5ESS®-2000 Switch
SYSTEM RECOVERY
5E12 and Later Software Releases

Document: 235-105-250
Issue Date: September 1999
Issue Number: 14.00

Legal Notice

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Acknowledgment

Developed by Lucent Technologies Customer Training and Information Products.

1. INTRODUCTION

1.1 PURPOSE

This System Recovery Manual contains descriptive material and detailed procedures of the software and hardware recovery capabilities of the *5ESS*®-2000 switch.

This manual is primarily intended for telephone company personnel who respond to critical *5ESS*®-2000 switch system and/or unit faults that result in call processing downtime.

Problems that are associated with service outage should be escalated to Lucent Technologies support, either the Regional Technical Assistance Center (RTAC) at 1-800-225-RTAC (1-800-225-7822) or Customer Technical Support (CTS) at 1-800-225-4672, as soon as possible. It is understood that some local recovery efforts may be attempted before contacting Lucent Technologies support. Table 1-1 lists the recommended maximum escalation intervals for various service affecting conditions.
Figure 1-1 is a recovery checklist. This checklist should be filled out and referred to during the recovery effort.

Table 1-1 Service Outage Escalation Guidelines

OUTAGE CONDITION	MAXIMUM ESCALATION INTERVAL
Power Outage	10 Minutes
AM Initialization Fault	10 Minutes
CNI Initialization Fault	10 Minutes
CM Duplex Failure	10 Minutes
SM Initialization Fault	10 Minutes
SM Isolation	10 Minutes
RSM Isolation	10 Minutes
DNU Duplex Failure Outage	10 Minutes
Other SM Peripheral Duplex Failure	30 Minutes

This manual covers the 5E12 through the 5E14 software releases. As the 5ESS-2000 switch continues to evolve, this manual will be reissued or updated to cover future software releases.

Recovery Checklist:

1. Who is on the bridge?

____

2. Site Information:
   - Office Name: ______________________________
   - Site Phone #: ______________________________

3. What is the nature of the outage? Brief description of what is not working:

____

____

4. What time did the incident start? ______________________________

5. What types of calls are affected?
   - Line calls: ______________________ #of lines: ________
   - Trunk calls (CCS/PSU/MF): ______________ #of trunks: ________
   - 911/Police/Fire/Hospital: ______________________________

6. What portion of calls of a given type are affected ?
   - All, 50%, intermittent, … ______________________________

7. What processors are affected (include types if appropriate)?
   - AM (3B20,3B21,Sun): ______________________________
   - CNI (IRN2,SSI): ______________________________
   - CM/CMP (CM1,CM2,SF,DF): ______________________________
   - SM (SMP12/20/23, RSM/ORM, SM2000): ______________________________

____

8. What has been done so far attempting to resolve the problem?
   - Initializations/pumps/boots (AM,CM,CNI,SM): ______________________________
   - System inhibits active (HW/SW checks): ______________________________

9. What led up to the incident?
   - SU application or RCV activity: ______________________________
   - Growth/Conversion activity: ______________________________
   - Loss of Power: ______________________________
   - Other: ______________________________

10. How old are backup tapes? ______________________________

    Recommend tape reload within 2 hours!

Figure 1-1 Recovery Checklist

1.2 UPDATE INFORMATION

This Issue 14.00, dated September 1999, is being issued to update the document for the 5E14 software release and to cover enhancements to existing procedures.

The 5E9(2) software release introduced the Switching Module-2000 (SM-2000). There are many references to the SM in this document that are also applicable to the SM-2000. All references to the SM have been changed to SM/SM-2000, where appropriate. It should be noted that these name changes have not been carried forward into software influenced items such as input and output messages, Master Control Center screens, Recent Change/Verify screens, etc.

In accordance with the *5ESS*®-2000 switch Software Support Product Policy, information supporting the 5E11 software release is being removed from all documentation. This software release has been rated Discontinued Availability (DA). If you are supporting offices using a 5E11 software release and therefore have a need for the information being removed, it is recommended that you retain the associated pages as they are removed from the document.

For the 5E13 software release, Issue 13.00 of this document was reissued to include information on the feature Alternate Boot Disk (ABD). A new procedure was added into 2.2.4 for Post Recovery Using ABD. A new procedure was added into 2.3.2 for Office Recovery Using ABD. Table 4.6-1 was updated to include commands for ABD.

For the 5E14 software release, issue 14.00 of this document is reissued to include information in Section 1.8 about the VCDX Reference Guide and the Distinctive Remote Module User's Guide. Figure 1-1 1 presents a new Recovery Checklist to be filled out during system recovery. Sections 2.2 and 2.2.4 present updated procedures for Post AM Recovery Cleanup. Sections 2.2.2 and 2.2.3 present updated information for ensuring that a tape can be read during SM Office Dependent Data Base and SM Text Tape Load Procedures. Section 2.2.4 presents updated procedures for Dead Start with Multivolume Formatted DATs. Section 2.3 contains additional information for Performing Office Recovery Using MHDs 14 and 15. Section 2.3.1 provides updated information for Performing Office Recovery Using Software Backup Disk. Section 2.3.2 provides updated information for Performing Office Recovery Using an Alternate Boot Disk. Section 4.10 contains additional information about the Off-Line Boot Verification Procedure for a switch configured with an Administration Services Module. Section 6.4 contains changes for establishing communication with a Remote Switching Module. Section 6.6 contains changes for the DBshpage tool used during the Off-line Pump for Recovery of a Functional SM/SM-2000.

Changes are indicated by the use of change bars (|) in the right-hand margin of the page.

1.3 ORGANIZATION

This manual contains the following sections:

- ***SECTION 1 - INTRODUCTION:*** This section contains an introduction to this manual and an overall description and strategy to system recovery.
- ***SECTION 2 - DISK INDEPENDENT OPERATION (DIOP)/DEAD START - TAPE LOAD:*** This section provides the description and the procedures for recovering the system when DIOP is the problem or when all attempts at disk recovery fail.
- ***SECTION 3 - POWER:*** This section contains the description and the procedures for recovering the system after a power loss or power interruption.
- ***SECTION 4 - ADMINISTRATIVE MODULE (AM):*** This section contains the descriptions and the procedures for recovering the AM when the fault has been caused by the AM.

- ***SECTION 5 - COMMUNICATION MODULE (CM):*** This section contains the descriptions and the procedures for recovering the CM when the fault has been caused by the CM.
- ***SECTION 6 - SWITCHING MODULE/SWITCHING MODULE-2000/REMOTES (SM/REMOTES):*** This section contains the descriptions and the procedures for recovering the SM/SM-2000/RSM when the fault has been caused by the SM/SM-2000/RSM.
- ***SECTION 7 - COMMON NETWORK INTERFACE (CNI/IMS):*** This section has one procedure (7.1 — Analyze and Control Repair of CNI Failures). This procedure is used in the recovery of the *5ESS*®-2000 switch when the Administrative Module (AM) has been taken down by the Common Network Interface (CNI). When the CNI ring needs to be repaired and the AM is sane, the craft personnel should reference 235-190-120, *Common Channel Signaling Service Features*, for the appropriate recovery steps.
- ***SECTION 8 - MISCELLANEOUS PROCEDURES:*** This section contains miscellaneous descriptions and procedures pertaining to system recovery.
- ***SECTION 9 - SYSTEM RECOVERY DESCRIPTION:*** This section provides a description of the software and hardware recovery capabilities of the *5ESS*®-2000 switch. Both automatic and manual recovery capabilities are covered.
- ***GLOSSARY:*** The glossary section provides brief definitions of acronyms and abbreviations used in this manual.
- ***INDEX:*** The index lists the subjects covered in this manual.

