GROWTH

SOFTWARE SUBSYSTEM DESCRIPTION (SSD)

2-WIRE NO. 1 AND NO. 1A ELECTRONIC SWITCHING SYSTEMS

CONTENTS PAGE

1. GENERAL

INTRODUCTION

1.01 This section provides an operational description of the growth software subsystem in a No. 1/1A Electronic Switching System (ESS) central office.

1.02 When this section is reissued, the reason for reissue will be given in this paragraph.

1.03 Part 5 of this document provides a defined list of the abbreviations and acronyms used herein.

PURPOSE OF GROWTH SUBSYSTEM

1.04 The growth subsystem programs provide means for maintaining uninterrupted telephone service during operations associated with office growth and with the cutover of a central office.

SCOPE OF SECTION

1.05 This section provides an operational description of the growth subsystem at the software subsystem and control program levels. Much of the information applies to both the No. 1 and No. 1A ESSs; however, differences do exist. Information unique to the No. 1A ESS is so noted; information unique to No. 1 ESS is not provided.

1.06 This section is based on the 1AE5 version of the generic program.

2. BRIEF DESCRIPTION OF PIDENTS

2.01 The following program identifications (PIDENTs) comprise the growth software subsystem:

(a) Network Make Busy Routine (NETG)—In growth situations, various switching equipment must be added to fractionally equipped networks and associated equipment must be relocated, disabled, replaced, or upgraded. When growth is experienced within a central office, PIDENT NETG provides a means for maintaining uninterrupted telephone service by isolating affected sections of the network from call processing.

(b) Cutover Program (SACT)—At times it is necessary to transfer groups of subscriber lines from one central office to another. The primary instance of line transfer occurs when a new office replaces an existing office. PIDENT SACT provides means for maintaining uninterrupted telephone service when such a transfer occurs by isolating affected customers from the network.

2.02 Table A provides a PIDENT-program listing cross-reference for the No. 1/1A ESS growth software subsystem.

3. GROWTH SUBSYSTEM FUNCTIONAL DESCRIPTION

3.01 Within any given No. 1/1A ESS central office, the wire center can have a unique set of engineered equipment. When the office grows, the amount of equipment changes. To eliminate the necessity for extensive software revisions every time growth is experienced, the generic program is designed to treat all information about quantities of office equipment as data which can be changed as the office grows.

3.02 The growth subsystem programs, in conjunction with associated subsystems (Fig. 1), provide the required operations to change this information and to maintain uninterrupted service during growth and cutover of a central office.

4. PIDENT FUNCTIONAL DESCRIPTION

NETWORK MAKE BUSY ROUTINE (NETG)

A. General

4.01 The primary functions of NETG are as follows:

(a) To respond to certain input messages from the maintenance TTY by making the specified switching network frame maintenance-busy.

TABLE A

GROWTH SOFTWARE SUBSYSTEM PIDENTS

PIDENT	TITLE	NO. 1 PD/PR-	NO. 1A PR-
NETG	Network Make Busy Routine	1A113	6A113
SACT	Cutover Program	1A098	6A098

