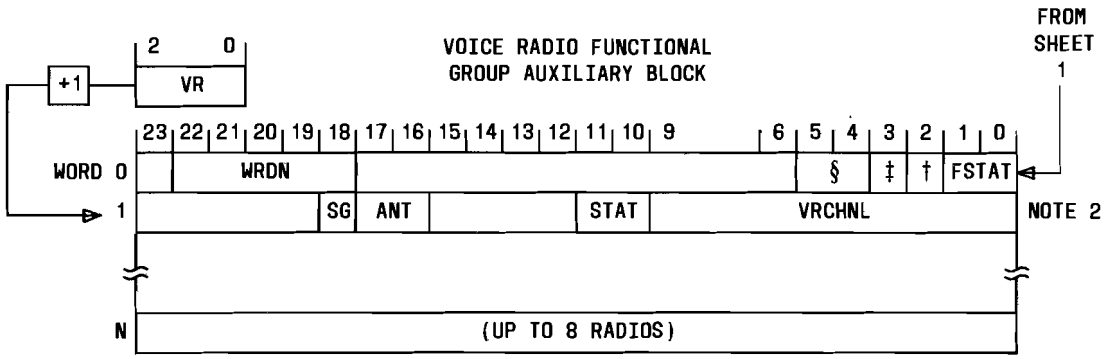


Fig. 26—Cell Master Equipage Translator (Sheet 1 of 2)



NOTES:

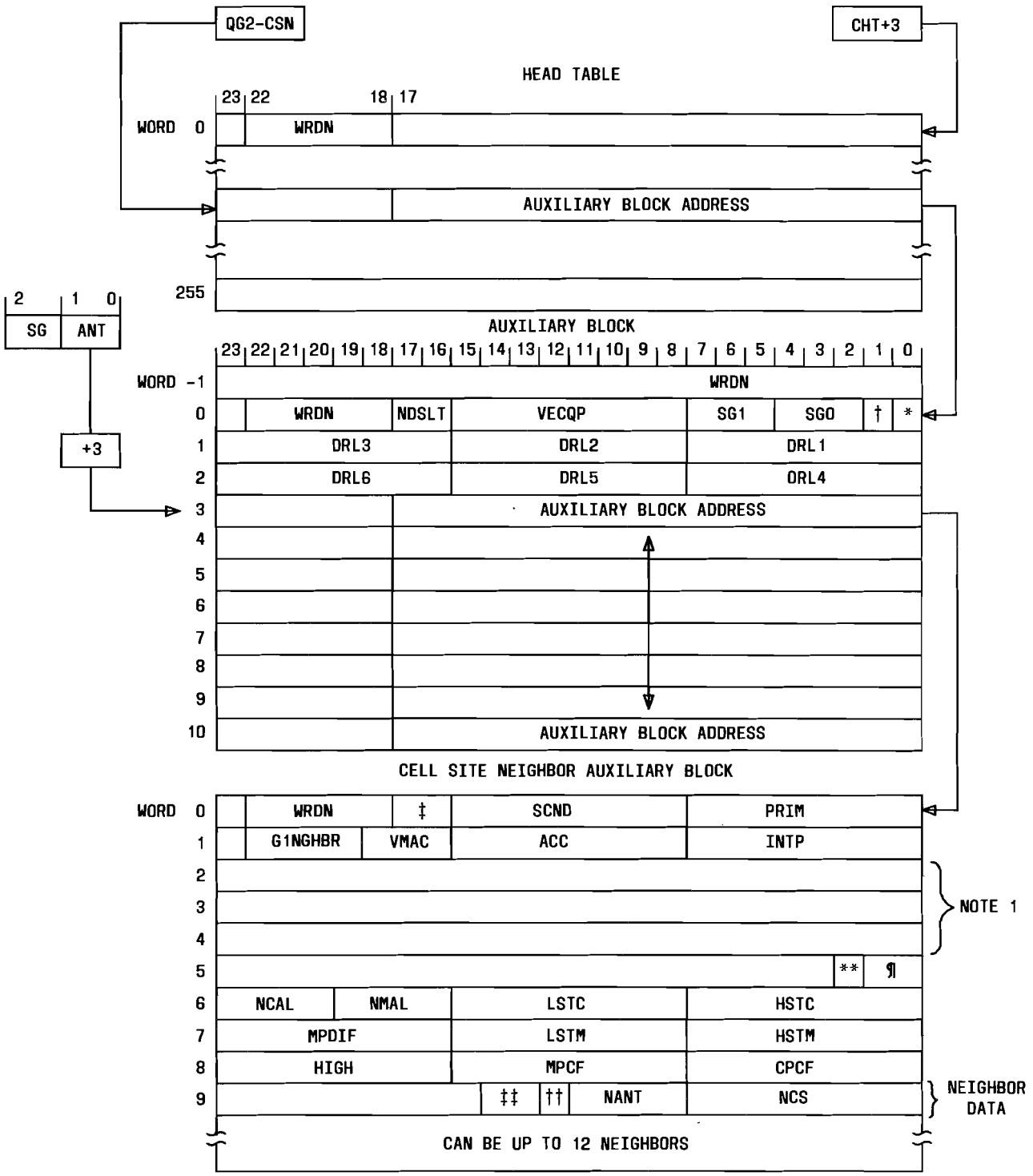
1. FOUR WORDS PER PHYSICAL ANTENNA FACE (0-3). 0 IS A OMNI ANTENNA.
2. ONE WORD PER RADIO.

* ANTS + VG ‡ VRGCT § MODEL

LEGEND:

AAFT - ACCESS ATTEMPT FAILURE THRESHOLD
AAST - ACCESS ATTEMPT SUCCESS THRESHOLD
AL - STATUS OF THE ALARM INTERFACE
ANT - ANTENNA NUMBER THE VOICE RADIO IS CONNECTED TO
ANTS - ANTENNA STATUS
BOGLC - BOG THRESHOLD FOR THE LOCATION RADIO FUNCTIONAL TEST
BOGRD - BOG THRESHOLD FOR THE ROUTINE DIAGNOSTICS
BOGSU - BOG THRESHOLD FOR THE SETUP RADIO FUNCTIONAL TESTS
DOTSU - DOTTING DETECTION THRESHOLD FOR THE SETUP RADIO TRANSMISSION
DOTVR - DOTTING DETECTION THRESHOLD FOR THE VOICE RADIO TRANSMISSION
FSTAT - STATUS OF THE ENTIRE FUNCTIONAL GROUP
LC0,LC1 - STATUS FIELDS FOR LOCATION RADIOS 0 AND 1 RESPECTIVELY
LCFTI - LOCATION RADIO FUNCTIONAL TEST INTERVAL
MI - STATUS OF THE MEASUREMENT INSTRUMENTS
MODEL - TYPE OF RADIO EQUIPMENT
REPL - RETURN LOSS VALUE FROM TEST GENERATOR
RF - STATUS FIELD FOR THE TEST RADIO
RFPC0, RFPC1 - RADIO FREQUENCY POWER CONTROL BITS
RG0,RG1 - STATUS FIELDS FOR REFERENCE GENERATORS 0 AND 1, RESPECTIVELY
RRL - RETURN LOSS VALUE FOR SIGNAL FROM TEST GENERATOR AND REFLECTED FROM ANTENNA AND ANTENNA CABLE SYSTEM
RSSIBD - RECEIVED SIGNAL STRENGTH INDICATOR
RVDT - REVERSE VOICE DATA TIME-OUT
SG - SERVER GROUP
STAT - STATUS OF THE VOICE RADIO
SIL - SYSTEM INTERFERENCE LEVEL THRESHOLD
SU0, SU1, SU2, SU3 - STATUS FIELDS FOR SETUP RADIOS 0 THROUGH 3, RESPECTIVELY
SUCHNL1,SUCHNL2,SUCHNL3 - SETUP CHANNEL NUMBER FOR SETUP RADIO 1 THROUGH 3, RESPECTIVELY
SUFTI - SETUP RADIO FUNCTIONAL TEST INTERVAL
SUTRL0,SUTRL1,
SUTRL2,SUTRL3 - SETUP RADIO TRANSMIT RETURN LOSS THRESHOLDS
TOORD - TIME OF DAY INDICATOR FOR ROUTINE DIAGNOSTICS
TRL - TRANSMIT RETURN LOSS THRESHOLD
UBCHRT - POWER THRESHOLD OF AN INCOMING SIGNAL
VG - VOICE GROUP
VRCHNL - CHANNEL NUMBER THE RADIO IS TRANSMITTING ON
VRG - VOICE RADIO GROUP
VRGCT - VOICE RADIO GROUP CHANNEL TYPE
VRLTI - VOICE RADIO LOCATION TIME INTERVAL
VRP0,VRP1 - VOICE RADIO OUTPUT POWER FOR RADIOS 0 AND 1
WRDN - NUMBER OF WORDS IN THE AUXILIARY BLOCK
XVSU0,XVSU1,XVSU2,XVSU3 - TRANSMITTER OUTPUT VALUES FOR SETUP RADIOS 0 THROUGH 3