1.4 USER FEEDBACK

The producers of this manual are constantly striving to improve quality and usability. Please use the enclosed user feedback form for your comments and to advise us of any errors. If the form is missing or your comments will not fit, you can write to the following address:

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1.5 DISTRIBUTION

This manual is distributed by the Lucent Technologies Customer Information Center (CIC) in Indianapolis, Indiana. Most operating telephone companies should place orders through their documentation coordinator. Some companies may allow customers to order directly from the Customer Information Center; however, the majority do not. Companies that use documentation coordinators to manage their orders receive a significant discount. If you do not know the name/number of the documentation coordinator for your company, you may call ***1-888-LUCENT-8 (1-888-582-3688)*** to obtain the name and telephone number.

Customers not represented by a documentation coordinator and Lucent Technologies employees can order the documentation for the 5ESS-2000 switch directly from the Lucent Technologies Customer Information Center. Proper billing information must be provided. These orders may be mailed to the following address:

Customer Information Center
Customer Service
2855 N. Franklin Road
Indianapolis, IN 46219

Orders may also be called in on ***1-888-LUCENT-8 (1-888-582-3688)*** or faxed in on ***1-800-566-9568***.

1.6 TECHNICAL ASSISTANCE

Technical assistance for the *5ESS*®-2000 switch can be obtained by calling the Regional Technical Assistance Center (RTAC) at ***1-800-225-RTAC (1-800-225-7822)***. This telephone number is monitored 24 hours a day, 7 days a week. During regular business hours, your call will be answered by your local RTAC. Outside of normal business hours, all calls will be answered at a centralized technical assistance center where service-affecting problems will be dispatched immediately to your local RTAC. All other problems will be referred to your local RTAC on the next regular business day.

1.7 MAINTENANCE OF VENDOR EQUIPMENT

The 235-XXX-XXX manuals do not provide maintenance procedures for the repair of equipment manufactured by vendors other than Lucent Technologies (for example, tape drives, disk drives, etc.). To identify the appropriate maintenance document for other vendor equipment, refer to 235-001-001, *Documentation Description and Ordering Guide*.

1.8 REFERENCES

The documents that contain information for supporting the *5ESS*®-2000 switch system recovery are as follows:

- 235-600-400, *Audit Manual*: This document provides the information to interpret the *5ESS*®-2000 switch application operating system audit messages.
- 235-600-500, *Assert Manual*: This document provides the information to interpret Defensive Check Failure (DCF) output messages.
- 235-600-601, *Processor Recovery Messages*: This document provides the information to interpret the *5ESS*®-2000 switch processor recovery messages (PRMs).
- 235-105-220, *Corrective Maintenance Procedures*: This document provides a series of "task-oriented" procedures for analyzing and clearing *5ESS*®-2000 switch hardware and/or software problems. The document contains information on diagnostic failures, non-diagnosable (operational) errors, postmortem dumps, as well as information on responding to asserts and audit reports.

Refer to 235-001-001, *Documentation Description and Ordering Guide*, for other *5ESS*®-2000 switch documents.

The Compact Digital Exchange (CDX), the Very Compact Digital Exchange (VCDX), and the Distinctive Remote Module (DRM) are switching systems based on the *5ESS*®-2000 switch. This document is a standard *5ESS*®-2000 switch document that is also applicable to the CDX , VCDX, and DRM switching systems. Information applicable only to CDX , VCDX, or DRM may be found in the following manuals:

- 235-120-010, *Compact Digital Exchange (CDX) Reference Guide*
- 235-120-020, *Compact Digital Exchange (CDX) User's Guide*
- 235-120-120, *Very Compact Digital Exchange (VCDX) User's Guide*.
- 235-200-150, *Distinctive Remote Module (DRM) User's Guide*

2. DIOP, DEAD START & TAPE LOAD

OVERVIEW

This group of procedures (2.x) is used in recovering the system when Disk Independent Operation (DIOP) is the problem or when all other attempts at disk recovery fail.

Procedure 2.1: START OF RECOVERY FROM DISK INDEPENDENT OPERATION

OVERVIEW

The purpose of this procedure is to recover the *5ESS*®-2000 switch from the Disk Independent Operation (DIOP) state. DIOP is a state where the switch is processing calls, the essential system disks (MHD0 and MHD1) have duplex failed, and the only accessible display pages are the disk file system access page (123) and the emergency action interface (EAI) page. If the switch is not processing calls, exit this procedure and refer to the applicable procedure in this document (235-105-250) to respond to system outages.

During this procedure, emphasis is placed on determining the reliability of MHD0 and MHD1 and on improving the probability of a successful recovery from DIOP at administrative module (AM) boot time. The chances of a successful recovery is improved by resolving any system disk or disk file controller (DFC) hardware problems, then reloading the essential disk software from backup tapes. Once the essential disks are available for booting, this procedure will guide the craft through the boot strategy.

CAUTION 1: When recovering from DIOP, support personnel should adhere to the explicit sequence of commands. Any deviation of the command sequence could lead to other problems. Consultation with Technical Assistance Groups is recommended.

CAUTION 2: While in DIOP, DO NOT use the "43;3;50" poke to clear the craft terminal (may cause craft lockout), and DO NOT perform an initialization before both essential system disks have been prepared for the boot.

PROCEDURE

1. Use the following list of procedures to recover the switch from the Disk Independent Operation (DIOP) state:
   - (a) Procedure 2.1.1 — Verify DIOP.
   - (b) Procedure 2.1.2 — Prepare DFCs and MHDs for Recovery.
   - (c) Procedure 2.1.3 — DIOP - Load Disk from Tape Procedure.
   - (d) Procedure 2.1.4 — Recovery Decision Point.
   - (e) Procedure 2.1.5 — Boot Procedures.
   - (f) Procedure 2.1.6 — SCSI-DFC Repair Guidelines.
   - (g) Procedure 2.1.7 — SCSI-MHD Repair Guidelines.
2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 2.1.1: VERIFY DIOP

OVERVIEW

Use this procedure to verify that the office is in Full Disk Independent Operation (DIOP). If the switch is not processing calls, do not use this procedure. Processing calls include completing inter and intra module calls, not just getting dial tone. When in DIOP, the only output messages printed are the disk community status report and the automatic message accounting (AMA) Disk Writer processor recovery message (PRM). The following provides an example of the DIOP Disk Community Report and Disk Writer Status Report.

Possible Status of Disk Community - printout every 15 minutes on ROP

```
DISK INDEPENDENT OPERATION MODE IN EFFECT
DISK INDEPENDENT OPERATION MODE STATUS MHD 0 OOS
DISK INDEPENDENT OPERATION MODE STATUS MHD 2 ACT
DISK INDEPENDENT OPERATION MODE STATUS DFC 0 ACT
DISK INDEPENDENT OPERATION MODE STATUS MHD 1 OOS  ffff
DISK INDEPENDENT OPERATION MODE STATUS MHD 3 ACT
DISK INDEPENDENT OPERATION MODE STATUS DFC 1 ACT

   Where:     ffff = FDIOP.
```

AMA Disk Writer Status - printout every 5 minutes on ROP

```
PRM_a EE00 5700 uuvv xxxx xx xx xx
PRM_a EE00 5780 yyyy zzzz xx xx xx

   Where:     uu = AMA Disk Write counter to ST1.
              vv = AMA Disk Write counter to ST2.
              yyyy = Incoming toll call counter.
              zzzz = Outgoing toll call counter.
```

PROCEDURE

1. At the Master Control Center (MCC), operate the **NORMAL** display key, then enter poke: **123**.
2. Is the MCC disk file system page displayed (Page 123)?

   If **YES**, observe Notes 1, 2, and 3, then continue with next step.

