

**CELL SITE GENERIC AND TRANSLATION UPDATES**

**1A ESS™ SWITCH**

**AUTOPLEX™ SYSTEM 100**

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**TABLE A**  
**ABBREVIATIONS AND ACRONYMS**

ABBREVIATION/ ACRONYM	DEFINITION
AMI	Autoplex System 100
APS	Miscellaneous Information
BOOT	Attached Processor System
CP	Bootstrap
CSC	Circuit Pack
E/D	Cell Site Controller
ID	Encoder/Decoder
INIT	Identification
MCU	Initialization
MTSO	Module Control Unit
PC	Mobile Telephone Switching Office
PS	Peripheral Controller
RAM	Program Store
RC	Random Access Memory
ROM	Recent Change
SC	Read Only Memory
SR	Stable Clear
TOP	System Reinitialization
TUC	Task Oriented Practice
	Tape Unit Controller

Changes to the generic base are made with overwrites, and cell site updates are used to change the cell site generic. The overwrite capability for the MTSO generic base follows standard 1A ESS switch procedures and is therefore not included in this document. Cell site update procedures are used to retrofit or modify the cell site generic. Cell site updates include: (1) cell site generic update and (2) possible hardware and/or firmware updates.

#### CELL SITE GENERIC COPY

**2.02** A copy of each cell site generic program is maintained in the MTSO with the 1A ESS switch generic base. This copy is sometimes referred to as the MTSO copy and resides in PS memory. The copy in PS is also backed up by another copy in the 1A-file area of APS.

#### A. Multiple Cell Site Generics

**2.03** The MTSO can simultaneously support many cell sites that are operating with different versions of the cell site generic. This feature is called multiple cell site generics, and its basic purpose is to help coordinate changes which involve hardware and software components that are dependent on one another. A cell site operating with hardware changes and a cell site operating without similar changes can be supported at the same time by a common MTSO. This is also true for software changes that are to be made. The multiple cell site generics feature is also helpful as a backup for cell site updates and generic retrofits. This is because old versions are immediately available from the 3B-file area of APS as described in the next paragraph.

**2.04** When any version of the cell site generic is read into PS, it becomes the resident version. This same version is automatically loaded into the

1A-file area and 3B-file area of APS. The 3B-file area always maintains every additional cell site generic version, including the current resident version in PS and 1A-file area of APS. When a version is paged from 3B-file area into PS and 1A-file area, a copy is still maintained in the 3B file.

## B. Download

**2.05** Download is the operation of sending the cell site generic from the MTSO copy to a cell site for the purpose of initializing the cell sites random access memory (RAM) area. The download is used during cell site updates and other procedures such as recovery action and initializing new cell sites added to cellular geographic service area (CGSA). The entire cell site generic (not including cell translators) is sent in a full download, and portions of the cell site generic are sent in a partial download. A full download is requested automatically by the cell site or manually with the INIT:CELL a:BOOT! input message. A partial download is only requested automatically by the cell site.

**2.06** The INIT:CELL input message will download a cell site generic if the requested version is resident. If the requested version is not resident but resides on 3B-file area, it will be paged into PS before honoring the download request. If this is the case, the download procedure will take more time to complete.

**2.07** The software subsystems that carry out the download operation are bootstrap and pumpup. The bootstrap is located in the cell site controller (CSC) read only memory (ROM) area. Pumpup is located in the MTSO and works hand-in-hand with bootstrap. No matter what the source of the request is (automatic or manual), bootstrap sends a request for download to the pumpup. After this request, an automatic check is made to verify the correct cell site generic version is resident in PS. If the resident version is incorrect, the required version is paged from the 3B-file area of APS to replace the resident version in PS and 1A-file area of APS.

**2.08** After the resident version is determined to be correct or the required version is paged into PS, pumpup downloads the cell site generic. The information is sent over both data links simultaneously and into both module control units (MCUs) of the cell site CSC. If one of the data links is unavailable, pumpup is forced to download over the remaining mate link.

**2.09** A partial download is requested by the cell site when small portions of its generic are lost or destroyed. Partial downloads may occur before and/or after a full download. The cell site translators are sent from the MTSO master translators during a stable clear (SC) phase of initialization. The SC could occur without a download but always occurs after any download action. A more comprehensive description of download is provided by the maintenance considerations for System 100 (Practice 231-200-020).