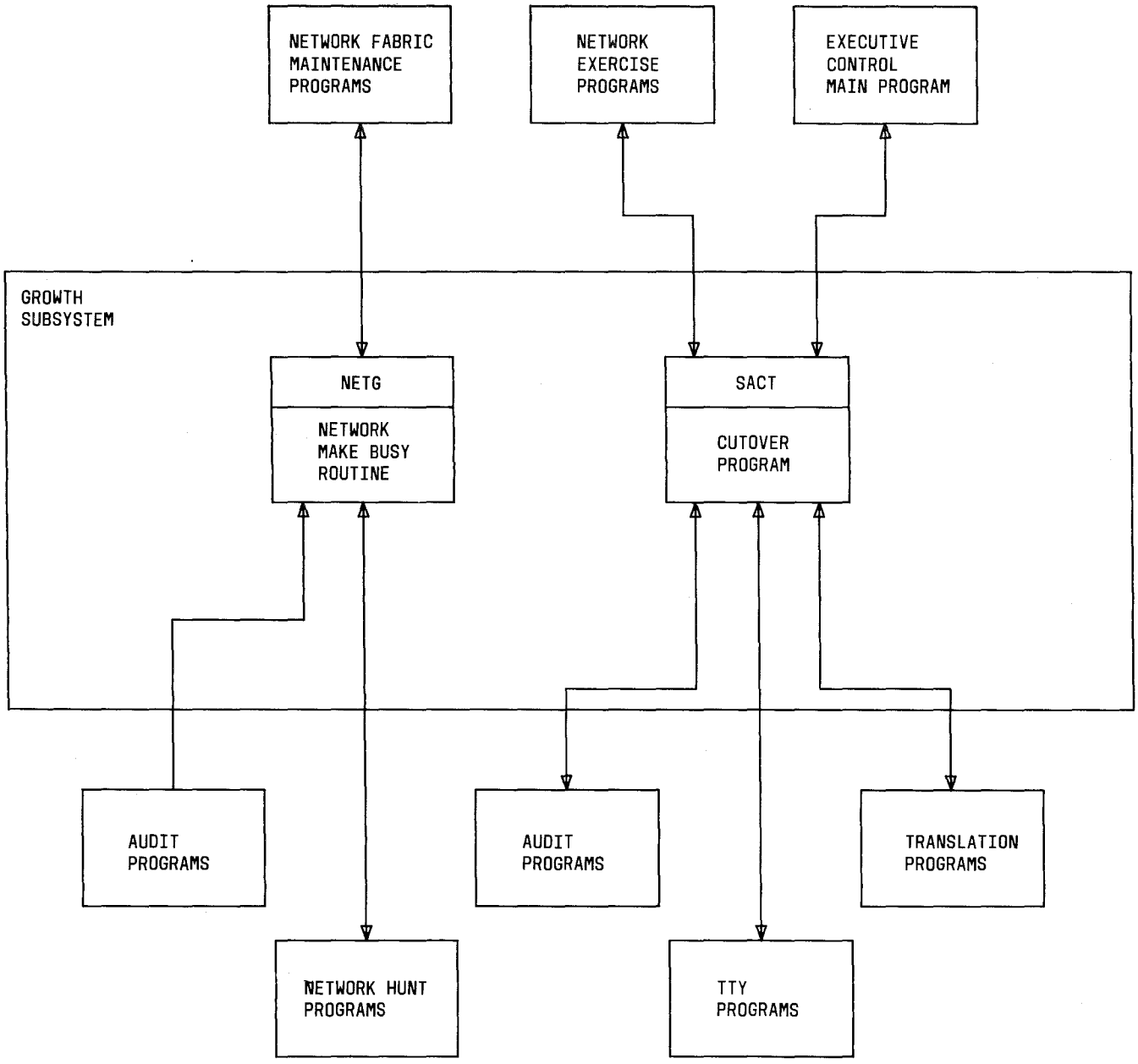

Fig. 1—Growth Software Subsystem Interface

(b) To respond to other input TTY messages by idling or restoring to service a specified network frame previously made busy.

(c) To print out on the maintenance TTY hourly, or on demand, the identification and busy-idle status of those frames of the switching network which are affected by make-busy messages.

(d) To audit the network frame out-of-service tables.

(e) To determine whether a path between two terminals can be established when call store (CS) word N4FLAG indicates that a frame(s) in the office is maintenance-busy.

4.02 The NETG global-entry routines, their primary functions, and the PIDENTs using these routines are identified in Table B.

B. Busying a Network Switch Frame

4.03 In order to make a frame busy, the following input message must be entered via the maintenance TTY:

FAB-MB-aab cc d0000 F.

where, aa = LS (line switch frame) or

= LJ (line junctor switch frame) or

= TS (trunk switch frame) or

= TJ (trunk junctor switch frame)

B = B links (B is specified when entire frame is made busy)

cc = Network number

d = Frame number

The F at the end of the message signifies to the network fabric routines (NMFA) that the specified frame is to be removed from service. PIDENT NMFA transfers control to the appropriate make-busy global entry (Table B) in NETG.

4.04 If the input message specifies a frame present in the office and conforms to the required format, an OK is printed via the TTY signifying acceptance of the message and execution of the action requested. If the message is entered incorrectly or specifies a frame not present in the office, an NG is printed via the TTY signifying rejection of the message. For additional details, refer to the Input Message Manual (IM-6A001).

4.05 After verifying that the specified frame is present in the office and that the sign bit of the J return address is positive, the appropriate make-busy global routine modifies the word corresponding to that frame in the applicable out-of-service table. If the frame is a line switch frame (LSF) or a line junctor switch frame (LJSF), a nonzero value is stored in the corresponding LSBOS word in the appropriate line link network (LLN) out-of-service table. In addition, the associated bit in CS word N4LNOS is set to 1 to indicate that a frame on the LLN represented by that bit is out of service.

4.06 If the frame to be made busy is a trunk switch frame (TSF) or a trunk junctor switch frame (TSJF), a nonzero value is stored in the corresponding TSBOS word in the appropriate trunk link network (TLN) out-of-service table. The associated bit in CS word N4TNOS is set to 1 to indicate that a frame on the TLN represented by that bit is out of service.

4.07 When any frame in the office is made busy, a nonzero value is stored in CS word N4FLAG to indicate that a network frame is out of service. Control is returned to NMFA.

C. Idling a Network Switch Frame

4.08 Any frame that has been made busy can be idled or restored to service by entering the following input message via the maintenance TTY:

FAB-RESTORE-aaB cc d0000 F.

The parameters are the same as those described earlier for the FAB-MB- message. The F at the end of the message signifies to NMFA that the specified frame is to be restored to service. NMFA transfers control to the appropriate idle global entry (Table B) in NETG.

4.09 As in the case of the FAB-MB- input message, acceptance or rejection of the message results in OK or NG, respectively, being printed via the TTY.

4.10 After verifying that the specified frame is present in the office and that the sign bit of the J return address is negative, the appropriate idle global routine modifies the word corresponding to that frame in the applicable out-of-service table. If the frame is an LSF or an LJSF, zeros are inserted in the corresponding LSBOS word in the appropriate LLN out-of-service table. If the frame is a TSF or a TJSF, zeros are inserted in the corresponding TSBOS word in the appropriate TLN out-of-service table.