   If **NO**, proceed to Step 4.

   NOTE 1: View the 123 page and observe the **Current Level** indicator. If the current level is **Full DIOP**, only the essential DIOP command pokes will be displayed. These pokes will be used to improve the probability of a successful boot out of DIOP by performing the disk verification test and by loading office backup tapes prior to the recovery attempt.

   NOTE 2: View Display Page 123 and observe the status of the **Auto MHD Configuration** indicator. If the software backup disk(s) has been configured for use by the system, the disk(s) may not contain a boot image to be used in recovery. The following provides a list of the possible states.

```
AUTO MHD CONFIGURATION OFF
SEE PAGE 179, CONFIG MHD  . . , . .
AUTO MHD CONFIGURATION READY
MHD CONFIG INHIBITED, SEE PAGE 178
```

`MHD CONFIG IN PROGRESS,` SEE PAGE 178

NOTE 3: Figure 2.1.1-1 is an illustration of the disk file system access (DFSA) DIOP page software release 5E10 and later. Two DIOP commands are available to allow for a dump of the Digital Audio Tape (DAT). When needed, use the **help** option on the DIOP display page to output the format of a specific DIOP display page poke command.

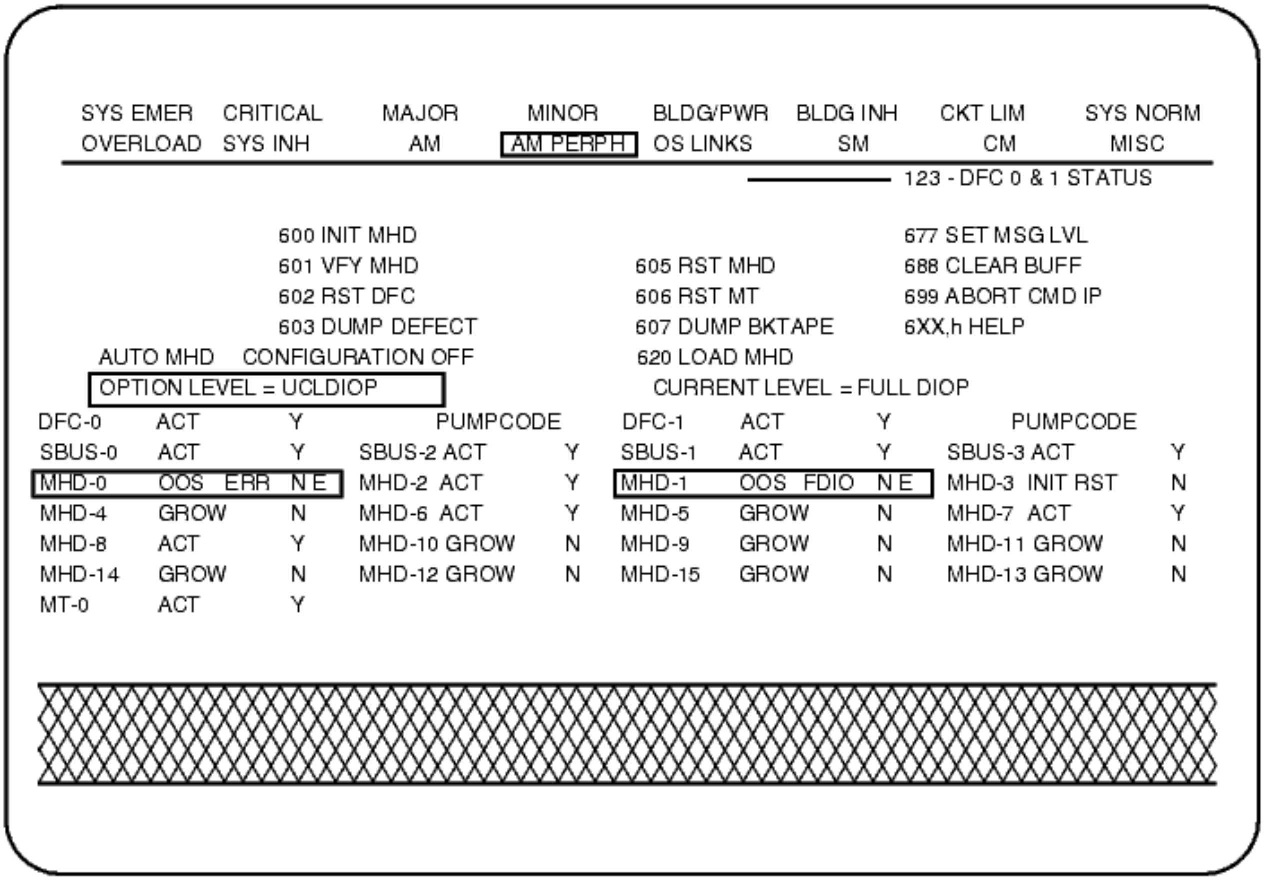


Figure 2.1.1-1 123 Page [5E10 - SCSI (3B21D) Full DIOP]

3. On MCC Page **123**, is the **CURRENT LEVEL** shown as **FULL DIOP**?

   If **YES**, go to Procedure 2.1.2 .

   If **NO**, continue with the next step.

4. **Seek technical assistance.** The system may be in DIOP or terminal suspend. If the switch is in DIOP **AND** terminal suspend, this procedure cannot help you. Recovery from this state may require reloading the system disk pair from tape (or software backup disk) which will interrupt call processing. If the switch is processing calls, WAIT before initializing the switch with a boot. Such a boot WILL terminate call processing. If the office is experiencing a duplex system disk outage, call processing cannot be restored until the disk problem is resolved.

Procedure 2.1.2: PREPARE DFCs AND MHDs FOR RECOVERY

OVERVIEW

This procedure maximizes the potential for a successful recovery from Disk Independent Operation (DIOP) by performing a reliability check on the system disks. If the disks are determined to be reliable, maintenance personnel should go to Procedure 2.1.3 to load backup tapes on at least one system disk. If the system disks do not pass the reliability check, maintenance personnel are referred to the appropriate section/procedure to resolve the problem.

CAUTION: Procedures 2.1.6 and 2.1.7 contain information on repairing SCSI-DFCs and SCSI-MHDs. These procedures are only guidelines for responding to a SCSI-DFC or system disk problem while in DIOP. Support personnel are expected to observe all cautions when making repairs. Failure to do so may prolong the recovery.

PROCEDURE

1. Ensure that DFC 0, DFC 1, MHD0 and MHD1 are powered up.

   NOTE 1: Figure 2.1.2-1 provides an illustration of a possible disk configurations for offices equipped with a 3B20D processor. Care must be used when identifying an MHD in the Tape/Disk Cabinet (T/DC) or in the SCSI Disk Cabinet (SDC).

   NOTE 2: Figure 2.1.2-2 provides an illustration of a possible disk configuration for offices equipped with a 3B21D processor. It shows MHD0 and MHD14 are assigned to SBUS 0, and that MHD1 and MHD15 are assigned to SBUS 1.