## 3. CELL UPDATE

### A. Cell Generic Update

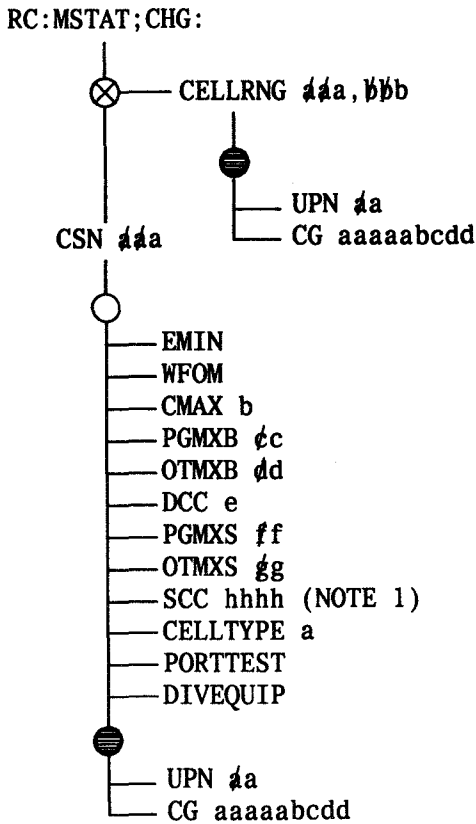
**3.01** A cell site generic update is the process of retrofitting a cell site with a new version of a cell site generic program. The update may or may not require associated hardware/firmware updates at the cell site(s). See the hardware and firmware update part of this practice. Cell site generic update procedures affect call processing and should be performed during low traffic periods.

**3.02** If the System 100 is operating with the multiple cell site generics feature, a cell site master status block should be changed to reflect the correct cell site generic version before the cell site generic update begins. The tables and auxiliary blocks that must exist before changing the master status blocks are:

- Master status head table for each cell site
- Three-word auxiliary block for the specified cell site number

**3.03** The input message to change existing cell site master status blocks is illustrated in Fig. 1, and the keywords are explained in Table B. For information on how to build new cell site master status blocks, refer to Practice 231-218-301.

**3.04** All 1A processor units should be in service before the new cell site generic is loaded into the MTSO copy. Also the attached processor system (APS) should not be involved with any other type of update before loading a cell site generic. The new cell site generic tape is loaded (also called read) from an unassigned tape unit controller (TUC) into the program store (PS) area. The MTSO will then automatically copy the new cell site generic into the APS disk



**NOTE:**

1. The SCC input is either 5970, 6000, or 6030 and is stored as binary 00, 01, or 10, respectively.

**Fig. 1—Changing Cell Master Status Blocks**

memory. The loading progress of the cell site generic into the APS memory may be observed by entering command 110 for system performance page on the APS terminal.

**3.05** The printing of REPT:SAWS AUDIT output messages during the loading of a generic update could be caused by incorrect hash sums. If this should occur, the update tape should be rewound and loaded again. The loading of the PS and copying into the APS takes approximately 8 to 9 minutes. When complete, the output message UPD:CELL GENERIC

UPDATE COMPLETE is printed. The update tape is demounted from TUC as soon as the cell generic is read into PS (2 to 4 minutes). It takes another 6 to 10 minutes to copy into 1A-file area, and 2 to 4 minutes to copy into 3B-file area.

**3.06** The MTSO pumpup subroutine may be inhibited from automatically down loading (when requested by a cell site bootstrap subroutine) the cell site generic via the INH:CELL a:BOOT! input message. Only one cell site should be manually down loaded with the new cell site generic via the INIT:CELL a:BOOT! input message. The download operation takes a minimum of 6 minutes, and when finished, the output message REPT:CELL a FULL BOOT FINISHED is printed. A period of time (soak period) should be allowed for the cell site to operate with the new generic. If there is no trouble and the new cell site generic is determined to be reliable, the remaining cell sites to be updated are then manually down loaded one at a time. An SR tape should now be prepared for backup of the system (TOP 231-368-011).

**3.07** If trouble occurs with a newly loaded cell site generic update, it can be removed by loading the last reliable cell site generic update tape into the MTSO copy and down loading to the troubled cell site(s). With multiple cell generic feature, the last reliable cell generic may be retrieved from 3B-file area. If this does not return the cell site(s) to normal operation, a system reboot with an old reliable SR tape may be necessary. See Fig. 2 to load a cell site generic update.

**B. Reboot**

**3.08** Reboot is a manual attempt to recover from a bad cell site update when the MTSO copy and cell generic are both bad. A reboot is very time consuming, interrupts call processing, and should only be performed after all other means to recover the cell sites have failed. The last reliable system reinitialization (SR) tape is first loaded into the MTSO memory. Then each cell site is reinitialized by a full download.

**C. Hardware and Firmware Update**

**3.09** There are several hardware, firmware, and software areas in the System 100 that are dependent on one another. When one area is updated, other dependent areas may or may not be updated to remain compatible. These dependent areas are illus-