4.11 In any case, a flag is set to call audit 6 which results in a transfer to NEWGRO, a part of audit 6 and a global entry routine in NETG. This routine checks the out-of-service data after a

TABLE B

NETG GLOBAL SUBROUTINES

GLOBAL	PRIMARY FUNCTION	REFERENCING PIDENT
	MAKE-BUSY ROUTINES	
NEBLJS	Makes busy one line junctor switch frame	NMFA
NEBLSB	Makes busy one line switch bay	NMFA
NEBTSJ	Makes busy one trunk junctor switch frame	NMFA
NEBTSF	Makes busy one trunk switch frame	NMFA
	IDLE ROUTINES	
NEILJS	Idles one line junctor switch frame	NMFA
NEILSB	Idles one line switch bay	NMFA
NEITJS	Idles one trunk junctor switch frame	NMFA
NEITSF	Idles one trunk switch frame	NMFA
	AUDIT ROUTINES	
NEAGRO	Audits network out-of-service tables and handles hourly and status messages	NMFA
NEWGRO	Audits network out-of-service tables and handles idle messages	NEGN
	PATH-HUNT-ASSOCIATED ROUTINES	
NGLLAJ	Determines whether a L-L path can be established when a frame(s) in the office is maintenance-busy (N4FLAG $\neq$ 0)	NMAP
NGLTAJ	Determines whether a L-T path can be established when a frame(s) in the office is maintenance-busy (N4FLAG $\neq$ 0)	NMAP
NGTTAJ	Determines whether a T-T path can be established when a frame(s) in the office is maintenance-busy (N4FLAG $\neq$ 0)	NMAP

FAB-RESTORE- message has been processed and updates network indicators N4LNOS and N4TNOS and flag word N4FLAG, accordingly. Control is returned to the client program.

D. Auditing Network Switch Frame Out-of-Service Data

4.12 NETG contains its own audit routine. The basic functions of this audit are as follows:

(a) To check the validity of the out-of-service data (flag word N4FLAG, network indicators N4LNOS and N4TNOS, and out-of-service tables LSBOS and TSBOS), correct the data when necessary, and print status information when requested via the FAB-STATUS- input message as well as hourly on request from NMFA.

(b) To check the out-of-service data after the processing of a FAB-RESTORE- message. As explained earlier, the idle routines respond to this message by modifying the contents of the LSBOS or TSBOS tables; however, updating of the associated network indicators (N4LNOS or N4TNOS) and flag word (N4FLAG) is handled by the audit routine. Any discrepancies encountered by the audit will be cleared up and error messages will result. The error message descriptions are such that the craft person is informed that the messages are the result of a FAB-RESTORE- entry at the TTY.

4.13 There are two entry points for the audit routine. The first, NEWGRO, is the entry point for audit 6, the network head cell and junctor list audit (NEGN), of which this audit is a part. This is the entry whereby idle messages are handled as explained in paragraphs 4.11 and 4.12(b). No status messages are printed from NEWGRO. The second entry, NEAGRO, is the NMFA entry used for hourly and status message printouts. An NT06 message is printed at the TTY in response to the following network status request:

FAB-STATUS-ALL 00 00000 X.

For any network switch frame affected by a FAB-MB- message, the NT06 message gives the busy-idle status of all the switch blocks on the frame. For additional details, see the Output Message Manual (OM-6A001).

4.14 Basically, the audit routine restores to the idle state any data which contains conflicting information. Upon entry from NMFA at global NEAGRO or from NEGN at global NEWGRO, the audit routine checks the state of N4FLAG, the flag word that indicates whether any network switch frame in the office is out of service. The line and trunk network indicators (N4LNOS and N4TNOS reflect the busy-idle condition of frames on each equipped LLN and TLN, respectively) are then checked to determine if there is a conflict with the state of N4FLAG. Subsequently, each TSF on each TLN and each LSF on each LLN are audited to determine if any conflicts exist with respect to the busy-idle condition of frames and networks. Where discrepancies are found, the appropriate TSBOS and LSBOS words in the out-of-service tables are zeroed, and error messages are printed to aid in tracing problems. If the audit finds that a frame on a TLN or on an LLN has been made busy properly and if entry to the audit was via NEAGRO, an NT06 status message is printed. Upon completion of the audit, control is returned to the client program.

E. Determining Available Paths When N4FLAG $\neq$ 0

4.15 When attempting to establish a path between any two network terminals, the network map administration program (NMAP) checks a flag word (N4FLAG) which is set via the busy routines in NETG when any frame in the office is made maintenance-busy. If a frame(s) is out of service (N4FLAG $\neq$ 0), NMAP transfers to the appropriate path-hunt-associated global entry (Table B) in NETG to determine if the busy frame is associated with one of the networks (LLNs and/or TLNs) under consideration. The NETG global entry to which transfer is made is based on the type of connection (L-L, L-T, T-T) sought by NMAP.

4.16 If NETG determines that the busy frame is not associated with the networks involved, program control is returned to NMAP for continuation of the path hunt. If, however, an out-of-service frame is associated with one or both of the networks under consideration, the appropriate routine in NETG modifies the A-B link busy-idle word formed by NMAP to make busy all the B links associated with the busy frame.

4.17 For example, if the call involves an L-T path and NETG global NGLTAJ determines

that either the associated LSF or TSF is maintenance-busy, the path is blocked and control is returned to NMAP. However, if a JSF on one of the networks is maintenance-busy, the call is not necessarily blocked since paths may be available through other JSFs on the associated network. If NGLTAJ determines that a JSF(s) is out of service on either the line side or the trunk side of the L-T path, the associated channel mask word (word indicating available channels) is modified to show the out-of-service JSF(s) as having all channels busy (there are four bits per JSF—one per grid).

CUTOVER PROGRAM (SACT)

A. General

4.18 In order to maintain uninterrupted telephone service when subscriber lines are transferred from one central office to another, the subscriber lines must be connected to both the old office (the one being transferred from) and the new office (the one being transferred to) for a period prior to the actual transfer or cutover. This allows line connections to the new office to be tested at the same time that switching functions for these lines are being performed by the old office. These lines must therefore be kept functionally isolated from the new office and serviced by the old. Provision for this isolation is made via the cutover program (SACT) which also provides for isolated lines to be accessed from certain test facilities and for the state of lines to be changed immediately from isolated to supervised and vice versa.