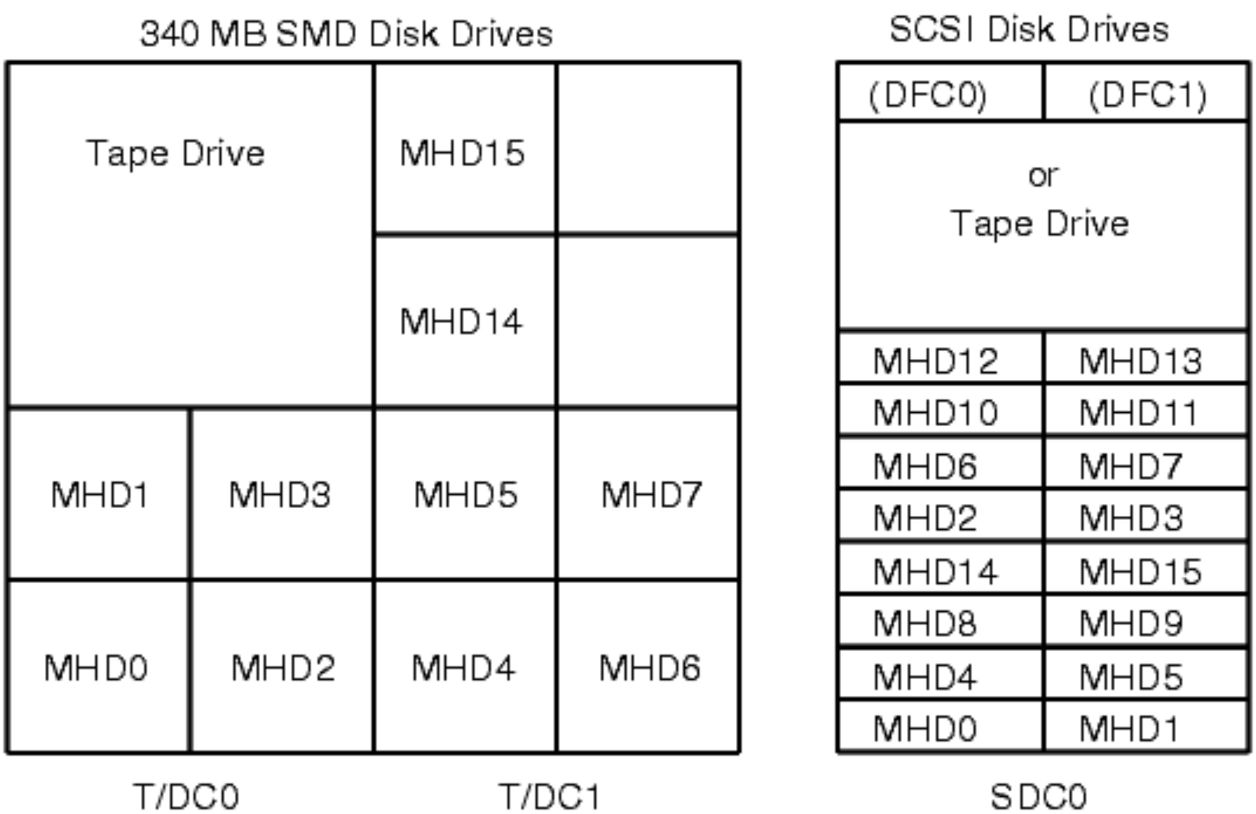


Figure 2.1.2-1 Possible 3B20D Disk Equipage in T/DC or SDC

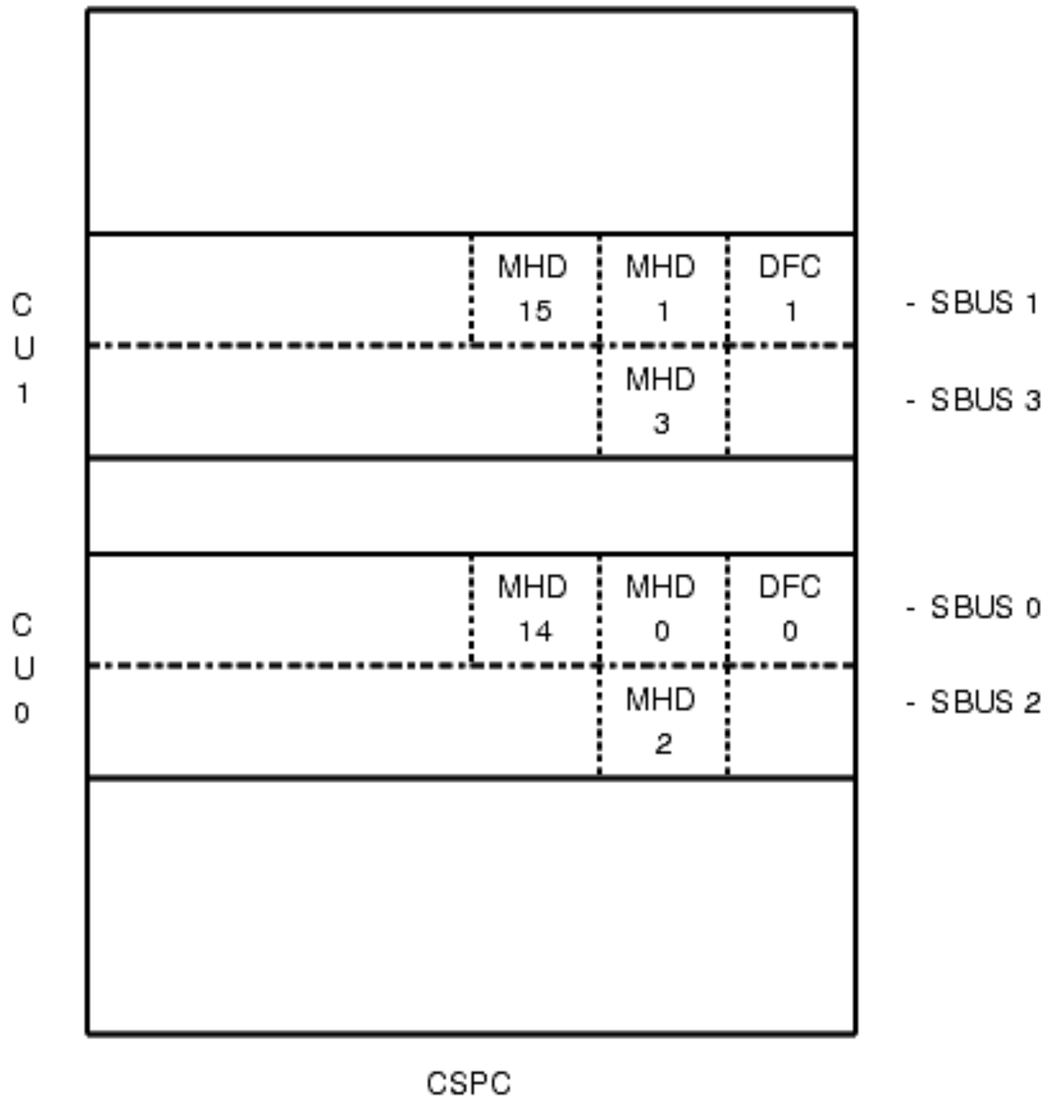


Figure 2.1.2-2 Possible 3B21D Disk Equipage in 3B21D CSPC

2. On MCC **123** page, unconditionally restore any DFC that is shown as out of service (OOS).

   To restore DFC, enter poke: **602,x,ucl** [where x = OOS DFC (0 or 1)].

3. Are both DFCs, SBUS 0 and SBUS 1, active?

   If **YES**, continue with next step.

   If **NO**, consult Procedure **2.1.6** for DFC repair guidelines. Once the problem has been resolved, continue with next step.

4. Is there a fault indicator light illuminated on either MHD0 or MHD1?

   If **YES**, consult Procedure **2.1.7** for MHD repair guidelines. Once the problem has been resolved, continue with next step.

If **NO**, continue with next step.

5. Are MHD0 and MHD1 usable (disk is not usable if it has a known hardware problem)?

   If **YES**, proceed to Step 7.

   If **NO**, continue with next step.

6. Is the office equipped with a software backup disk MHD14 or MHD15 (includes ABD) that can be substituted for MHD0 or MHD1?

   If **YES**, proceed to Step 13.