TABLE B		
RC:MSTAT KEYWORD DEFINITIONS		
KEYWORD UNIT	DEFINITION	FORM
CELLRNG <i>ááa, ááá</i>	Cell Update Range ( $1 < = QG2CELL, 1 < = QG2CELL$ ). Variable <i>ááa</i> must be less than or equal to <i>ááá</i> . Keyword is used to update the CG and UPN fields for a range of cells where <i>ááa</i> is the first cell in the range and <i>ááá</i> is the last cell. All cells in the range must be assigned.	
CELLTYPE <i>a</i>	Cell Type. Variable <i>a</i> = 0 through 7. Defines the cell equipment; 1 = MOD 1, 2 = MOD 2, etc. (0 is reserved).	ESS 1902-1 ITEM 00B Col. 47
CG <i>aaaaabcd</i>	Cell Generic. Variable <i>aaaa</i> = system type input as a 5 alphanumeric character. Variable <i>b</i> = generic release number (1 through 9). Variable <i>c</i> = generic type (A through Z). Variable <i>dd</i> = generic issue (00 through 15).	ESS 1902-1 ITEM 00B Cols. 43,44
CMAC <i>b</i>	Control Mobile Attention Code. Used by the mobile to control power level during setup. Variable <i>b</i> = 0 through 7.	ESS 1902-1 ITEM 00B Col. 28
CSN <i>ááa</i>	Cells Site Number (index). Variable <i>ááa</i> = 1 through 255.	ESS 1902-1 Cols. 16-18
DCC <i>e</i>	Digital Color Code. Used to uniquely identify a cell during system access. Variable <i>e</i> = 0 through 3.	ESS 1902-1 ITEM 00B Col. 29
DIVEQUIP YES/NO	Optional Diversity Receive Antenna System Equipped.	
EMIN	Extended Mobile Identification Number indicator. When set, the mobile will access the system using a 34-bit MIN, otherwise it will use the 24-bit MIN.	ESS 1902-1 ITEM 00B Col. 25
OTMXB <i>áá</i>	Number of times a mobile is allowed to find a setup channel busy before giving up trying to access the system for another reason besides page response (e.g., an originating message). Variable <i>áá</i> = 0 through 15.	ESS 1902-1 ITEM 00B Cols. 35,36
OTMXS <i>áá</i>	The number of times a mobile is allowed to try and seize a setup channel before giving up trying to access the system for another reason besides page response (e.g., an originating message). Variable <i>áá</i> = 0 through 15.	ESS 1902-1 ITEM 00B Cols. 39, 40
PGMXB <i>áá</i>	Number of times a mobile is allowed to find a setup channel busy before giving up with its page response. Variable <i>áá</i> = 0 through 15.	ESS 1902-1 ITEM 00B Cols. 33, 34
PGMXS <i>áá</i>	The number of times a mobile is allowed to try and seize a setup channel before giving up with its page response. Variable <i>áá</i> = 0 through 15.	ESS 1902-1 ITEM 00B Cols. 37, 38
PORTTEST YES/NO	Portable Test Equipment.	
SCC <i>ááá</i>	Supervisory Audio Tone (SAT) Color Code. Keyword SCC inputs of 5970 Hz, 6000 Hz, or 6030 Hz will be internally stored in binary as 00, 01, or 10, respectively.	ESS 1902-1 ITEM 00B Col. 30
UPN <i>áá</i>	Current Update Number. Variable <i>áá</i> = 0 through 99.	ESS 1902-1 ITEM 00B Cols. 41,42
WFOM	Wait for Overhead Message indicator. When set, the mobile must wait for an overhead message from the cell.	ESS 1902-1 ITEM 00B Col. 26