4.19 Generally, there are lines in one or both offices that are not involved in the transfer. These lines may require different treatment from the lines being transferred. For example, the new office may already be providing service to some subscriber lines; then, when lines are bridged during the period prior to cutover, the new office must keep some lines isolated and provide service to others. It must also recognize that the calls to isolated (inactive) lines are given interoffice treatment while calls to normal (active) lines are given intraoffice treatment. The cutover program provides the capability for making all these distinctions.

4.20 Since the cutover program can handle line transfers into and/or out of an office, SACT may be present in either the old or the new office. When SACT is present in both offices, it is possible to "undo" the transfer if, for example, the new office has serious trouble during or immediately after the transfer. Although the basic unit of line transfer is 1000 directory numbers (a thousands group), it is possible to cut over just part of a thousands group via the directory number translator mechanism (Fig. 2) which is in effect when the cutover program is active.

4.21 After all transfers have been performed, the cutover program is no longer needed. The program is made inactive by zeroing the cutover indicator via the appropriate recent change (RC) message. [The presence or absence of an alternate directory number head table (ADNHT) address in word 5 of the auxiliary master head table (Fig. 2) indicates the status (active or inactive) of SACT.] Translation data associated with lines transferred out of the old office is modified (via RCs) as required. See Section 231-100-311 for additional details on translation data and RC messages associated with cutover.

4.22 The SACT global-entry routines, their primary functions, and the PIDENTs referencing these routines are identified in Table C.

B. Isolating Inactive Lines

4.23 When SACT is active, inactive lines are kept isolated from the switching machine by maintaining cutoff contacts of all lines in the office in the proper state (open for inactive lines and closed for active lines) according to translation information. The translation mechanism (Fig. 2) is arranged so that two sets of translation information can be present for any thousands group or number group (NOG) via the directory number head table (DNHT) and the alternate directory number head table (ADNHT). This allows some groups to be active while others are inactive and provides the capability for changing the activity status of 1000 DNs instantaneously. By using an additional table, the directory number exception list (DNEL), it is also possible to have active lines within a NOG that is designated inactive in the rate center (RAC) table. Two bits within each RAC table word indicate the precut and postcut status (active or inactive) of each number group when SACT is active. A third bit indicates the presence or absence of a DN on the DNEL for inactive NOGs. The DNEL is ignored for any NOGs marked active in the RAC table. For detailed information on the translation mechanism