   If **NO**, **seek technical assistance**.

7. On **123** page, execute the disk verification test on MHD0 and MHD1. Once the results are known, continue with next step.

   To Verify MHD0, enter the following poke: **601,0**.

   To Verify MHD1, enter the following poke: **601,1**.

8. Did MHD0 and MHD1 successfully complete their verification tests?

   If **YES**, continue with next step.

   If **NO**, ***DO NOT CONTINUE***. Consult Procedure 2.1.7 for repair guidelines. Once the MHDs have been repaired, repeat from Step 7.

9. A minimum of one disk (MHD0 or 1) will probably be loaded from tape as part of the DIOP recovery strategy. Use the following information to determine which MHD(s) to load:

   - The MHD(s) to be loaded depends on the circumstances (often unique) which lead to DIOP. The age of data and subjective reliability of the data are the factors used to decide (1) which tapes to load and (2) which MHD(s) are to be loaded. If the backup tapes are significantly out of date (2 months old), every attempt should be made to save the original data on at least one of the original system disks for use during post-recovery operations. When needed, **seek technical assistance**.

   - If the drives that are currently identifiable as MHD0 and MHD1 (disk on SBUS 0 and 1 with a ID-Switch of ``0'') contain similar bootable images, one of them will be loaded from tape. The last active MHD (marked ``OOS FDLM'' on MCC Page 123) *should not be* considered for loading unless it is known to be bad. This disk would contain the most likely-to-boot disk image.

   - If the disk that is currently identifiable as MHD0 and/or MHD1 is a new drive that was not active in the system (did not contain a copy of the system disk data), was just initialized (*disk inited*), or was rendered unusable, then that drive does not contain a boot image. Therefore, a boot image must be loaded from backup tapes. If both MHD0 and MHD1 were rendered unusable, both drives must be reloaded from tape; one with the most recent set of backup tapes, and the other MHD with the second most recent set of backup tapes.

   - If a software backup disk (includes ABD) is equipped (MHD14 or MHD15), and if the backup disk **was not** automatically reconfigured by the Auto MHD feature, it may contain a good boot image. If the backup disk has a fairly recent version of the system disk data (data less than 3 months old), *DO NOT RELOAD IT!* The backup disk will be used during Procedure 2.1.4 — Recovery Decision Point.

10. Have you determined which disk will be loaded from tape?

    If **YES**, continue with next step.

    If **NO**, **seek technical assistance**.

11. Retrieve the most recent and the next most recent set of backup tapes, then continue with next step.

    NOTE: Offices equipped with a Digital Audio Tape (DAT) Drive can have more than one backup session stored on the same DAT.

12. If you have reached this point, the disks identifiable as MHD0 and MHD1 have passed their disk verification test, and you have determined which MHD should be reloaded from tape. Go to Procedure 2.1.3 of this procedure to load the MHD selected in Step 9.

13. Is the Auto MHD Configuration active (see auto MHD indicator on Page 123)?

    If **YES**, observe note.

    If **NO**, continue with next step.

    NOTE: If MHD14 (or MHD15) has been reconfigured as a primary disk, it **may not** contain a bootable disk image that can be used during the recovery attempt. This procedure will reload this MHD if necessary. When needed, **seek technical assistance**.

14. You should have only reached this step if the office is equipped with a software backup disk, **and if** one of the system disks (MHD0 or MHD1) has been determined to be unusable. This step changes the identity disks. The disks targeted for the identity change must be configured on the same DFC. Perform Substeps (a) through (c), then continue with next step.

    (a) Power down the disks to undergo an identity change (MHD0 and MHD14 **or** MHD1 and MHD15).

    (b) Exchange the disk ID-Switches [disk powered down in Substep (a)].

        Change MHD0 (or MHD1) ID-Switch to **3**.

        Change MHD14 (or MHD15) ID-Switch to **0**.

    (c) For a 3B21D, swap the MHD circuit packs. Replace new MHD 0 (or new MHD 1) into the correct location for the system disk for MHD 0 at EQL 028-162 (or for MHD 1 at EQL 053-162).

    (d) Power up both drives, then verify MHD0 and MHD1.

15. If you have reached this step, the identity of the system disk and the software backup disk has been changed. The disks that have the **0** ID-Switch will take on the identity of the system disk. Return to Step 7 and execute the disk verification test.

Procedure 2.1.3: DIOP - LOAD DISK FROM TAPE PROCEDURE

OVERVIEW

This procedure uses the DIOP Load Disk From Tape (LDFT) program to load a copy of AM text and AM ODD onto the MHD selected in Procedure 2.1.2 . The DIOP LDFT program can only load backups that were created using the generic backup program (Installing office or retrofit tapes CANNOT be loaded). The TOP tape will not be required for these load procedures. If the craft has not determined which tapes and MHD to load, return to Procedure 2.1.2 .

CAUTION: Maintain a record of which backup tapes are loaded on each drive (software update level of text and date of ODD backup). When loading multivolume formatted DATs, be sure to record the session and volume number of backups loaded. This information will be used to synchronize the office if the AM recovers on an MHD that was loaded from tape.

PROCEDURE

1. At the MCC, operate the EAI display key.
2. Force the active CU on-line. On the EAI Page, enter the following poke: **12**.
3. Force the MHD to be loaded by entering the Poke from Table 2.1.3-1 .

Table 2.1.3-1 Poke Commands for MHD

CHOSEN MHD	ACTIVE CU	ACTIVE DISK	POKE
0	0	Primary	20
0	1	Secondary	22
1	0	Secondary	22
1	1	Primary	20

4. Operate the MCC normal display key, then continue with next step.
5. Determine whether the backup tape(s) is single volume formatted or multivolume formatted. A DAT that has more than one software media backup on the same DAT (such as, AM/SM text and ODD) is referred to as a multivolume formatted DAT.

   If a single volume formatted tape, go to Step 12.

   If a multivolume formatted DAT, mount multivolume DAT on the tape drive, then continue with Step 6.

   NOTE: A multivolume formatted tape can only be used in offices that are equipped with a 3B21D Digital Audio Tape (DAT) Drive.
6. Insert the DAT into the DAT drive (UN376 pack).
7. Enter the command to output the DAT header.

   On MCC Page **123**, enter the following poke: **607,x** (where x = /dev/mt00).

   Response: **REPT DKDIP MESSAGE**
   DUMP BKTAPE TD /dev/mt00 STARTED
   REPT DKDIP MESSAGE
   DUMP BKTAPE TD /dev/mt00 IN PROGRESS

```
SESSION  VOLUME  NAME  BLOCKS  SOURCE  DATE
   a        b      c      d       e      f
```

REPT DKDIP MESSAGE
DUMP BKTAPE TD /dev/mt00 COMPLETED

NOTE: Secure a copy of header dump and determine which session/volume numbers are assigned to the AM text and AM ODD volumes. Record the date of the latest and the next latest AM text and ODD volumes.

8. Using the data gathered in Step 7, load an AM text volume.

   On MCC Page **123**, enter the following poke: **620,x y s v**.

   Where: **x** = MHD to be loaded.
   y = /dev/mt00.
   s = Number of backup session you want loaded.
   v = 1 (AM text volume number).

NOTE: Once the poke is entered, the following messages will provide progress reports. Any failures of the tape operation must be restarted with the **620,x y s v** command. Be sure to record the session/volume number entered.

```
REPT DKDIP MESSAGE
LOAD MHD x  FROM TD  /dev/mt00  STARTED
SESSION  s  VOLUME  v

REPT DKDIP MESSAGE
LOAD MHD x  FROM TD  /dev/mt00  IN PROGRESS
SESSION  s  VOLUME  v

REPT DKDIP MESSAGE
LOAD MHD x  FROM TD /dev/mt00 COMPLETED
SESSION  s  VOLUME  v
```

9. Was the LOAD MHD x FROM TD y COMPLETED message printed?

   If **YES**, continue with next step.