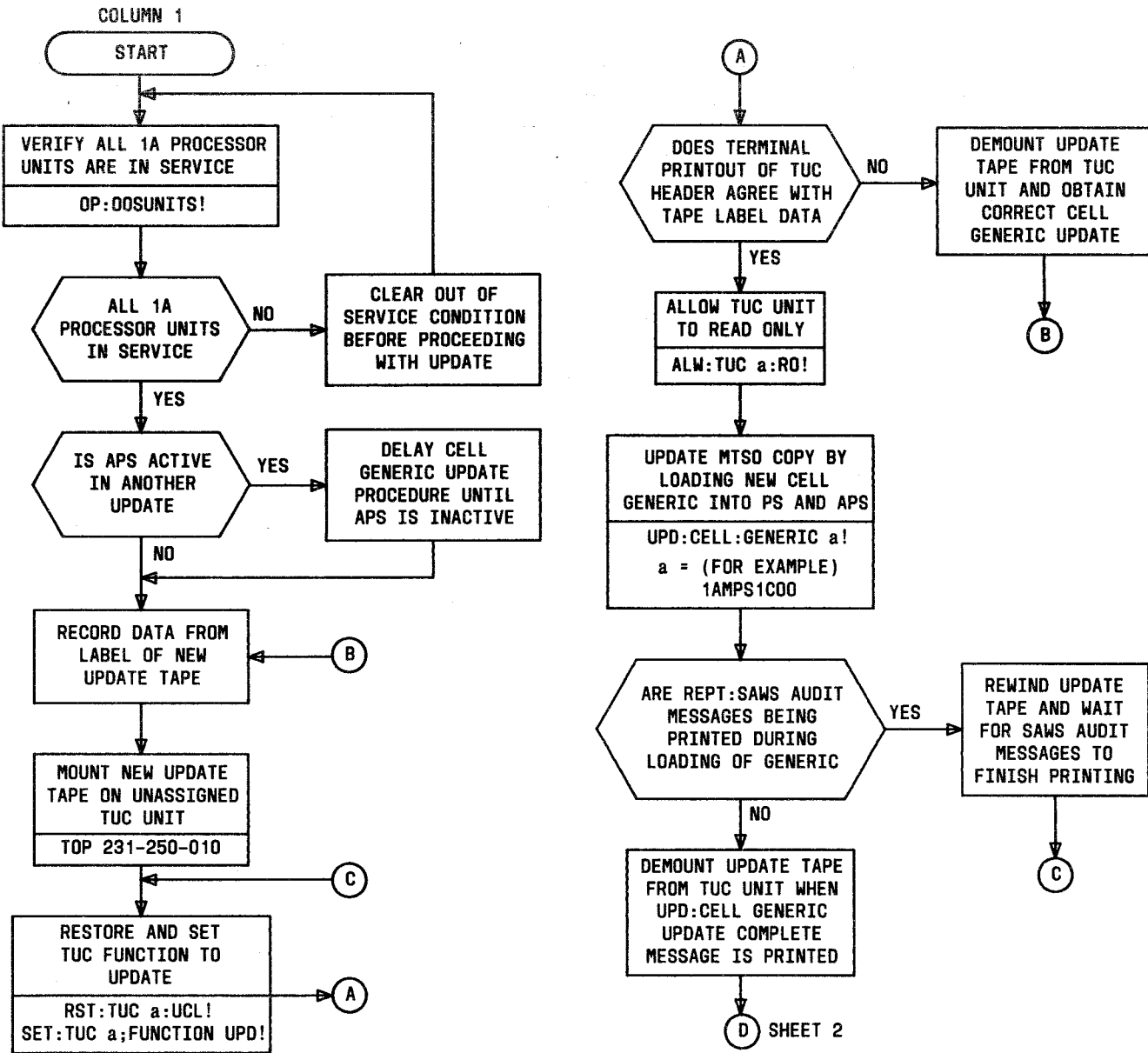


Fig. 2—Load Cell Generic Update (Sheet 1 of 2)