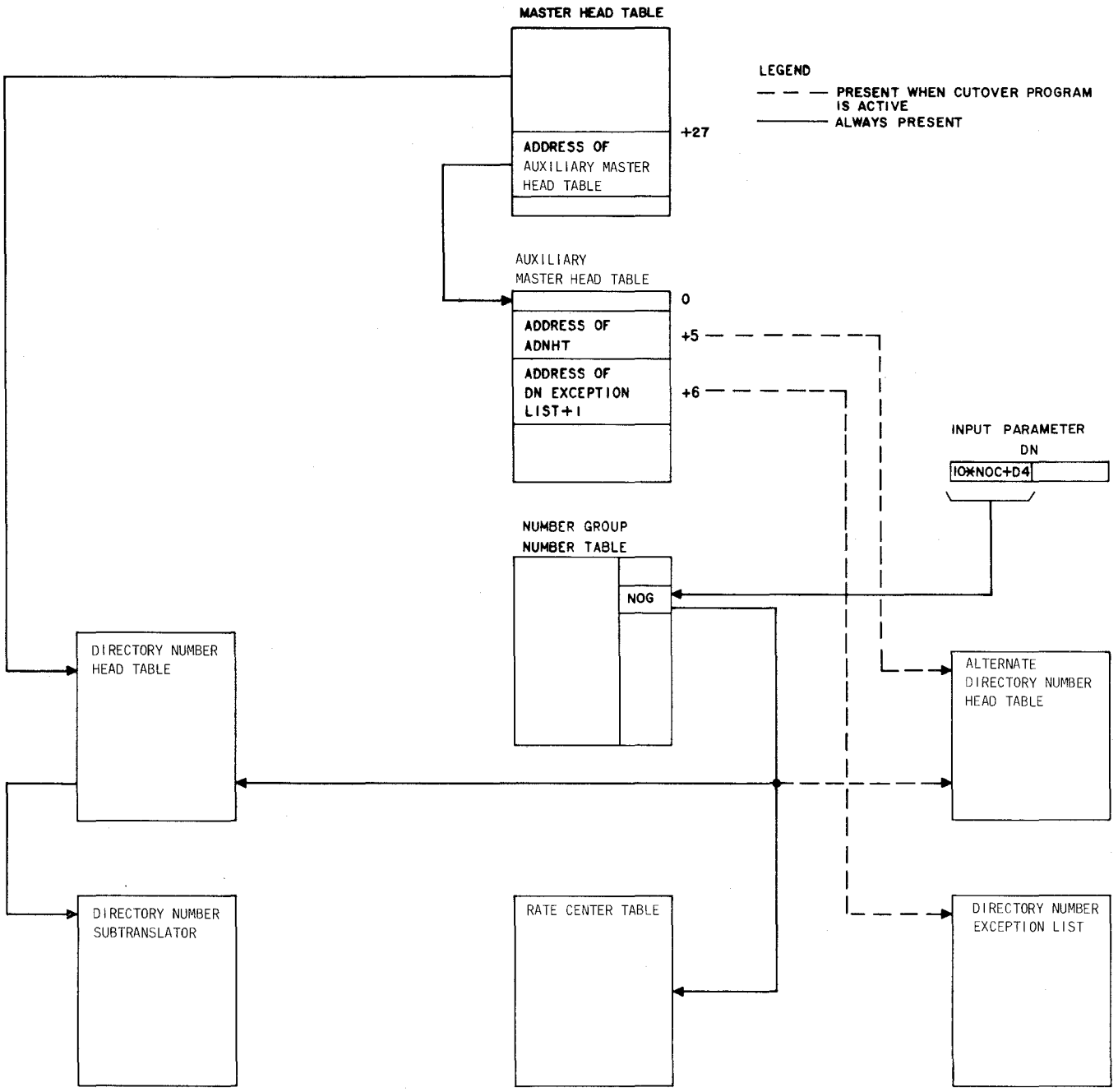

Fig. 2—Translation Mechanism Involved in Cutover

involved in the cutover of an office, refer to Section 231-100-311.

4.24 To ensure isolation of inactive lines when SACT is active, all lines are regularly audited by the cutover audit (audit 64). This audit can be requested by maintenance control during the normal audit cycle or via the appropriate TTY input messages.

4.25 There are a number of interfaces with SACT for maintaining cutoff contacts in the proper state and for denying termination to inactive lines except from selected facilities. The majority of

TABLE C

SACT GLOBAL SUBROUTINES

GLOBAL	PRIMARY FUNCTION	REFERENCING PIDENT
SACTMS	Processes ESS-CUT- messages	TTIA
SADMND	Runs demand mode of cutover audit	SADT
SAELEV	Checks state of MCC CUTOVER KEY 0	ECMP, EMERRECV
SANNMX	Provides open or closed cutoff contact indication to network test program	NMMX
SAOPEN	Opens the cutoff contact on a single line when an inactive line originates	TRLC
SAROUT	Runs routine mode of cutover audit	SADT

these interfaces is accomplished through the standard originating and terminating translation routines, which indicate to their clients whether a line is active or inactive. For example, during a phase 4, translation information is interrogated to determine whether to open or close cutoff contacts. The effect of these interfaces can be controlled by means of master control console (MCC) CUTOVER KEY 1 (Fig. 3). When this key is set to ON, the cutover audit will not run and the interfaces are in effect eliminated, allowing cutoff contacts to be closed on inactive lines.

C. Cutover Audit (Audit 64)

4.26 The purpose of the cutover audit is to maintain cutoff contacts of all lines in the proper state according to RAC table and DNEL entries. Audit 64 can be requested in three ways:

(1) By maintenance control during the normal audit cycle

(2) By TTY message SA-AUDIT-64777777

(3) By TTY message ESS-CUT-0 or ESS-CUT-1, with MCC CUTOVER KEY 0 and KEY 1 (Fig. 3) set properly.

The effects of cutover-associated TTY input message for various combinations of CUTOVER keys and audit control word (O8CTRL) states are listed in Table D. For more detailed information on messages and keys, refer to IM-6A001 and Section 231-100-311 (note variations in key designations for No. 1 and No. 1A ESS cutover controls).

4.27 The cutover audit has two modes: routine and demand. The demand mode is activated only when an actual cutover is requested.

Routine Mode

4.28 The SACT global entry for running the cutover audit in the routine mode is SAROUT. The routine mode of the audit can be requested by either of the first two ways listed in paragraph 4.26. Both maintenance and TTY programs enter SAROUT via the system audit program (SADT) which contains the system audit vector table (a map of pointers to all of the audits).

4.29 Every time the audit is requested via maintenance control during the normal audit cycle, it audits a single thousands group (NOG). Lines are audited from the highest to the lowest NOG. Two peripheral order buffers (POBs) are used to hold orders to operate (open or closed) cutoff contacts, with each POB holding orders for a maximum of 15 lines. If a failure occurs during the execution of an order, the POB containing that order is taken out of use for the remainder of that thousands group. If failures occur in both POBs, the audit aborts and starts over at the highest NOG the next time the audit is run.