   If **NO**, **seek technical assistance**.

10. Using the data gathered in Step 7, load an AM ODD volume.

    On MCC page **123**, enter the following poke: **620,x y s v**.

    Where: **x** = MHD to be loaded.
    y = /dev/mt00.
    s = Number of backup session you want loaded.
    v = 2 (AM ODD volume number).

11. Was the LOAD MHD x FROM TD y COMPLETED message printed?

    If **YES**, return to Procedure 2.1.2 - Step 14.

    If **NO**, **seek technical assistance**.

12. For 9-Track or single volume formatted DAT only, mount the AM text tape on the tape drive, then enter the

command to load AM text.

On MCC Page **123**, enter the following command: **620,x y z**.

Where: **x** = **0 or 1** (x = MHD to be loaded).
y = **/dev/mt00** (tape device).
z = **both** (load AM text and AM ODD tapes).
= **gen** (for loading AM text only).
= **dbonly** (for loading AM ODD only).

NOTE: Use caution when selecting the disk load options. Only enter the value that represents the disk to be loaded, and the value that calls for both AM text and AM ODD to be loaded. Failures of the tape operation must be restarted with the **620,x,/dev/mt00,both** command. The following messages will be used to provide progress reports.

Start of Tape Load: **PRM_0 E15x 5400 xxxx xxxx xx xx xx**
OR
LOAD MHD x FROM TD y STARTED

Tape Load Progress: **PRM_0 E15x 57xx xxxx xxxx xx xx xx**
OR
LOAD MHD x FROM TD y IN PROGRESS

Tape Rewind: **PRM_0 E15x 58xx xxxx xxxx xx xx xx**
OR
LOAD MHD x FROM TD y MOUNT NEXT TAPE

13. Remove the AM text tape and mount the next tape in the tape load sequence (next AM text tape or AM ODD tape).

NOTE: If there is more than one AM text tape, the next AM text tape must be mounted immediately after the first AM text tape and before the AM ODD tape. If there is only one AM text tape, mount the AM ODD tape.

14. Enter the command to continue the tape load, enter the following poke: **620,cont**

NOTE: The following messages will be used to provide progress reports. Failures of the tape operation must be restarted with the **620,cont** command.

Start of Tape Load: **PRM_0 E15x 5400 xxxx xxxx xx xx xx**
OR
LOAD MHD x FROM TD y STARTED

Tape Load Progress: **PRM_0 E15x 57xx xxxx xxxx xx xx xx**
OR
LOAD MHD x FROM TD y IN PROGRESS

Tape Rewind: **PRM_0 E15x 59xx xxxx xxxx xx xx xx**
OR
LOAD MHD x FROM TD y COMPLETED

15. Was **PRM_x E15x 59xx xxxx** or the LOAD MHD x FROM TD y COMPLETED message printed?

    If **YES**, proceed to Step 17.

    If **NO**, continue with next step.

16. Was **PRM_x E15x 58xx xxxx** or the LOAD MHD x FROM TD y MOUNT NEXT TAPE message printed after the tape rewound?

    If **YES**, mount the next AM ODD tape, then repeat Step 13.

    If **NO**, **seek technical assistance** or consult 235-600-750, *Output Message Manual*.

17. Were both system disk rendered unbootable?

    If **YES**, obtain the next most recent set of backup tapes, then return to Step 3 and reload the MHD that is not usable.

    If **NO**, continue with next step.

18. If you have reached this step, the MHDs that were deemed not bootable have been prepared for the recovery from DIOP. Go to Procedure 2.1.4 .

Procedure 2.1.4: RECOVERY DECISION POINT

OVERVIEW

This section assumes that all system disks (and software backup disks, if equipped) have been repaired and loaded for the recovery attempt. It provides guidelines for determining when to change the AM boot configuration (if applicable, by swapping
ID-Switches) and when to proceed with the DIOP recovery attempt.

CAUTION: If the Auto MHD Configuration feature is available and NOT set to AUTO MHD CONFIGURATION OFF, the software backup disk may not contain a boot image.

PROCEDURE

1. Is the office equipped with the Alternate Boot Disk (ABD) feature (are pokes 28 and 29 visible on the EAI page)?

   If **YES**, proceed to Step 15.

   If **NO**, continue with Step 2.

2. Is there a software backup disk (MHD14 or MHD15) with a boot image equipped in this office?

   If **YES**, continue with next step.

   If **NO**, proceed to Step 12.

3. Decide which disk should be used first during the recovery attempt, system disk (MHD0/MHD1) or software backup disk (MHD14/MHD15). The disk containing the most current data should normally be selected.

4. Does the disk to be used first have an ID-Switch labeled **0** in the control panel of the MHD?

   If **YES**, proceed to Step 12.

   If **NO**, continue with next step.

5. Exchange the identity of the disk to be tried first.

   If **MHD14** on DFC 0 is to be tried first, continue with next step.

   If **MHD15** on DFC 1 is to be tried first, proceed to Step 8.

6. The identity of MHD14 and MHD0 will be switched. Power down MHD0 and MHD14.

7. Exchange the identity of MHD0 and MHD14. ***Change SCSI MHD0 ID-Switch to 3 and change SCSI MHD14 ID-Switch to 0***.

8. Power up MHD0 and MHD14, then proceed to Step 11.

9. The identity of MHD15 and MHD1 will be switched. Power down MHD1 and MHD15.

10. Exchange the identity of MHD1 and MHD15. ***Change SCSI MHD1 ID-Switch to 3 and change SCSI MHD15 ID-Switch to 0***.

11. Power up MHD1 and MHD15, then continue with next step.

12. If the ID-Switches were changed correctly, the primary disk will take the identity of the software backup disk and the software backup disk will take the identity of the primary disk.

13. This step is used to setup the EAI page for the DIOP recovery attempt.

    NOTE: The DFCs will recognize any change in the ID-Switch arrangement at boot time. If there is an MHD that is still believed to contain a good boot image, that MHD should be chosen to recover on first. If the recovery is not successful, the next oldest MHD should be used, so on and so on.

    On the EAI page, enter the command from Table 2.1.4-1 to select the first MHD to be used for the recovery attempt.

Table 2.1.4-1 MHD Poke Commands (for SBD)

CHOSEN MHD	ACTIVE CU	ACTIVE DISK	POKE
0	0	Primary	20
0	1	Secondary	22
1	0	Secondary	22
1	1	Primary	20

14. Was the selected MHD recovered from backup tapes?

    If **YES**, set BROOT and proceed to Step 16. On EAI page, enter poke: **30**.

    If **NO**, proceed to Step 16.

15. For offices with Alternate Boot Disks backing up the boot drives (MHD 0 and MHD 1), select the latest (newest) software backup disk.

16. To identify the latest software backup disk (SBD), type and enter,

    OP:ABD

```
Response:
                OP: ABD COMPLETED
                MHD        STATUS       REASON        DATE
                0          xxx          xxxxxxx       xxxxxx
                1          xxxx         xxxxxxx       xxxxxx
                .
                .
                .
                14         xxx          xxxxxx        xxxxxx
                15         xxx          xxxxxxx       xxxxxx
```

17. On the EAI page, type and enter 28 to select the ABD.

18. Did the EAI page respond with **Select Boot Device?(0-15)**?

    If **YES**, enter the number of the ABD selected and continue with the next step.

    If **NO,** return to Step 1 to retry the procedure.

19. Did the EAI page respond with the **Set boot devices x/1 (y/n)**?

    If **YES**, enter y and proceed to Step 21.