Fig. 26—Cell Master Equipage Translator (Sheet 2 of 2)



NOTE:
1. THESE 3 WORDS ARE ADDED TO ALLOW FOR GROWTH IN FUTURE GENERICS.
* LASTRY † CTYPE ‡ CNDLST § DPCI ¶ SGPAID ** NSG ‡‡ NSBGRP

Fig. 27—Cell Master Location Translator (Sheet 1 of 2)

LEGEND:

ACC - ACCESS CHANNEL THRESHOLD
ANT - ANTENNA FACE
CNDLST - NUMBER OF CELLS TO PUT ON CANDIDATE LIST
CPCF - CELL SITE POWER CONTROL FLAG
CTYPE - TYPE OF CELL
DPCI - DYNAMIC POWER CONTROL INDICATOR
DRL - LIST OF ALTERNATE CELL SITES THE MOBILE IS DIRECTED TO
GINGHBR - NUMBER OF NEIGHBOR CELLS IN GROUP 1
HIGH - VOICE CHANNEL SELECTION HIGH THRESHOLD
HSTC - HIGH SIGNAL STRENGTH FOR THE CELL SITE
HSTM - HIGH SIGNAL STRENGTH FOR THE MOBILE
INTP - INTERFERENCE PROTECTION THRESHOLD
LASTRY - ALTERNATE ACCESS INDICATOR
LSTC - LOW SIGNAL STRENGTH FOR THE CELL SITE
LSTM - LOW SIGNAL STRENGTH FOR THE MOBILE
MPCF - MOBILE POWER CONTROL FLAG
MPDIF - MAXIMUM POWER DIFFERENTIAL
NANT - INDICATES WHICH OF THE ANTENNAS OF THE NEIGHBOR CELL SITE ARE NEIGHBOR ANTENNAS
NCAL - NUMBER OF CELL SITE ATTENUATION LEVELS
NCS - CELL SITE NUMBER OF THE NEIGHBOR
NOSLT - NUMBER OF TIMES A SIGNAL LEVEL TRIGGER IS IGNORED DURING A DELAYED TRIGGER STATE
NMAL - NUMBER OF MOBILE ATTENUATION LEVELS
NSBGRP - SUBGROUP NUMBER FOR THE NEIGHBOR CELL
NSG - NEIGHBOR SERVER GROUP
PRIM - PRIMARY SIGNAL STRENGTH THRESHOLD
SCND - SECONDARY SIGNAL STRENGTH THRESHOLD
SGPAID - SERVER GROUP POWER AMPLIFIER IDENFIFIER
SG0 - SERVER GROUP 0
SG1 - SERVER GROUP 1
STF - SPEED TRENDING FLAG
VCEQP - INDICATES VOICE RADIO EQUIPPED FACES
VMAC - VOICE MOBILE ATTENUATION CODE
WRDN - NUMBER OF WORDS IN THE AUXILIARY BLOCK

Fig. 27—Cell Master Location Translator (Sheet 2 of 2)