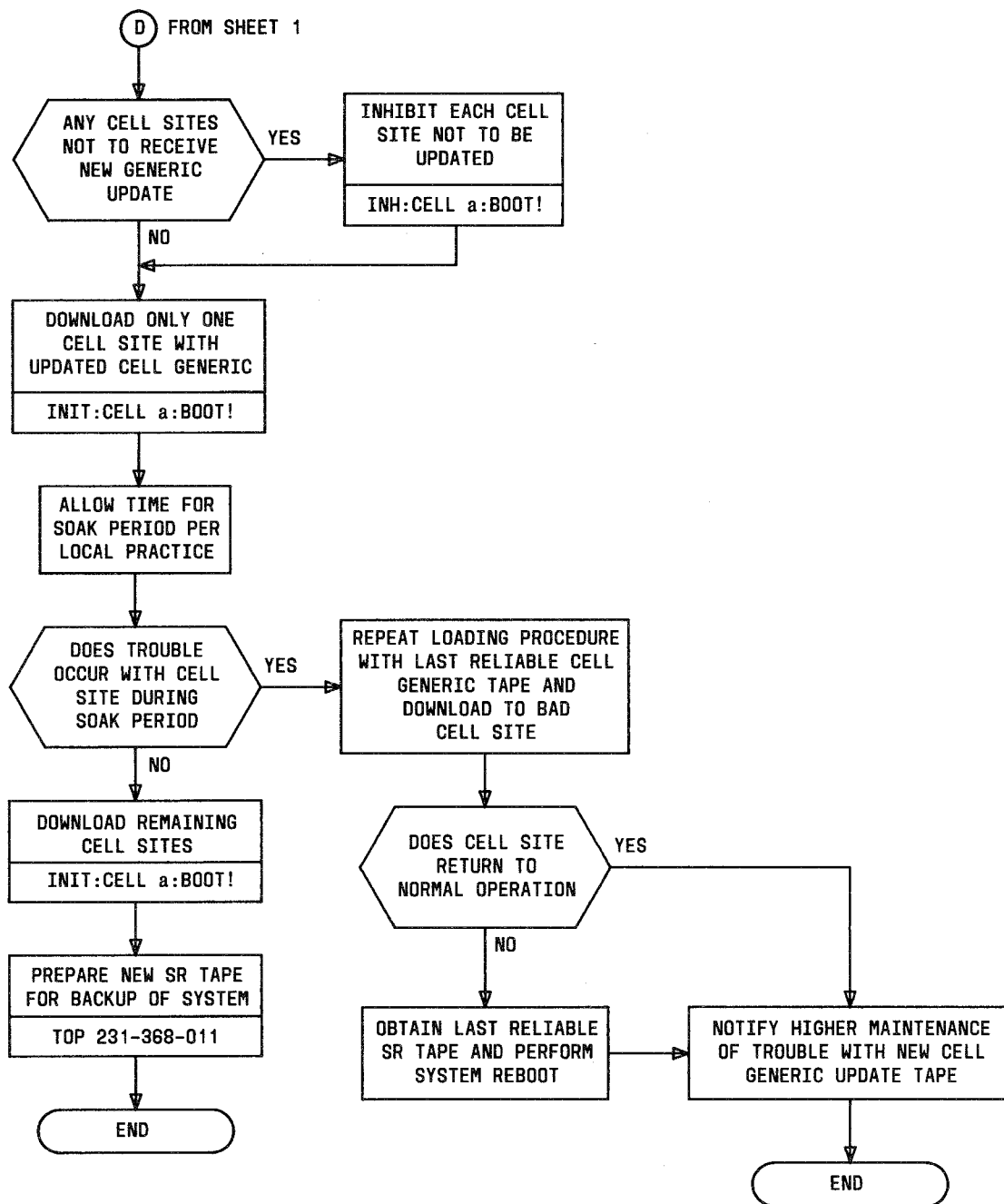


Fig. 2—Load Cell Generic Update (Sheet 2 of 2)

trated in Fig. 3. The mobile unit contains its own ROM code. Each cell site contains encoder/decoder (E/D) ROM code located in its peripheral unit hardware. Along with the E/D ROM, a cell site has its cell site generic program in RAM and ROM code with the CSC hardware. The MTSO contains the 1A ESS switch generic base along with a copy of the cell site generic program in its 1A processor hardware. The MTSO also contains ROM code in the peripheral controllers (PCs) of the expanded input/output processors (IOPs).

**3.10** A cell site generic update sometimes requires a hardware and/or firmware update along with it. The hardware/firmware is updated in each cell site in order to remain compatible with the new cell site generic. The main problem with this type of update is to modify all cell sites without disrupting service. After a cell site has been updated with new hardware/firmware, it must be able to correctly communicate with the old/new versions at other cell sites.

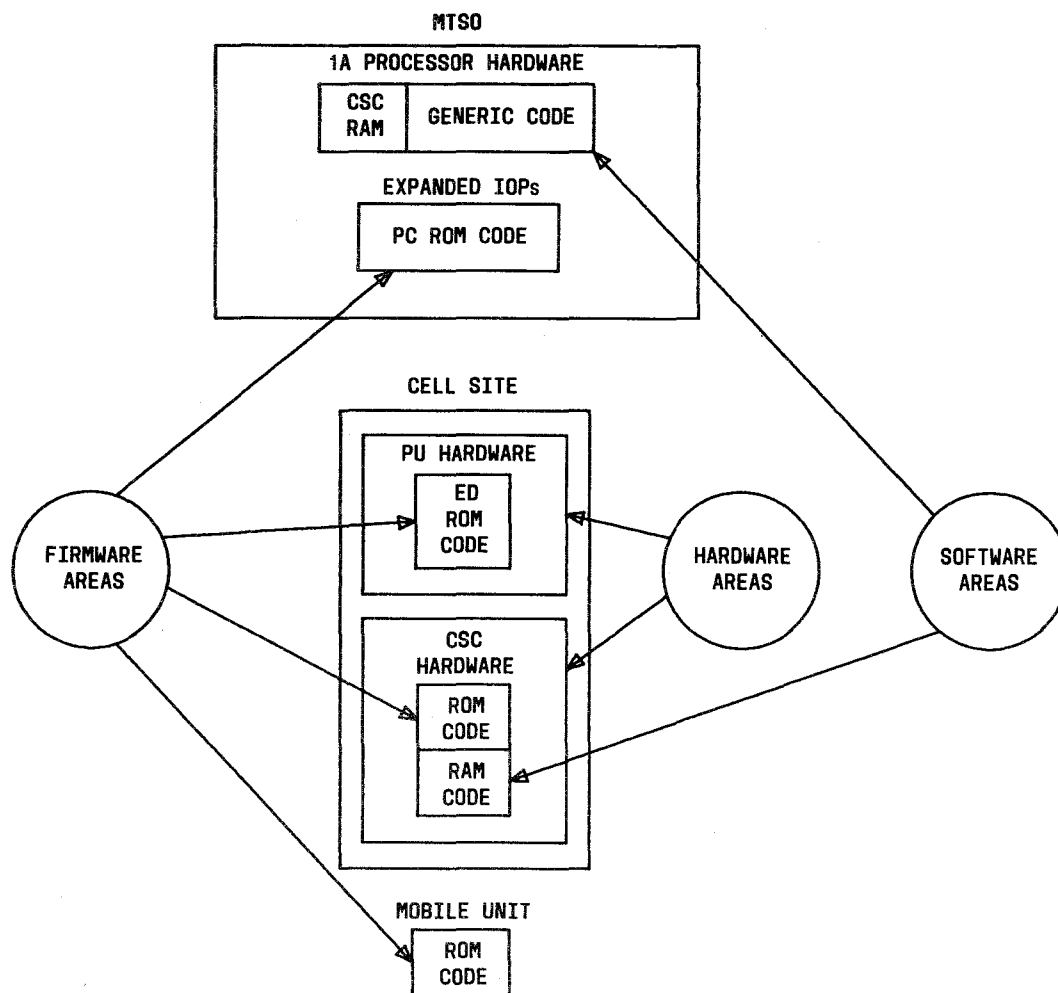


Fig. 3—Possible Dependent Areas During Update



### CSC Firmware Update

**3.11** The CSC firmware, which contains cell site ROM code, resides on its duplicated TN274 circuit pack (CP). An update of the CSC firmware is performed by maintenance personnel, at cell site locations, installing new updated TN274 CPs after the MTSO copy has been updated. This type of update affects call processing of the cell site coverage area and should be performed during low traffic periods.