    If **NO**, continue with the next step.

Where x=number of the ABD selected.

20. Did the EAI page respond with **Set boot devices 0/x (y/n)**?

    If **YES**, enter y and continue with next Step.

    If **NO**, go to Step 1 to retry the procedure.

    Where x=number of the ABD selected.

21. To select the proper configuration enter the poke from the following:

Table 2.1.4-2 MHD Poke Commands (for ABD)

CHOSEN MHD	ACTIVE CU	ACTIVE DISK	POKE
14	0	Primary	20
14	1	Secondary	22
15	0	Secondary	22
15	1	Primary	20

22. Was the selected MHD recovered from backup tapes?

    If **YES**, enter 30 on the EAI page and continue with Step 23.

    If **NO**, continue with Step 23.

23. Using the following criteria, decide when to perform the actual boot attempt. The answer should be ``as soon as possible'' or some specific time (such as midnight).

    - Have all preparations been made per Procedure 2.1.2 ?
    - Are customers sensitive to short outages?
    - When booted, AM call processing will stop and DIOP will be exited. Is the time selected appropriate in case the boot attempt is NOT successful? And, is on-site support available for the boot attempt?
    - Is the AMA billing data being recorded/collected, and is it important in this case?

24. When the time to boot comes, proceed to Procedure 2.1.5 .

Procedure 2.1.5: BOOT PROCEDURES

OVERVIEW

This procedure assumes the craft has prepared the system for the DIOP recovery attempt. The following preparations are assumed:

- Both system MHDs (SCSI-MHDs with ``0'' ID-Switches) have been verified and contain suspected good boot images.
- The CU and the MHD to be used for the first attempt at recovery have been configured for the boot (on EAI Page, CU forced and the disk to be used set).
- The proper time for attempting a recovery from DIOP (system initialization) has been determined.

NOTE 1: The object of this procedure is to successfully boot the AM with the most recent disk possible. If the system is booted on an MHD that was restored from a backup source, the application boot parameter that backs out AM recent changes (42;H;54 poke) must be used to initialize the system. The reason for requesting the backout of AM recent changes is that any recent change log files which may exist on the disk will be inconsistent with the Office Dependent Data (ODD) disk image just read into the system.

NOTE 2: If a spare MHD was configured for either MHD0 or MHD1, then a **42;H;54;** must be used to remove the **AUTO MHD CONFIGURATION**. This is indicated by MHD0 or MHD1 being listed in the <Auto MHD Configuration Status> area on Page **123**.

NOTE 3: If a recovery fails trying all possible configurations using a particular disk, the next oldest version from tape or software backup disk will be tried next. If the PRM messages indicate there is a CM duplex failure, refer to Procedure 5.2 to analyze CM Duplex Failures.

PROCEDURE

1. On the MCC EAI page, verify that the MIN-CONFIG indicator **is not set** (MIN-CONFIG should be ***clr***).

   CAUTION: The next step boots the AM. If a 54 is used at boot time, any AUTO MHD CONFIGURATION will be lost.

2. Is the MHD chosen for the boot restored from backup tapes or a software backup disk (includes ABD)?

   NOTE: Either case will cause the ODD to be out of sync.

   If **YES**, enter EAI poke ***42;H;54;*** to boot the AM. (Yes, a **54**)

   If **NO**, enter EAI poke ***52*** to boot the AM. (Yes, a **52**)

3. Did the EAI Page respond with **Boot?**

   If **YES**, enter **y** and continue.

   If **NO**, proceed to next step.

4. Did the initialization complete (Page 111/112 displayed)?

   If **YES**, proceed to Step 25.

If **NO**, continue with next step.

5. On MCC 124 page, are all units displayed in normal (i.e., green) status?

   If **YES**, continue with next step.

   If **NO**, refer to 235-105-220,*Corrective Maintenance Procedures*, for the ASM procedure.

6. If the selected MHD was restored from backup tapes, continue with next step. If the selected MHD was not restored from backup tapes [that is, MHD was an original system disk or a software backup disk (includes ABD)], was backup root tried?

   If **YES**, continue with next step.

   If **NO**, enter EAI poke **30** to set backup root, then repeat from Step 1.

7. The AM has not successfully booted on the chosen MHD. Have all the MHDs (system and software backup disk with AM boot image) been tried using the CU that is currently forced?

   If **YES**, proceed to Step 22.

   If **NO**, continue with next step.

8. Is the office equipped with the Alternate Boot Disk (ABD) feature (Are pokes 28 and 29 visible on the EAI page)?

   If **YES**, proceed to Step 19.

   If **NO**, continue with next step.

9. Set up the EAI page for the next recovery attempt by entering the command that selects the next most recent vintage MHD.

   On the EAI page, enter the Poke from Table 2.1.5-1 to select the next MHD to be used for the recovery attempt.

Table 2.1.5-1 Poke Commands Used for MHD

CHOSEN MHD	ACTIVE CU	ACTIVE DISK	POKE
0	0	Primary	20
0	1	Secondary	22
1	0	Secondary	22
1	1	Primary	20

10. Was the selected MHD recovered from backup tapes?

    If **YES**, enter EAI poke **30**, then continue with next step.

    If **NO**, continue with next step.

11. Is the office equipped with a software backup disk?

    If **YES**, continue with next step.

    If **NO**, repeat from Step 1.

12. Does the chosen MHD have an ID-Switch ``**0**'' in the control panel?

If **YES**, repeat from Step 1.

If **NO**, continue with next step.

13. Time to change ID-Switches on the software backup disk. Which software backup disk is to be switched to the system disk?

    If **MHD14** on DFC 0, continue with next step.

    If **MHD15** on DFC 1, proceed to Step 17.

14. The identity of MHD14 and MHD0 will be switched. Power down MHD0 and MHD14.

15. Exchange MHD0 and MHD14 identities. ***Change SCSI MHD0 ID-Switch to 3 and change SCSI MHD14 ID-Switch to 0***.

    NOTE: If the ID-Switches were changed correctly, the primary disk (MHD0) will take the identity of the software backup disk (MHD14) and the software backup disk will take the identity of the primary disk.

16. Power up MHD0 and MHD14, then repeat from Step 1.

17. The identity of MHD15 and MHD1 will be switched. Power down MHD1 and MHD15.

18. Exchange MHD1 and MHD15 identities. ***Change SCSI MHD1 ID-Switch to 3 and change SCSI MHD15 ID-Switch to 0***.

    NOTE: If the ID-Switches were changed correctly, the primary disk (MHD1) will take the identity of the software backup disk (MHD15) and the software backup disk will take the identity of the primary disk.

19. Power up MHD1 and MHD15, then repeat from Step 1.

20. Select the next most recent vintage MHD.

    If MHD 14 was used to boot the first time, then try MHD 15.
    If MHD 15 was used to boot the first time, then try MHD 14.

    On the EAI page, enter the poke from Table 2.1.5-2 to select the proper configuration.

Table 2.1.5-2 Poke Commands Used for MHD (14/15)

CHOSEN MHD	ACTIVE CU	ACTIVE DISK	POKE
14	0	Primary	20
14	1	Secondary	22
15	0	Secondary	22
15	1	Primary	20

21. On the EAI page, enter poke 28. At the prompt enter the ABD#. Respond with "y".

22. Repeat from Step 1.

23. Has the other CU been tried?

    If **YES**, proceed to Step 24.

    If **NO**, continue with next step.

24. It is time to try another boot configuration. On EAI Page, enter command to force other CU, then return to Step 1.

    If **CU 0** active, enter the following poke: **11**.

    If **CU 1** active, enter the following poke: **10**.