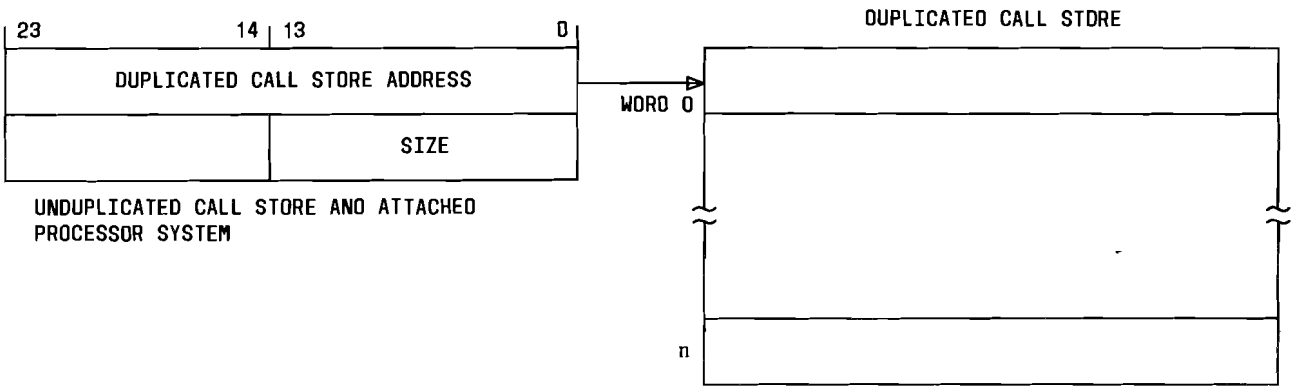


Fig. 28—Parameter Layout for the MTSO Feature

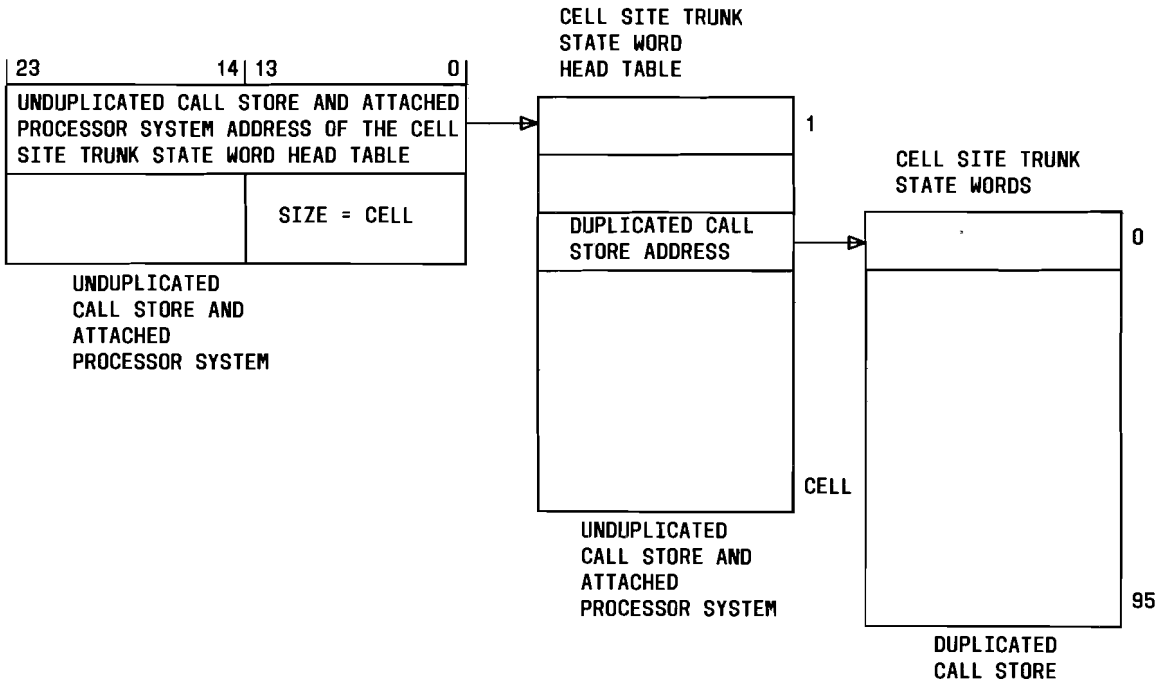


Fig. 29—Parameter Word QM2ACSTSW and Associated Call Store Option

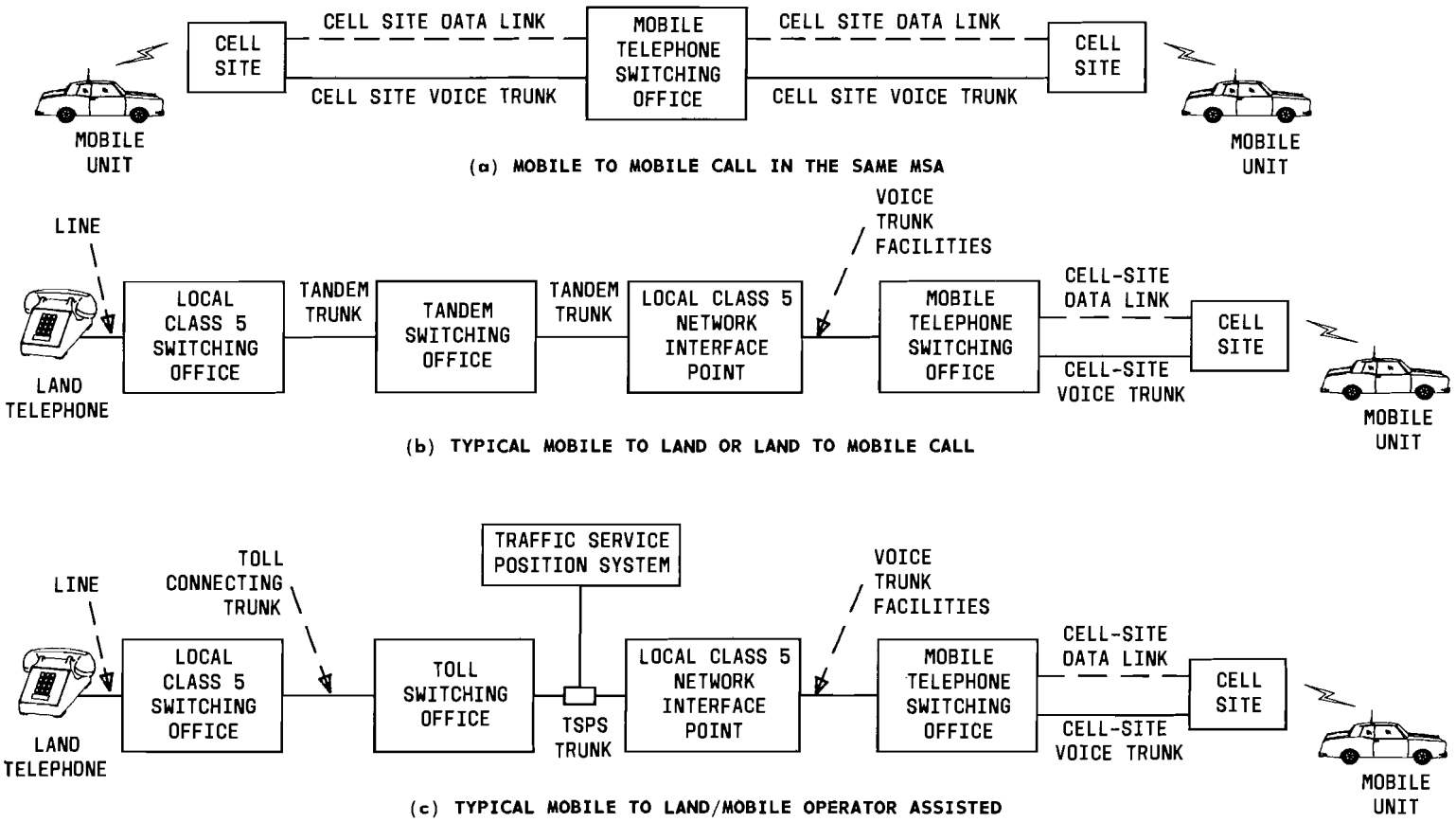