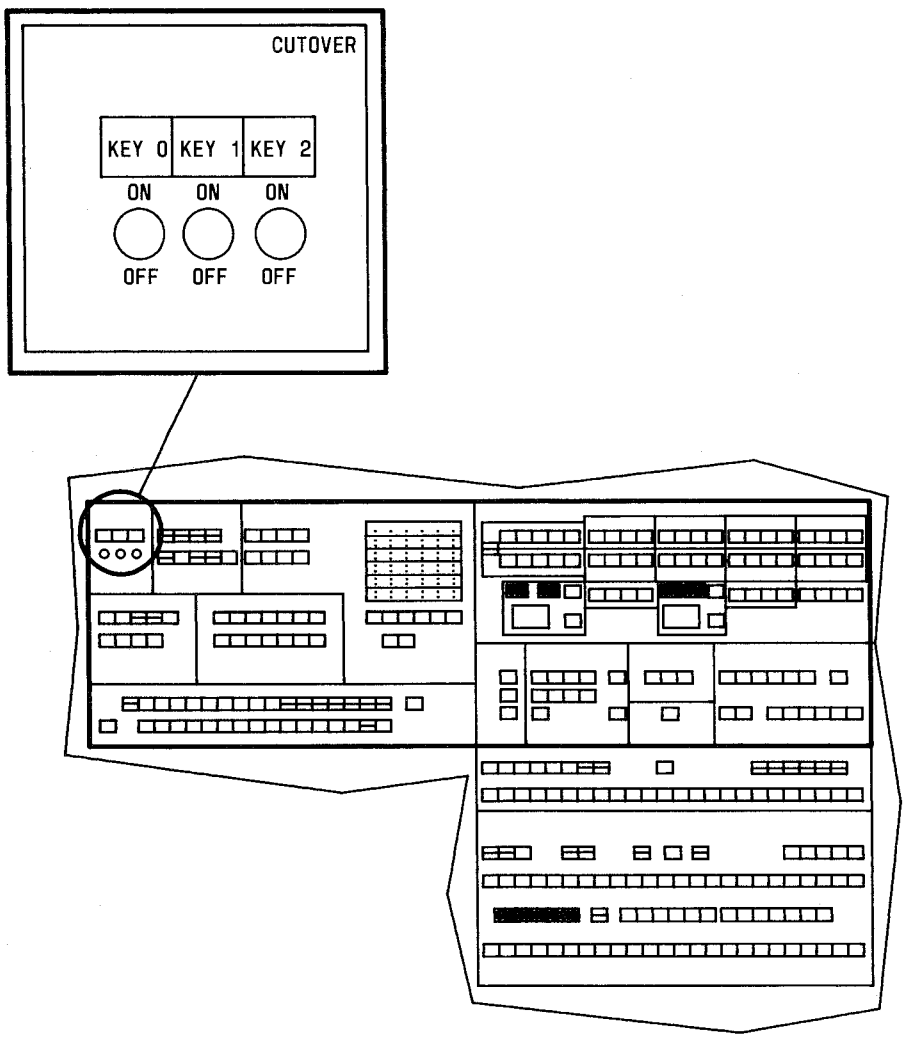

Fig. 3—Cutover Section of Status Panel on No. 1A ESS Master Control Console

4.30 In the No. 1A ESS, when the routine mode of the audit is requested via TTY message SA-AUDIT-64777777, transfer is made to SACT global SADMND (the entry for the demand mode of the cutover audit). This routine audits all NOGs in the office; whereas, in the No. 1 ESS only one NOG is audited per TTY audit request.

4.31 There are two output messages associated with the routine mode of the cutover audit:

SA04 NORM

indicates the routine mode aborted and

SA04 ERR

indicates the routine mode terminated successfully but a POB execution failure occurred.

4.32 If CUTOVER KEY 1 is set to ON, the routine mode of the audit is inhibited; ie, the audit will not run when called by maintenance control during the normal audit cycle and cannot be requested via TTY message SA-AUDIT-64777777.

TABLE D

EFFECTS OF CUTOVER-ASSOCIATED TTY INPUT MESSAGES
FOR VARIOUS COMBINATIONS OF KEYS AND SWITCHES

STATE OF CONTROL WORD AND KEYS				MESSAGE (NUMBERS REFER TO NOTES BELOW)					
ADNHT EXISTS (08CTRL (22)=1)	08CTRL PRECUT/POSTCUT INDICATOR	08CTRL TEST MODE INDICATOR SET	KEY 1	KEY 0	ESS-CUT-0	ESS-CUT-1	ESS-CUT-3	SA-AUDIT-64	NM-LINE
NO	—	—	—	—	1	1	2	1	4
YES	PRECUT	YES	ON	OFF	5	6	7	3	4
YES	PRECUT	YES	ON	ON	6	5	7	3	4
YES	PRECUT	NO	OFF	OFF	8	6	7	9	10
YES	PRECUT	NO	OFF	ON	6	8	7	9	10
YES	POSTCUT	YES	ON	OFF	5	6	7	3	4
YES	POSTCUT	YES	ON	ON	6	5	7	3	4
YES	POSTCUT	NO	OFF	OFF	8	6	7	9	10
YES	POSTCUT	NO	OFF	ON	6	8	7	9	10

NOTE	SYSTEM RESPONSE	EFFECT OF MESSAGE
1	OK	NONE: CUT PROGRAM INACTIVE
2	PF, FOLLOWED BY CUT01 MESSAGE INDICATING CUT PROGRAM IS INACTIVE; OTHER INDICATORS ARE MEANINGLESS	NONE: CUT01 INFORMATION RESPONSE
3	OK	AUDIT WILL NOT RUN BECAUSE KEY 1 INHIBITS.
4	OK, FOLLOWED BY MN02	CLOSES CUTOFFS ON ALL IDLE LINES.
5	OK	AUDIT WILL NOT RUN BECAUSE KEY 1 INHIBITS; HOWEVER, OFFICE STATE CHANGES.

TABLE D (Contd)

EFFECTS OF CUTOVER-ASSOCIATED TTY INPUT MESSAGES
FOR VARIOUS COMBINATIONS OF KEYS AND SWITCHES

NOTE	SYSTEM RESPONSE	EFFECT OF MESSAGE
6	OK	NONE: CUTOVER KEYS NOT IN PROPER STATE. CUTOVER WILL OCCUR WHEN KEY 0 IS CHANGED IF KEY 1 IS NOT UP AT THAT TIME. IF KEY 1 IS UP, THE STATE OF THE OFFICE WILL BE CHANGED, BUT THE CUTOFFS WILL NOT BE OPENED OR CLOSED. THE COMMAND WILL HAVE NO EFFECT IF ANY OTHER ESS-CUT MESSAGE IS ENTERED BEFORE KEY 0 IS CHANGED.
7	PF, FOLLOWED BY CUT01	1) SET TEST MODE ACCORDING TO KEY 1. 2) SET REMOTE SD ACCORDING TO CUTOVER STATE.
8	OK, FOLLOWED BY SA04	1) CLOSES CUTOFFS ON ALL IDLE ACTIVE LINES. 2) OPENS CUTOFFS ON ALL IDLE INACTIVE LINES. DOES NOT AFFECT UNASSIGNED LINES.
9	OK, FOLLOWED BY SA02	1) CLOSES CUTOFFS ON ALL IDLE ACTIVE LINES. 2) OPENS CUTOFFS ON ALL IDLE INACTIVE LINES. IGNORES ALL UNASSIGNED LINES.
10	OK, FOLLOWED BY MN02	1) CLOSES CUTOFFS ON ALL IDLE ACTIVE LINES. 2) OPENS CUTOFFS ON ALL IDLE INACTIVE LINES. 3) OPENS CUTOFFS ON ALL UNASSIGNED LINES.