**3.12** Call processing should be inhibited at the cell site and both data links removed from service with terminal input messages. Both CSCs are powered down by unseating two +8 to -5 volt converters (type 491A1 CPs) and four +5 volt converters (type 492A1 CPs) at the cell site control frame. With the power removed, the original firmware of both CSCs is replaced with the new updated CPs. The power is returned to the CSCs by reseating all CPs and the data links restored to service with the RST:CELL input message. The maintenance terminal should then be observed for messages indicating the cell site has been down loaded and is stable. A nonstable cell site would be indicated by escalating cell site recovery phases and repeated attempts at down loading the cell site. If a download is not performed, a manual request should be made via the INIT:CELL a:BOOT! input message. Call processing is allowed after the cell site has stabilized with the updated cell site generic and firmware.

**3.13** If trouble occurs with the newly installed CSC firmware, another set of update CPs should be installed. If this does not remove the trouble, the last reliable cell site generic should be loaded into the MTSO copy, the original CSC firmware replaced, and the cell site down loaded. The cell site is then returned to normal call processing and higher maintenance notified of trouble with the update. See Fig. 4 to install CSC firmware.

## 4. TRANSLATION DATA

**4.01** The System 100 translation software consists of an MTSO data base and a data base at each cell site. The MTSO data base includes standard 1A ESS switch translations and additional translations that are unique to the System 100 (these unique translations are modified existing 1A translators and new translators). The data base at the cell site is unique to the particular cell site. A copy of each cell site data base is kept at the MTSO in the MTSO data

base. The cell site data base copy at the MTSO is referred to as the master copy or the MTSO copy.

**4.02** The translators in the data base at each cell site and related message identifications (IDs) include:

- Status (RC:MSTAT)
- Common (RC:AMI, RC:PCS, RC:RSL, and RC:FSN)
- Equipage (RC:CELEQ and RC:VRAD)
- Location (RC:MLOC).

The status, equipage, and location translators kept in the MTSO copy are referred to as master translators. The common translator kept in the MTSO copy is referred to as the AUTOPLEX System 100 miscellaneous information (AMI) translator.

**4.03** The cell site status translator is used mainly for information given in the overhead word which may change faster than the rest of the data in the cell. The cell site common translator contains miscellaneous parameter data which is the same for all cell sites. The cell site equipage translator contains initialization information about the peripheral equipment at the cell site. The cell location translator contains information for voice channel selection activity and the locating process for the locate radio.

## CELL TRANSLATION UPDATE

**4.04** Changes to the MTSO data base follow standard 1A ESS switch recent change/verify procedures. The recent change capability is used to modify, add, or delete any translation data in the MTSO data base. The verify capability can be used to identify information currently in the MTSO data base and also the generic and parameter memory. For the unique System 100 RC/verify message formats and associated implementation procedures refer to Practice 231-218-301. A description of procedures for mapping recent changes during a translation update using the recent change mapping program (RCMAP) is provided by Practice 231-311-010. Detailed procedures on how to do a translation update are provided by TOP 231-368-011.