Fig. 30—Network Routing

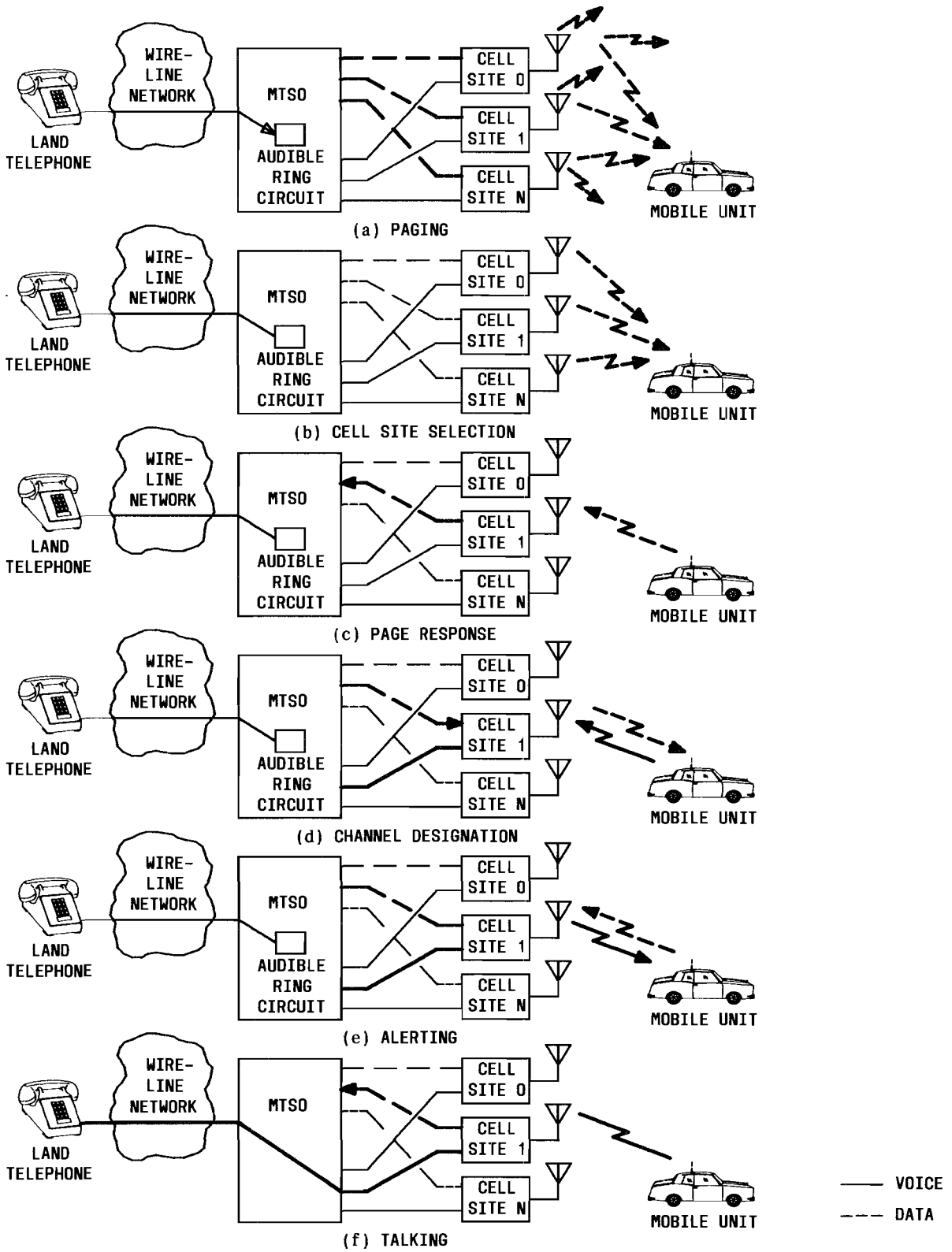


Fig. 31—Mobile-Completed Call Sequence

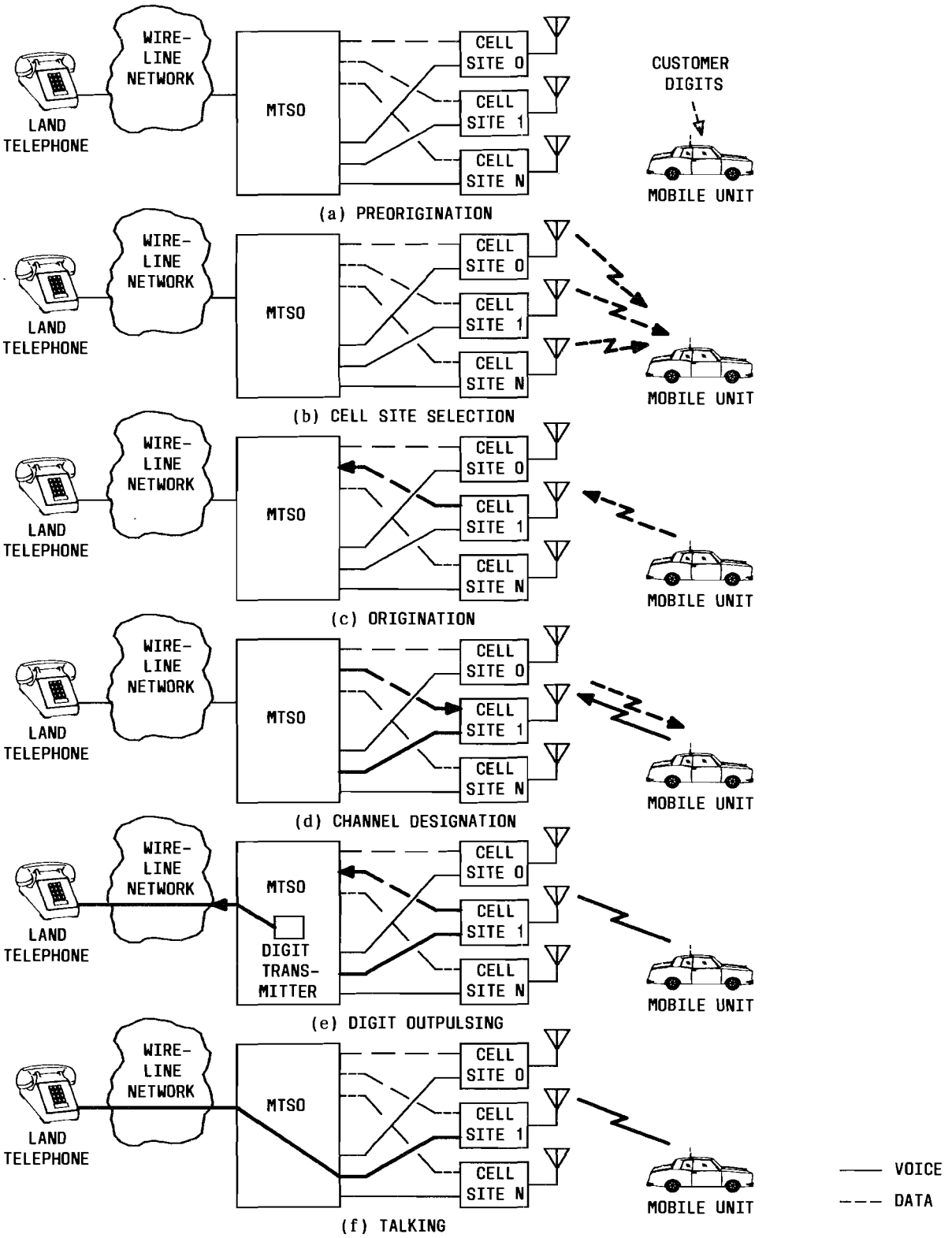


Fig. 32—Mobile-Originated Call Sequence

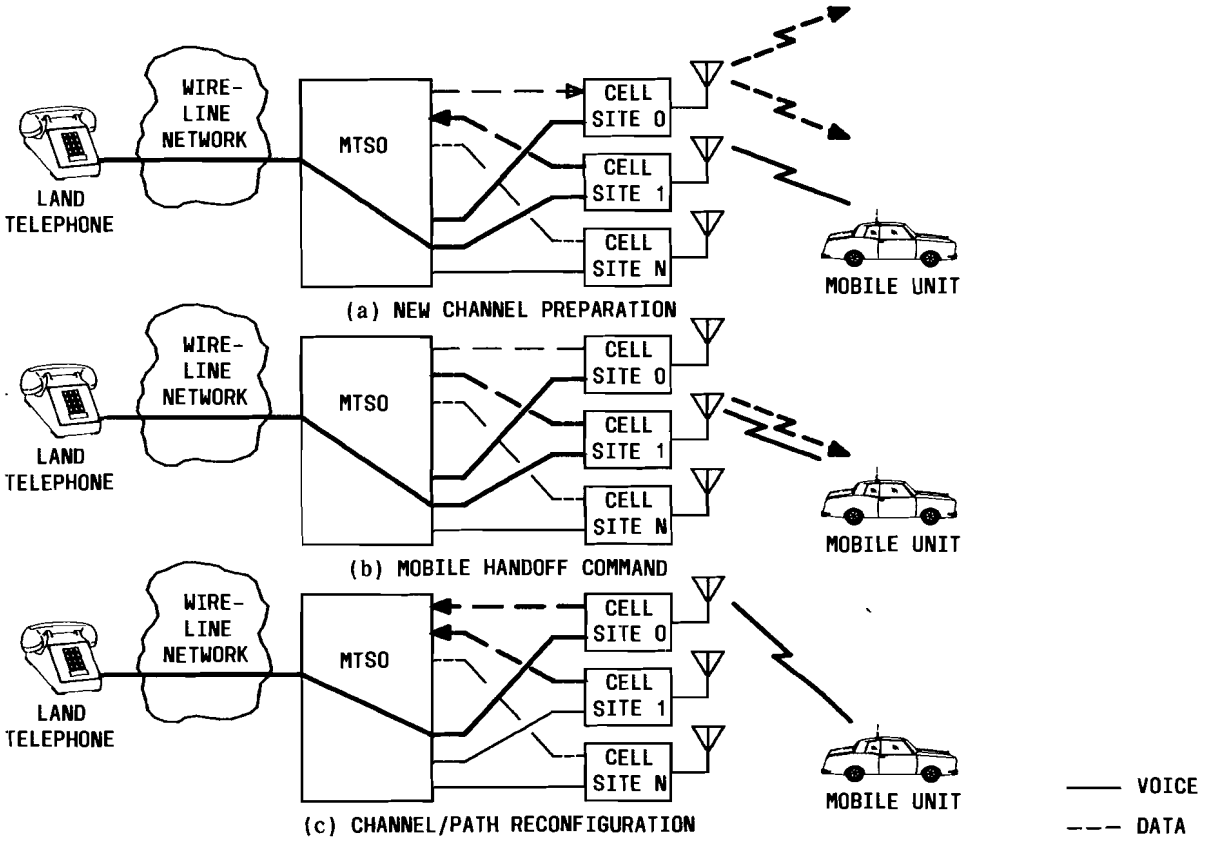