If CUTOVER KEY 2 is set to ON, the routine mode again will not run when called by maintenance control during the normal audit cycle, but can be requested via the TTY.

Demand Mode

4.33 The demand mode of the cutover audit is requested on a high priority basis when either of two input messages (ESS-CUT-0 or ESS-CUT-1) available to cut over lines is entered at the TTY. Upon receipt of either message, the TTY program (TTIA) enters SACT via global SACTMS. This routine records receipt of the message, erases any other ESS-CUT- message indicator, and transfers to the executive control main program (ECMP). A third message, ESS-CUT-3, is also processed by SACTMS. This is an inquiry message requesting the state of the cutover program and keys. SACTMS erases all ESS-CUT- message indicators, sets the remote signal distributor (SD) point (via transfer to local DIST in SACT global SAELEV explained in a subsequent paragraph), and transfers to the print routine to print cutover status message (CUT01 (OM-6A001). Upon return to SACTMS, transfer is made to ECMP.

4.34 To make line transfer independent of the order in which the cutover message is entered and CUTOVER KEY 0 is thrown, SACT global SAELEV checks for their occurrence. SAELEV is entered from ECMP every class E visit. If the cutover program is active and either ESS-CUT-0 or ESS-CUT-1 has been received, SAELEV checks the state of KEY 0. If it is in the proper position according to the message received (OFF for ESS-CUT-0 and ON for ESS-CUT-1), the remote SD point is operated via local DIST. If the SD point operation fails because no POB is available, output message CUT02 (OM-6A001) is

printed. Since the position of KEY 0 is generally changed only when cutover is performed, the SD point can be used to operate a light or give some other indication to the distant office that cutover is occurring. It can also be used to initiate cutover in the distant office for automatic synchronization. If the distant office is also an ESS office with SACT, the remote SD point may replace KEY 2.

4.35 Following operation of the remote SD point, demand mode of the cutover audit is requested via maintenance control (MACR). MACR sets up entry via SADT to SACT global SADMND, the routine for running the audit in demand mode. (In the No. 1 ESS, SADMND runs as a client of MACR.)

4.36 The ESS-CUT-0 message causes a transition from the precut state (state of an office before cutover occurs) to the postcut state (state of an office after cutover occurs), while the ESS-CUT-1 message causes a transition from the postcut to the precut state. The ESS-CUT-1 message is used, for example, to revert to the precut state if trouble occurs during or immediately after a cutover. For a gradual cut where only a part of the total number of lines to be cut is cut over at one time (as opposed to a flash cut where all lines to be present in a new office are cut over simultaneously), the ESS-CUT-1 message is also used in the normal procedure to place the office in the precut state for the next stage of the cutover. To ensure that the office cutover is deliberate, CUTOVER KEY 0 must be properly set and the cutover audit must be inhibited by KEY 1.

4.37 When in the demand mode, the cutover audit works only on NOGs that are actually changing status during the cutover. The number of POBs used is supplied by the operating company (the default value is 2).

4.38 There are two output messages associated with the demand mode:

SA04 SUCC

indicates the demand mode terminated successfully and

SA04 REQ

indicates the demand mode was aborted.

D. Interfaces for Maintaining Isolation of Inactive Lines

Maintaining Calls in Progress During Cutover

4.39 In a line transfer where both offices isolate lines by removing battery, the cutover program maintains calls that are in progress. Lines involved in a call are then cut after disconnect. This is handled in the following way:

(a) If a line being cut ***out*** is off-hook when the transfer takes place, the cutover audit ignores it. Following disconnect, it is restored to normal (cutoff contact closed). On its next origination or when the routine mode of the audit is run, the cutoff contact is opened. In this case, in order to maintain a conversation, the new office must be an ESS since electromechanical systems cannot withhold dial tone from off-hook lines.

(b) If a line being cut ***in*** is off-hook, its line bit is marked busy and its cutoff contact is closed, causing a drop in transmission on the line. When the cutover audit terminates, it requests the line bit audit (NMDT)—audit 50. If the line has disconnected by this time, audit 50 will put it into service by idling the line bit. Otherwise, audit 50 will place it on the high and wet list and the line will be restored to normal on disconnect. If the high and wet list is full, the line will be examined by audit 50 every audit cycle until it disconnects or until room exists on the high and wet list. In this case, the old office need not be an ESS as long as the line is cut out by removal of battery from the line relay.

Interfaces Through Originating and Terminating Translations

4.40 Most interfaces for maintaining isolation of inactive lines are implicit since they are accomplished through originating and terminating translation routines. Following is a brief description of the action of translation routines when the cutover program is active.

Terminating Translation

4.41 In general, terminating translation performed on an inactive directory number (DN) will

return a route index (RI); however, there are some exceptions:

(a) A translation request resulting from a verify message or call trace will return local information.