**4.05** The data base at a cell site is updated by changing the master copy. When recent

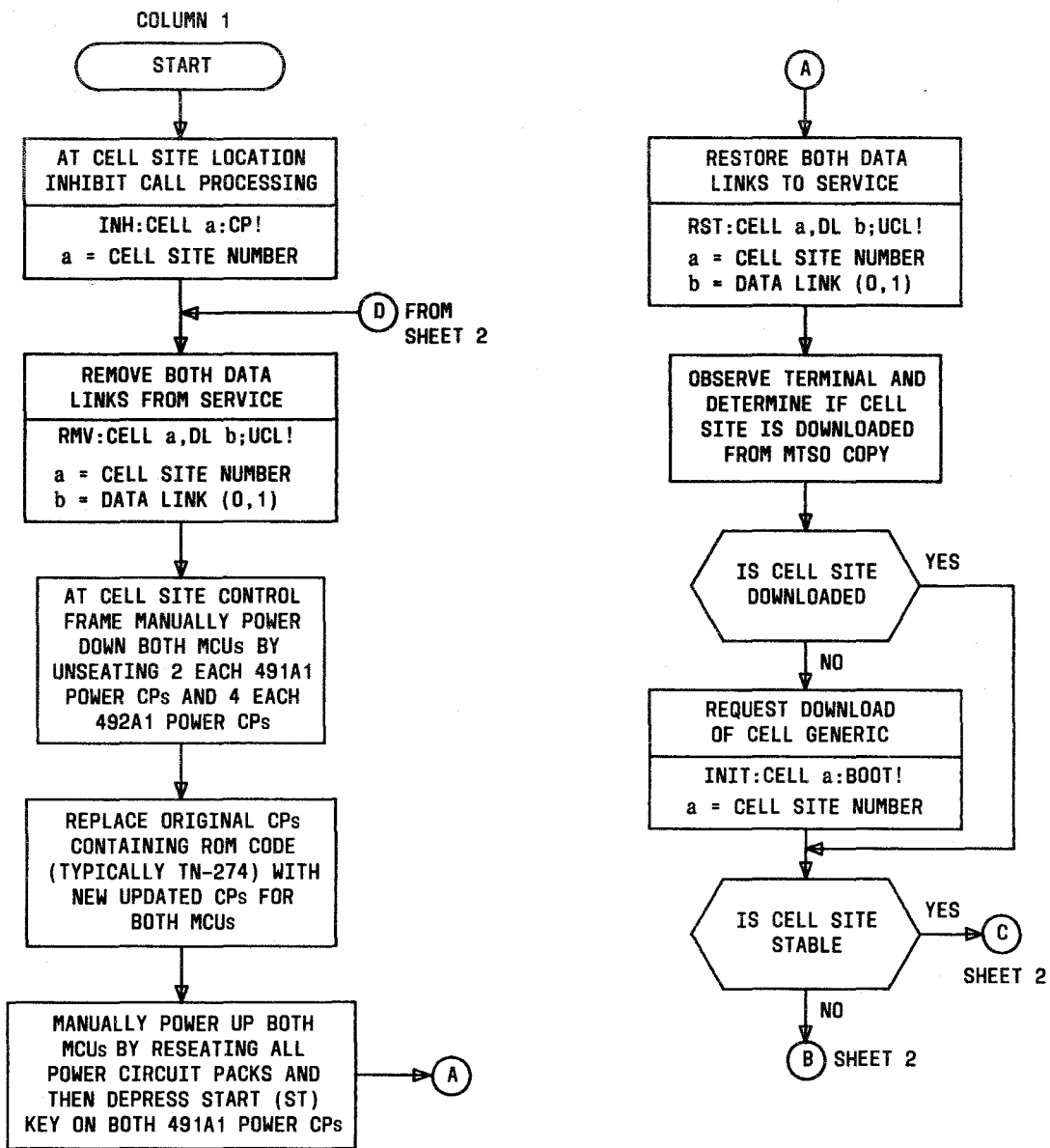


Fig. 4--Install CSC Firmware (Sheet 1 of 2)

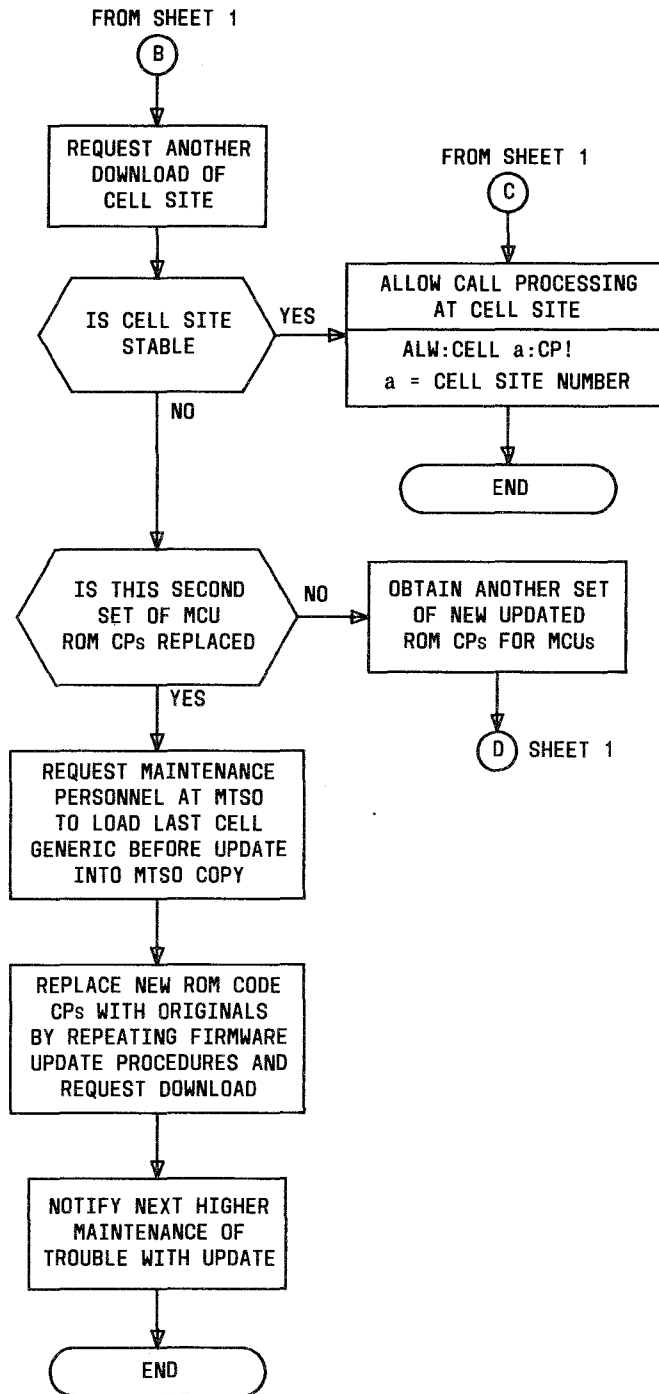


Fig. 4—Install CSC Firmware (Sheet 2 of 2)

change procedures change the master copy, the corresponding cell site data base is automatically updated by the cell translation update routine.