Fig. 33—Handoff Sequence

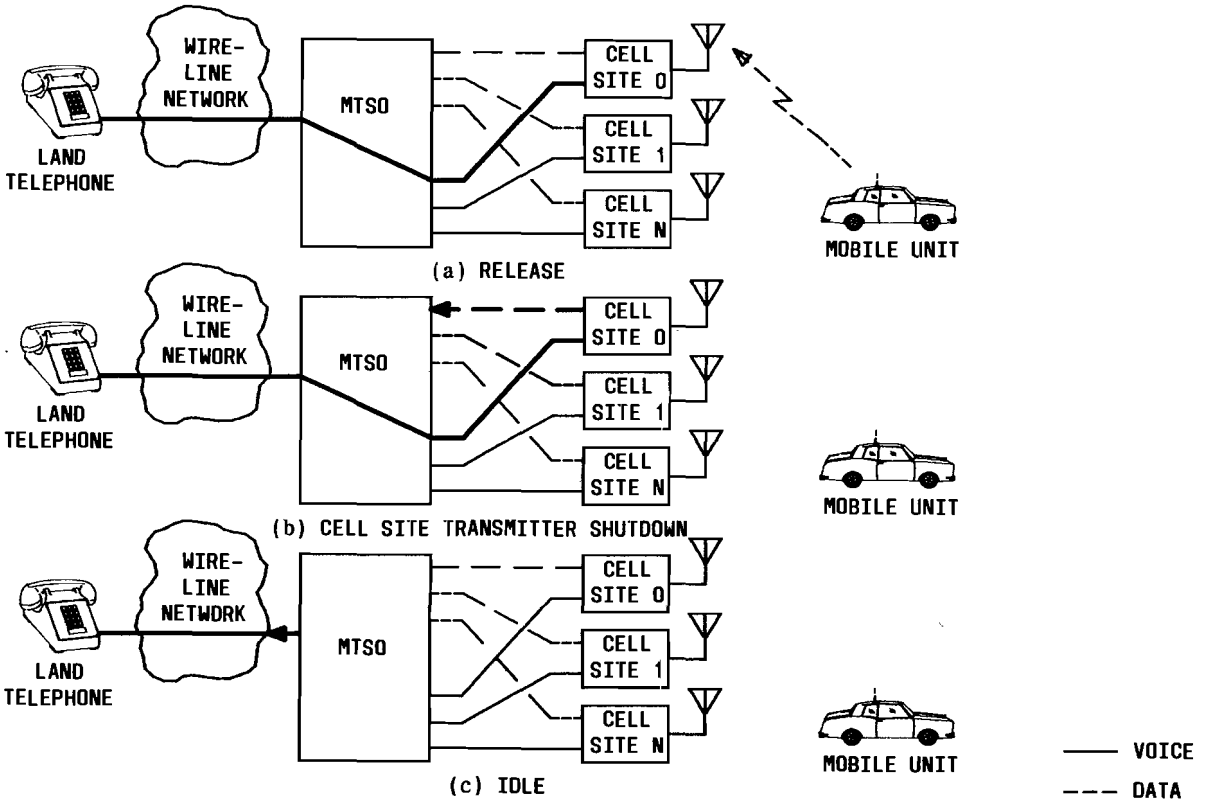


Fig. 34—Disconnect Sequence (Mobile Initiated)

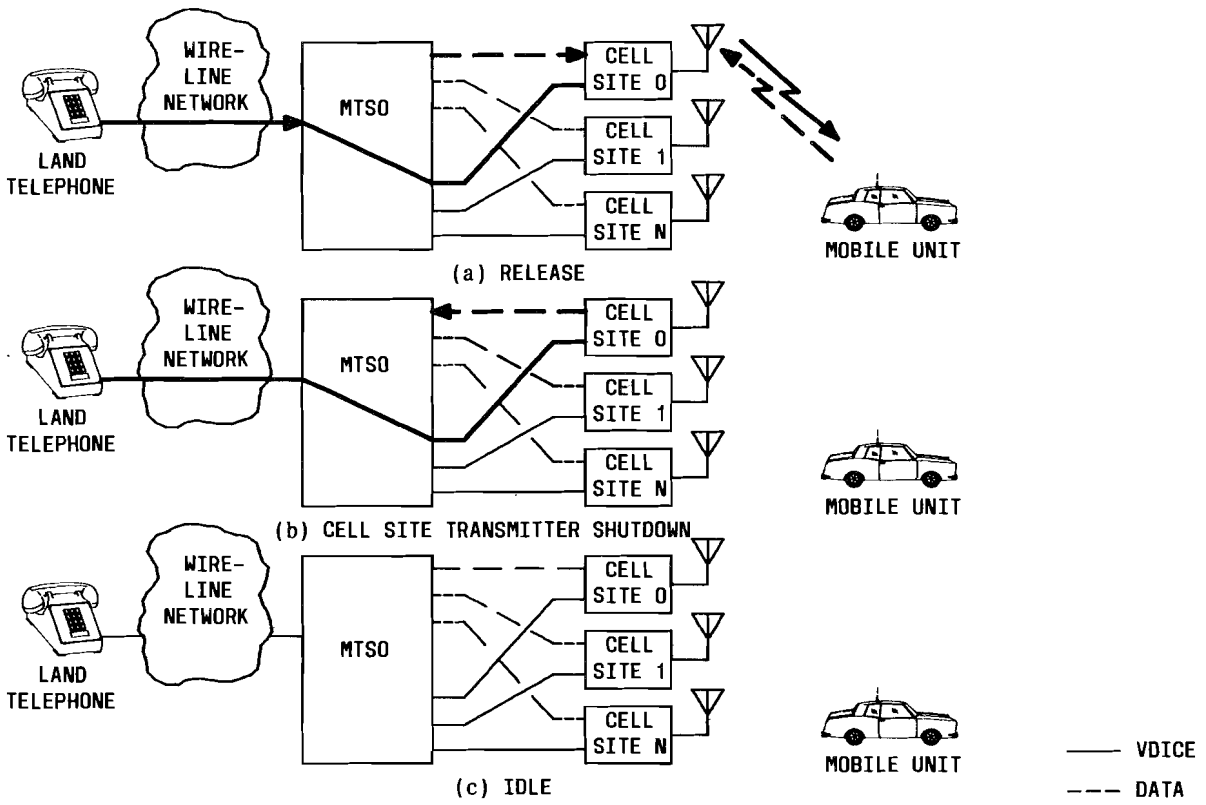


Fig. 35—Disconnect Sequence (System Initiated)