(b) Local test desk (LTD) and trunk and line test panel (TLTP) are allowed to terminate to inactive lines.

(c) A new originating major class has been created and lines having this major class, called cutover access lines, are allowed to terminate to inactive lines.

4.42 The terminating translation procedure is generally as follows:

(a) DNHT data is used if

(1) No ADNHT exists (ie, SACT is not active)

(2) No alternate routing information exists in the ADNHT for that particular thousands group (ie, the ADNHT entry is all zeros)

(3) The RAC table indicates that the thousands group is active

(4) The translation request is the result of a verify message, call trace, or call from TLTP, LTD, or a cutover access line

(5) The dialed number appears on the DNEL with sign bit set to 0.

(b) ADNHT data is used if the thousands group is inactive; the dialed DN is not in the DNEL (or if in DNEL, has been made inactive via sign bit set to 1); and the client is not LTD, TLTP, verify, call trace, or a cutover access line.

4.43 All terminating translation routines are affected by the cutover program except those that do not change the line and activity bits. Actions of the affected routines are modified by transferring to routine SATERM in the translation routines—line cutover (TRLC) program. SATERM determines if a given DN is active or inactive and takes appropriate action.

Originating Translation

4.44 Originating line translation is also affected by activation of the cutover program (SACT). When SACT is active and CUTOVER KEY 1 is set to OFF (cutover audit uninhibited), originating translation performs a check on the activity status of the line equipment number (LEN). To determine whether the line is active or inactive, the same criteria are used as those applying to terminating translation.

4.45 Originating line translation routines affected by the cutover program are TRENAA, TRLIAB, and TRTFAL in the translation routines—basic line and directory number (TRBL) program. Their actions are modified by transfer to TRLC routine SAORIG when the cutover program is active. SAORIG determines whether the given LEN is active or inactive based on the status of its associated calling DN. If the calling DN is marked inactive and yet an origination occurs (indicating a closed cutoff contact), SAORIG transfers to SACT global entry SAOPEN to correct the condition by opening the cutoff contact. Return is made to the client routine of the LEN translation as if the line were unassigned.

4.46 An example of an interface through translations is the dialing connection program—lines (DCNL). It performs an originating translation via transfer to TRENAA. When the cutover program is active, any inactive line that happens to have its cutoff contact closed is denied origination. After opening the cutoff contact, originating translation returns as if the line were unassigned, causing the call to be abandoned.

Interface Through Network Matrix Routine Exercises (NMMX)

4.47 The network matrix routines exercise or test the relay matrix in the line switch frames by connecting a path from a network B link to an idle line. After the test has been completed, the matrix program normally restores the cutoff contact of the line involved in the path. When SACT is active and CUTOVER KEY 1 is set to OFF (cutover audit uninhibited), the action of NMMX is modified via transfer to SACT global SANMMX. This routine derives the LEN from the network path order and transfers to originating translation routine TRTFAL in PIDENT TRBL to determine if the line is active or inactive. Upon

return to SANMMX, an order is loaded, along with the network path order, to open the cutoff contact if the line is inactive. Return is made to NMMX.

Interface Through Restore Cutoff Program (NMLI)

4.48 PIDENT NMLI restores cutoff contacts for all idle lines and releases any associated line relays. If SACT is active, all inactive and unassigned lines will have their cutoff contacts opened. NMLI runs after a phase 4, 5, or 6 to guarantee that the hardware agrees with the software state of the line. During phase 4 or 5, NMLI takes action in response to requests from audit 50 to restore cutoff contacts only on those lines which have a high probability of requiring restoral. NMLI may also be requested via TTY message NM-LINE-. The effects of this TTY request are listed in Table D.

5. ABBREVIATIONS AND ACRONYMS

ADNHT	Alternate Directory Number Head Table
CS	Call Store
DCNL	Dialing Connection Program—Lines
DN	Directory Number
DNEL	Directory Number Exception List
DNHT	Directory Number Head Table
ECMP	Executive Control Main Program
EMERRECV	Emergency Mode Control Program
ESS	Electronic Switching System
JSF	Junctor Switch Frame
LEN	Line Equipment Number
LJSF	Line Junctor Switch Frame
L-L	Line-to-Line
L-T	Line-to-Trunk
LLN	Line Link Network
LSF	Line Switch Frame
LTD	Local Test Desk
MACR	Maintenance Control Program
MCC	Master Control Console
NEGN	Network Head Cell and Junctor List Audit
NETG	Network Make Busy Routine
NMAP	Network Map Administration Program
NMDT	Line Bit Audit
NMFA	Network Fabric Routines
NMLI	Restore Cutoff Program
NMMX	Network Matrix Routine Exercises
NOC	Normalized Office Code
NOG	Number Group
PD	Program Description
PIDENT	Program Identification
POB	Peripheral Order Buffer
PR	Program Listing
RAC	Rate Center
RC	Recent Change
RI	Route Index
SACT	Cutover Program
SADT	System Audit Program
SSD	Software Subsystem Description
T-T	Trunk-to-Trunk
TJSF	Trunk Junctor Switch Frame
TLN	Trunk Link Network
TLTP	Trunk and Line Test Panel

TRBL	Translation Routines—Basic Line and Directory Number
TRLC	Translation Routines—Line Cutover
TSF	Trunk Switch Frame
TTIA	TTY Input Messages—Directory and Catalog
TTY	Teletypewriter

6. REFERENCES

A. Growth Subsystem PIDENTs—see Table A

B. IM-6A001—Input Message Manual

C. OM-6A001—Output Message Manual

D. Section 231-100-311—Cutover Procedures (PIDENT SACT)