**4.06** The translation update routine is resident at each cell site. When changes are made to the master copy, the recent change subroutine (at the MTSO) contacts each cell site related to the changed master translators. A change to the AMI translator results in all cell sites being contacted. Each translation update routine contacted will request the MTSO to send the new cell site translators to its CSC RAM area.

## 5. GLOSSARY OF TERMS

**5.01** The following is a glossary defining some terms used in the System 100. See Table A for a definition of abbreviations and acronyms used in this practice. A more comprehensive glossary of terms is included in Practice 231-200-005.

### **Bootstrap:**

A software subsystem in a cell site ROM that works hand-in-hand with the pumpup subsystem at the MTSO. The bootstrap subsystem, when required, requests a full or partial download, organizes the cell generic after down loaded from the MTSO, and completes the download operation. (See download.)

### **Cell Generic Update:**

Updates the RAM area of a cell site with a new version of the cell site generic. This action affects call processing.

### **Cell Site:**

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

### **Cell Site Controller (CSC):**

A duplicated module control unit (MCU), also called cell processor, located at a cell site that provides basic control of cell site internal functions. Portions of the TN-272 circuit pack (one of many different circuit packs making up the CSC) are considered to be part of the data link hardware for diagnostic purposes.

### **Cell Site Controller Firmware Update:**

Updates the ROM area of a cell site controller with new firmware circuit packs. This action affects the cell site call processing.

### **Cell Translation Update:**

A subroutine at each cell site that automatically requests the MTSO to send any change in cell site translations kept at the MTSO via recent change/verify input messages.

### **Download:**

An operation that moves full or partial cell site generic data from MTSO memory to cell site RAM using functions called pumpup and bootstrap. This is done while other system operations are being performed. Download is required to initially load programs into a cell site RAM, reloading a cell site RAM when it is lost or mutilated, or when a cell is added to a CGSA.

### **Firmware:**

A combination of hardware and ROM code components in a system. Software information is microprogrammed into integrated circuits such as ROM, PROM, EPROM, etc.

### **Generic Retrofit:**

An office goes from one generic to a different generic with changes to both the base and main issues, e.g., 1A(B6)5 to 1A(B7)7.

### **Hardware:**

Hardware is physical equipment, such as mechanical, magnetic, electrical or electronic devices, and circuits. Hardware is a term used to distinguish physical equipment from software components in a system.

### **Initialization:**

A system recovery phase of software, hardware, and/or download operation that takes an existing state (possibly unknown) and sets it to a desired state.

**Module Control Unit (MCU):**

See cell site controller.

**Cellular Geographic Service Area (CGSA):**

A basic coverage region in which service is made available.

**Mobile Telephone Switching Office (MTSO):**

A modified 1A ESS switch that serves as the coordinating element in the AUTOPLEX System 100.

**Overwrite:**

An action to change data in the 1A ESS switch generic base of the MTSO software.

**Parameter Information:**

Information contained in the call store pertaining to office equipment and certain hardware and software options.

**Program:**

An organized set of instructions used to control system functions.

**Program Store:**

A memory unit that stores the resident generic program.

**Pumpup:**

A software subsystem, at the MTSO, that works hand-in-hand with the bootstrap subsystem at a cell site. After a request from bootstrap, the pumpup subsystem will download cell site generic data from the MTSO PS memory to a cell site RAM. (See download.)

**Recent Change:**

A term used when it is desired to enter, delete, or change translation data concerning service orders, trunks, etc.

**Retrofit:**

See Generic Retrofit.

**Software:**

Information or data structures, such as programmed instruction (generic program), routines, translations, parameters, manuals, and documents associated with a system. Software is a term used to distinguish information from hardware components.

**Translation:**

A software operation used to obtain additional information, via translators, of a known piece of information.

**Translations:**

Static information contained in the unduplicated CS pertaining to the individual lines or trunks. It is made up of about 75 to 150 translators and may be used, for instance, to convert a directory number into an equipment location to derive the class of service, etc.

**Translator:**

A portion of the translations where information is obtained for a particular translation. A translator includes a group of software tables which contain data for the type of translation being performed.

**Update:**

A term used when it is desired to change an item to agree with current or up-to-date supplementary source(s). (See Cell Generic Update, Cell Translation Update, and Hardware/Firmware Update.)