MTSO	STEPS	CELL SITE	MOBILE UNIT
	1	Transmits setup channel data on forward setup channel	
	2		Scans and locks on forward setup channel
Receives incoming call and performs translations	3		
Provides audible ring to calling party	4		
Sends paging message to paging sites	5		
	6	Reformats paging message	
	7	Sends paging message to mobile unit via forward setup channel	
	8		Detects page
	9		Scans and locks on reverse setup channel
	10		Seizes setup channel
	11		Acquires synch
	12		Sends service request
	13	Reformats service request	
	14	Performs directional location*	
	15	Sends service request and priority list to MTSO	
Selects voice channel	16		
Sends channel designation message to cell site	17		
	18	Reformats channel designation message	
	19	Sends channel designation message to mobile unit via forward setup channel	
	20		Tunes to voice channel
	21		Transmits SAT
	22	Detects SAT	
	23	Sends alert order	
	24	Sends alert order to mobile unit via blank-and-burst on voice channel	
	25		Alerts user
	26		Sends 10-kHz ST
	27	Detects 10-kHz ST	
	28	User answers	
	29	Stops sending 10-kHz ST	
	30	Detects absence of 10-kHz ST	
	31	Sends answer message to MTSO	
Receives answer message	32		
Removes audible ring and completes connection	33		

* Applies to directional cell site antenna only

Fig. 36—Call Sequence for Land-Originated Calls

MTSO	STEPS	CELL SITE	MOBILE UNIT
	1	Transmits setup channel data on forward setup channel	
	2		Scans and locks-on forward setup channel
	3		User initiates call
	4		Scans and locks-on reverse setup channel
	5		Seizes setup channel
	6		Acquires synch
	7		Sends service request
	8	Reformats service request	
	9	Performs directional location*	
	10	Sends service request and priority list to MTSO	
Selects voice channel	11		
Sends channel designation message to cell site	12		
	13	Reformats channel designation message	
	14	Sends channel designation message to mobile unit via forward setup channel	
	15		Tunes to voice channel
	16		Transmits SAT
	17	Detects SAT	
	18	Sends voice channel confirmation message to MTSO	
Detects off-hook	19		
Completes call through network	20		

* Applies to directional cell site antenna only

Fig. 37—Call Sequence for Mobile-Originated Calls

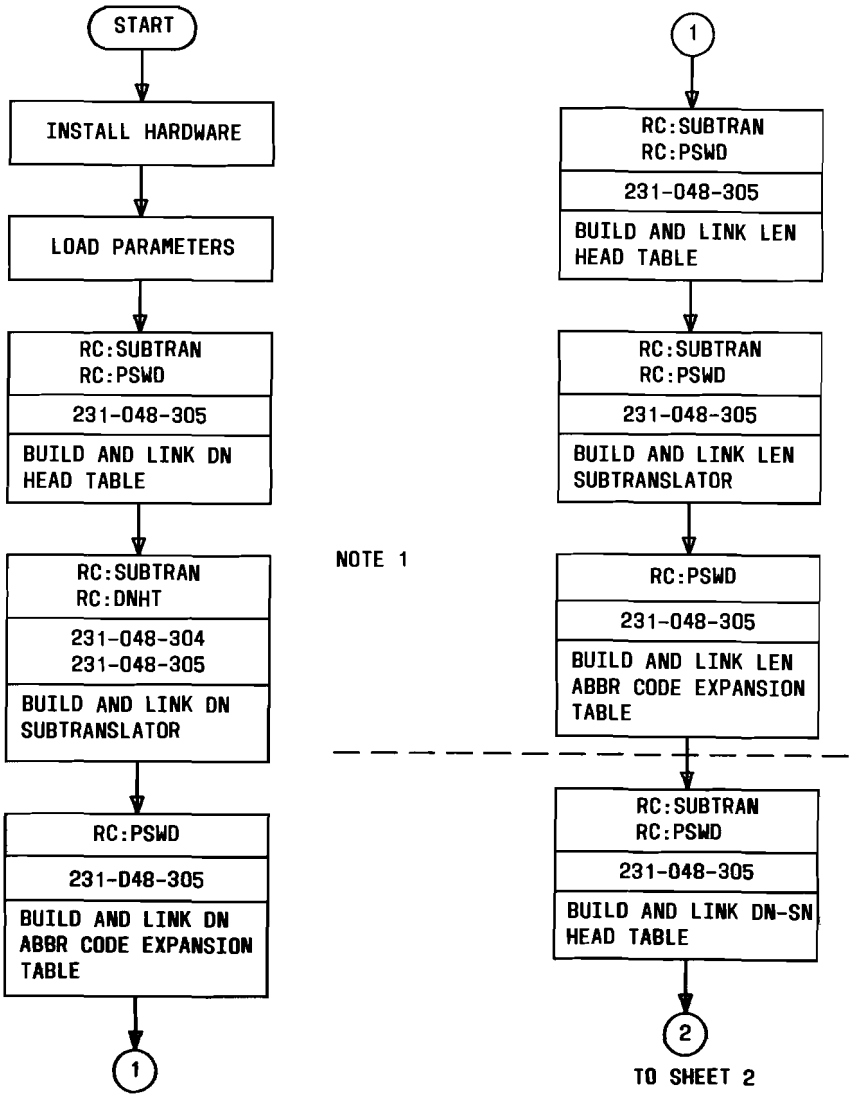


Fig. 38—Procedure for Adding the MTSO Feature (Sheet 1 of 4)

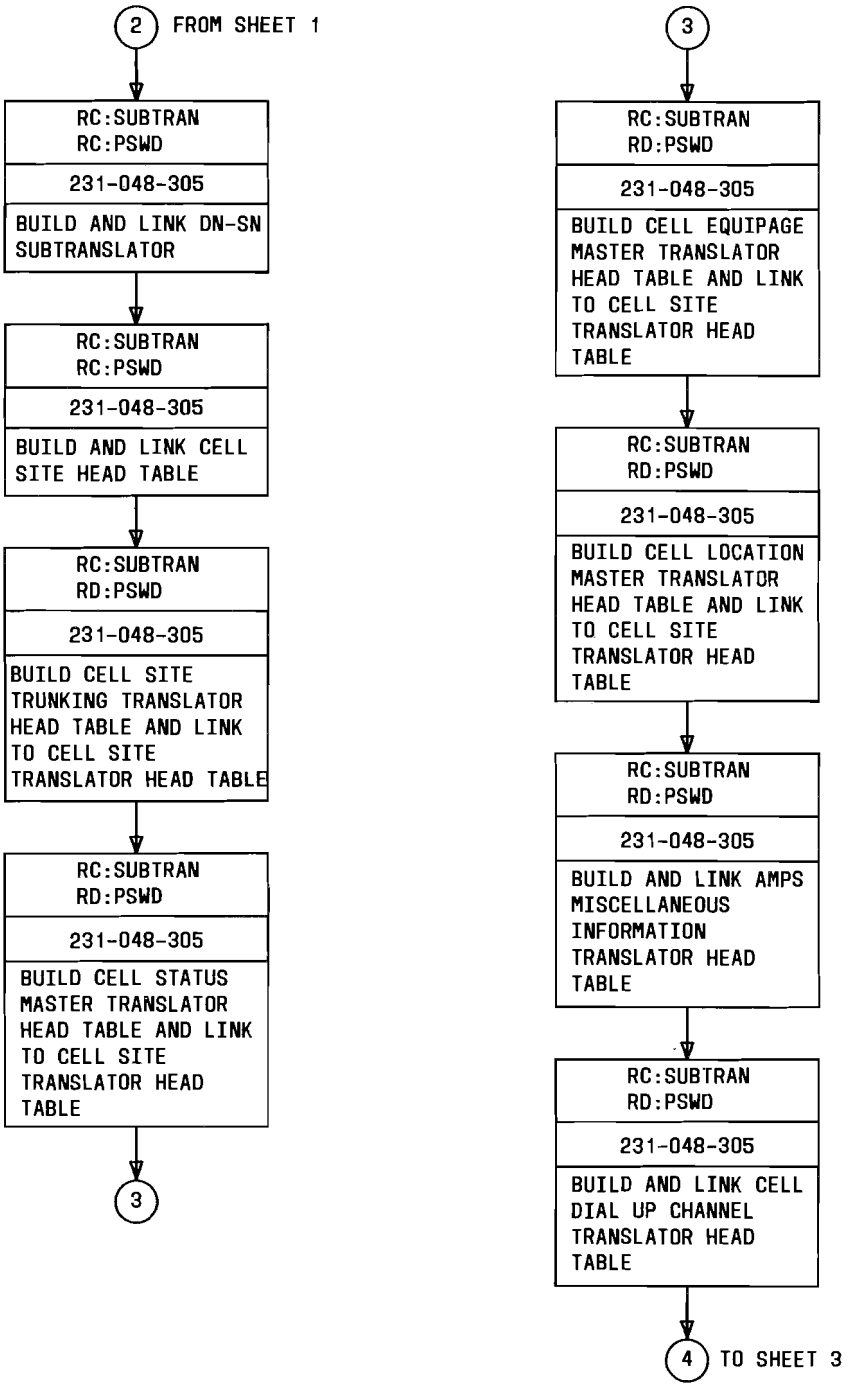


Fig. 38—Procedure for Adding the MTSO Feature (Sheet 2 of 4)

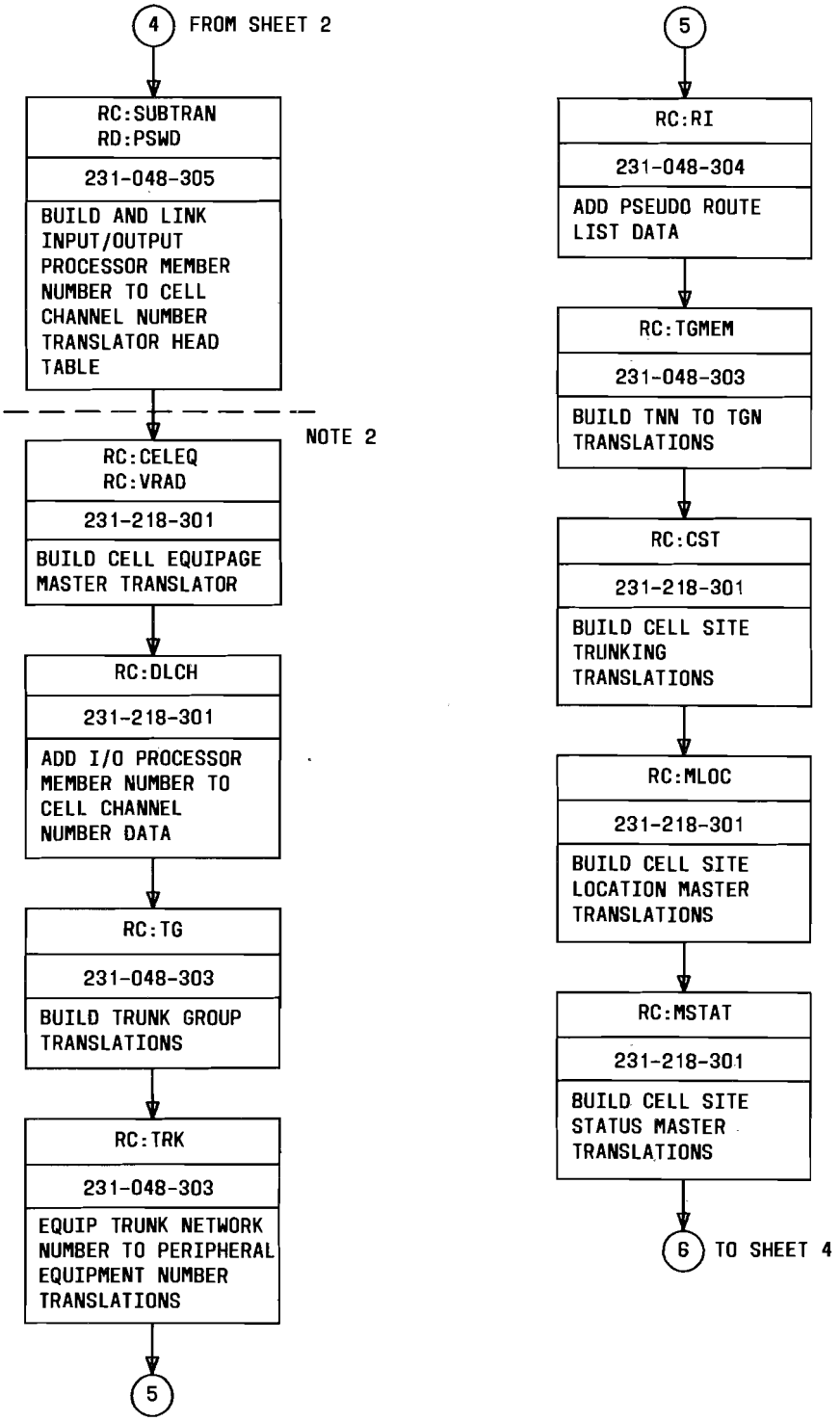
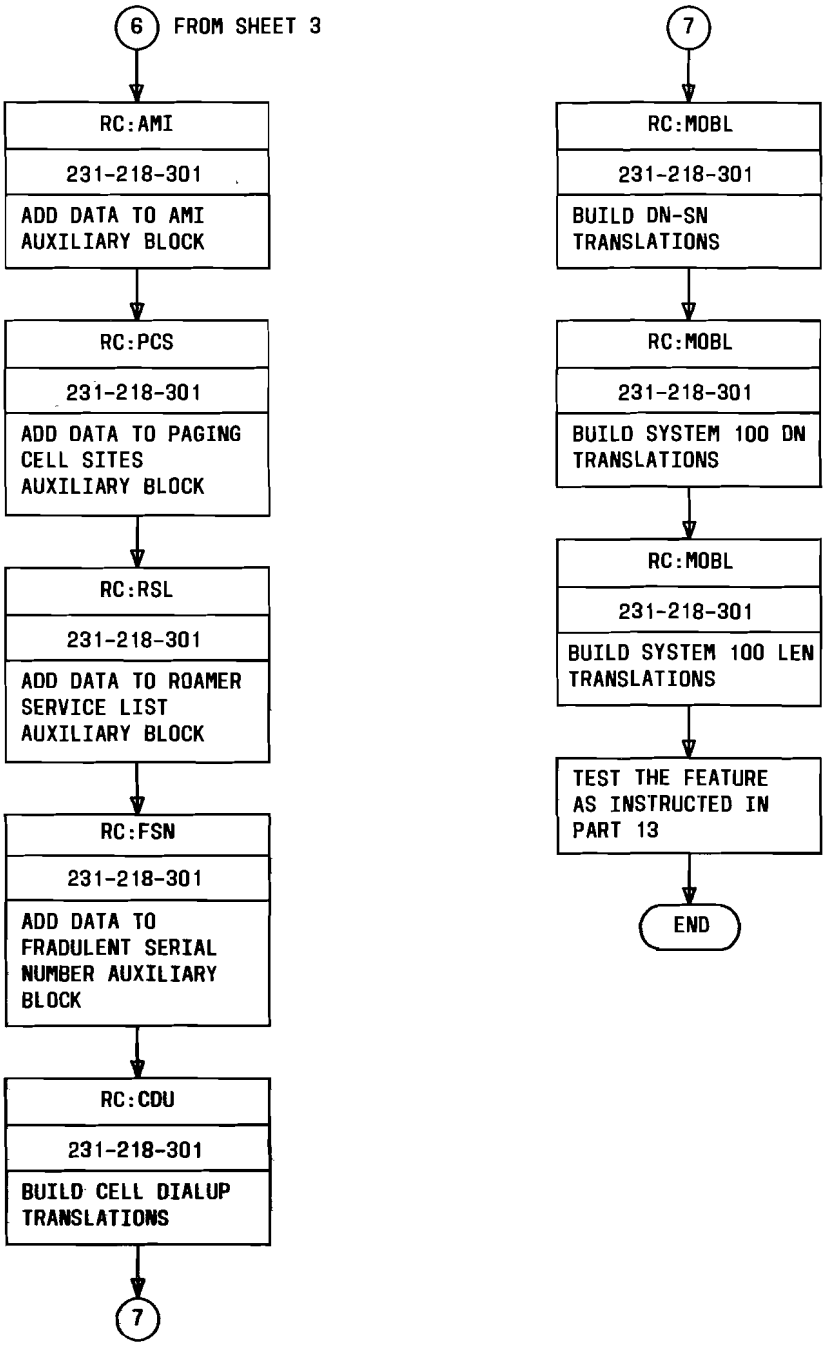


Fig. 38—Procedure for Adding the MTSO Feature (Sheet 3 of 4)



NOTES:
1. In a working office, all steps to this point would normally have been completed.
2. The following translation data input procedures must be done in the sequence shown.

Fig. 38—Procedure for Adding the MTSO Feature (Sheet 4 of 4)

TABLE A

GENERATED CONTROL PULSES FOR I/O PROCESSOR POLLING

PULSE SOURCE	OCTAL ADDRESS	PULSE SOURCE	OCTAL ADDRESS
PPU030	00404001	PPU062	01002004
PPU031	00404002	PPU063	01002010
PPU032	00404004	PPU064	01002020
PPU033	00404010	PPU065	01002040
PPU034	00404020	PPU066	01004001
PPU035	00404040	PPU067	01004002
PPU036	01000101	PPU068	01004004
PPU037	01000102	PPU069	01004010
PPU038	01000104	PPU070	01004020
PPU039	01000110	PPU071	01004040
PPU040	01000120	PPU072	02000101
PPU041	01000140	PPU073	02000102
PPU042	01000201	PPU074	02000104
PPU043	01000202	PPU075	02000110
PPU044	01000204	PPU076	02000120
PPU045	01000210	PPU077	02000140
PPU046	01000220	PPU078	02000201
PPU047	01000240	PPU079	02000202
PPU048	01000401	PPU080	02000204
PPU049	01000402	PPU081	02000210
PPU050	01000404	PPU082	02000220
PPU051	01000410	PPU083	02000240
PPU052	01000420	PPU084	02000401
PPU053	01000440	PPU085	02000402
PPU054	01001004	PPU086	02000404
PPU055	01001002	PPU087	02000410
PPU056	01001004	PPU088	02000420
PPU057	01001010	PPU089	02000440
PPU058	01001020	PPU090	02001001
PPU059	01001040	PPU091	02001002
PPU060	01002001	PPU092	02001004
PPU061	01002002	PPU093	02001010

TABLE B

INDEXING SCHEME FOR THE CELL MASTER LOCATION TRANSLATOR AUXILIARY BLOCK POINTER

LOGICAL ANTENNA FACE	ANTENNA FACE	SERVER GROUP
0	0	0
1	1	0
2	2	0
3	3	0
4	0	1
5	1	1
6	2	1
7	3	1

TABLE C

SET CARDS REQUIRED FOR MTSO

SET CARD	DEFINITION	TYPICAL VALUES	MINIMUM VALUES	MAXIMUM VAUES
CELL	Highest cell site member number	5-250	1	255
GCPH	Number of call processing hoppers for general use	—	150	—
IOS(II)	Defines one input-output unit selector	—	1	63
NMCR	Number of mobile call registers	50-2500	0	5000
NMHR	Number of mobile handoff registers	—	10	NMCR
NMOR	Number of mobile originating registers	5-250	0	2500
NRMR	Numer of roamer units allowed to access the system	500	50	—

TABLE D

SUMMATION OF FEATURE GROUPS

FEATURE GROUP	SET CARD	FEATURE PACKAGE	SET CARD	PROGRAM STORE WORDS (DECIMAL)
Advanced Mobile Phone Service (AMPS)	9S163	Advanced Mobile Phone Service (AMPS) Maintenance (AMPSMT)	9F163	57,824
Advanced Mobile Phone Service (AMPS)	9S164	Advanced Mobile Phone Service (AMPS) Common System (AMPSCM)	9F164	46,048
Advanced Mobile Phone Service (AMPS) Call Processing	9S165	Advanced Mobile Phone Service (AMPS) Call Processing (AMPSCP)	9F165	194,688
Advanced Mobile Phone Service (AMPS)	9S176	Advanced Mobile Phone Service (AMPS) Cell Generic (AMPSCG)	9F176	524,288
Attached Processor System	9SAPS	Attached Processor System	9F195	896
Carrier Interconnect	9SCARI	Carrier Interconnect	9F203	3140
Division of Revenue peg And usage Count	9SDRPC	Division of Revenue peg And usage Count	9FDRPC	1440
General Purpose Subroutines	9S157	General Purpose Subroutines	9F157	32
Manual Trunk Test Position	9S073	Manual Trunk Test Position	9F073	1984

TABLE E

NUMBER OF CELL SITES

SPECTRUM AVAILABLE	NUMBER OF USERS	AVERAGE NUMBER OF USERS PER CELL SITE	AVERAGE NUMBER OF CELL SITES
20 MHz	625,000	460	136
	100,000	460	220
30 MHz	62,500	830	95
	200,000	830	240

TABLE F

MTSO TERMINATIONS (NOTE)

TYPE OF FACILITY	BLOCKING PROBABILITY	NUMBER OF TRUNK GROUPS	NUMBER OF TRUNKS	SPECTRUM AVAILABLE	NUMBER OF SUBSCRIBERS
Cell Site Trunks	*2%	140	2,600	20 MHz	62,500
		75	2,200	30 MHz	(Generic 1.0)
		220	4,200	20 MHz	100,000
		240	7,000	30 MHz	200,000
Intra-MTSO Trunks	+1%	1	40	—	62,500

Note: The maximum quantity of these trunks is a function of traffic engineering discipline, blocking probability, number of trunk groups and spectrum available.

* Erland B with low day-to-day variations traffic engineering

† Poisson traffic engineering.