25. On reaching this point, all possible combinations have been tried without success. **Seek technical assistance.**

26. Was the system booted on an MHD that was restored from backup tapes or backup software disk (includes ABD)?

    NOTE: Either case will cause AM and CMP text/ODD to be out of sync.

    If **YES**, continue with the next step.

    If **NO**, proceed to Procedure 2.2 , Post AM Recovery Clean Up.

27. Clear files that point to temporary copies of CMP text files, enter the following:

    clr:filesys,file,fn="/update/tmpcmp1"

    clr:filesys,file,fn="/update/cmppmap1"

    Response: **CLR FILESYS FILE COMPLETED**

    or

    CLR FILESYS FILE STOPPED

    rm: /update/tmpcmp1 non-existent

    or

    CLR FILESYS FILE STOPPED

    rm: /update/cmppmap1 non-existent

28. Was AM ODD reloaded from backup tapes or a backup software disk (includes ABD)?

    If **YES**, set standby CMP RC Backout flag. On MCC 1851 page, enter the following poke: **407**.

    If **NO**, continue with next step.

29. Pump the standby CMP. On MCC 1851 page, enter the following poke: **923**.

    NOTE: If the CMP recovers the **MATE STAT** indicator for standby, CMP (on 1851 page) should become either **BACKOUT** or **POSTINIT**. If the CMP does not recover, **seek technical assistance**.

30. Once the CMP recovers, move cursor to the bottom of the 1851 page and enter the command to hard switch the CMPs. The expected response is "SW CMP=0-0 COMPLETED".

    At command prompt, enter the following command: **sw:cmp 0-0,ucl**.

31. Was the CMP switch successful (CMP that was standby is now active)?

If **YES**, continue with next step.

If **NO**, **seek technical assistance**.

32. Was AM ODD reloaded from backup tapes or a backup software disk (includes ABD)?

    If **YES**, set standby CMP RC Backout flag. On MCC 1851 page, enter the following poke: **407**.

    If **NO**, continue with next step.

33. Repump the other CMP. On MCC 1851 page, enter the following poke: **923**.

    NOTE: If the CMP recovers the **MATE STAT** indicator for standby, CMP (on 1851 page) should become either **BACKOUT** or **POSTINIT**. If the CMP does not recover, **seek technical assistance**.

34. If you have reached this point, both CMPs have been repumped; proceed to Procedure 2.2 , Post AM Recovery Clean Up.

Procedure 2.1.6: SCSI-DFC REPAIR GUIDELINES

PROCEDURE

1. Is the AM a 3B21D?

   If **YES**, proceed to Step 12.

   If **NO**, continue with next step.

2. Does the DFC power up (assuming there is power to the power pack)?

   If **YES**, proceed to Step 9.

   If **NO**, replace the power pack (495FA), and continue with next step.

3. Does the DFC power up now?

   If **YES**, proceed to Step 9.

   If **NO**, replace the power switch (TN5B), and continue with next step.

4. Does the DFC power up now?

   If **YES**, proceed to Step 9.

   If **NO**, continue with the next step.

5. Install the original 495FA and TN5B back in the DFC. Unseat (pull partially out of the frame) the remaining DFC packs (TN69, UN294, and TN2116) and attempt to power up.

6. Does the DFC power up now?

   If **YES**, continue with the next step.

   If **NO**, **seek technical assistance**.

7. Remove the power, insert the circuit packs one at a time, and power up the DFC again to isolate the faulty pack and pack location.

8. Was the faulty pack isolated?

   If **YES**, replace it and continue with the next step.

   If **NO**, **seek technical assistance**.

9. Restore the DFC using **602,x,UCL**.
   Does the DFC restore?

   If **YES**, return to Procedure 2.1.2 .

   If **NO**, replace DFC HA circuit packs (TN294 and UN2116), and continue with next step.

10. Does the DFC restore?

    If **YES**, return to Procedure 2.1.2 .

If **NO**, replace D2SBS circuit pack (TN69), and continue with next step.

11. Does the DFC restore?

    If **YES**, return to Procedure 2.1.2 .

    If **NO**, **seek technical assistance**.

12. Does the DFC power up (assuming there is power to the power jack)?

    If **YES**, proceed to Step 16.

    If **NO**, replace the power pack (410AA), and continue with next step.

13. Does the DFC power up now?

    If **YES**, proceed to Step 16.

    If **NO**, replace the DFCA (UN373) which provides the power control function, and continue with next step.

14. Does the DFC power up now?

    If **YES**, proceed to Step 16.

    If **NO**, replace the DFCB pack (TN2116), and continue with the next step.

15. Does the DFC power up now?

    If **YES**, proceed to next step.

    If **NO**, **seek technical assistance**.

16. Restore the DFC using **602,x,UCL** command.

    Does the DFC restore?

    If **YES**, proceed to Step 19.

    If **NO**, replace the Host Adapter circuit pack (DFCB or TN2116), and continue with next step.

17. Does the DFC restore?

    If **YES**, proceed to Step 19.

    If **NO**, replace the DFCA circuit pack (UN373), and continue with the next step.

18. Does the DFC restore now?

    If **YES**, proceed to Step 19.

    If **NO**, **seek technical assistance**.

19. Restore the SBUS using **604,x,RST,UCL**.

    Does the SBUS restore?

    If **YES**, return to Procedure 2.1.2 .

If **NO**, replace the Host Adapter circuit pack (DFCB or TN2116), and continue with next step.

20. Does the SBUS restore?

    If **YES**, return to Procedure 2.1.2 .

    If **NO**, replace the DFC circuit pack (UN373).

21. Does the SBUS restore?

    If **YES**, return to Procedure 2.1.2 .

    If **NO**, **seek technical assistance**.

Procedure 2.1.7: SCSI-MHD REPAIR GUIDELINES

OVERVIEW

Repairing essential system disks generally results in further degradation of the system (loss of additional active operational MHDs). Repair actions should NOT be performed without reading and understanding the following cautions listed in this procedure.

COMPLETION CODES: The failure of a maintenance command will result in DFC error completion codes being printed on the ROP. Reference: **235-600-750**.

PROCEDURE

1. Refer to the following cautions:

CAUTION 1: An SBUS must be removed from service (604,x,RMV,UCL) whenever replacing an MHD or SBUS cables.

CAUTION 2: In order to remove the SBUS from service, all MHDs on that SBUS (not the DFC) must be out of service. First remove the MHD power and then remove the SBUS using 604,x,RMV,UCL pokes.

CAUTION 3: If a simplex NOMANRMV disk is on that SBUS, that DFC must be powered down.

CAUTION 4: Any MHDs removed from service (that is, while swapping ID-Switches) cannot be returned to service while in DIOP.

CAUTION 5: If the ID-switch is changed, the drive MUST be power cycled.

CAUTION 6: If an AMA disk is active, removing the MHD (or DFC) will terminate AMA recording on that MHD.

CAUTION 7: The ``INIT'' command (600,x; x = MHD Number) WILL ERASE all the data on the disk and reformat the disk. Do not execute indiscriminately.

CAUTION 8: When an SCSI disk is replaced with a new drive, an ``INIT'' command (600,x) must be used on the drive. Refer to 235-105-210 for the hardware replacements steps.

CAUTION 9: If a 600-Mb SCSI drive is replacing a 322-Mb SCSI drive, ECD changes must be entered after system recovery (Reference: 235-105-210).

Procedure 2.2: POST AM RECOVERY CLEANUP

OVERVIEW

This procedure has been reached because the administrative module (AM) was booted such that further recovery action is required. This procedure will deal with switching module/switching module-2000 (SM/SM-2000) related recoveries. This procedure will also deal with outboard disks that have experienced failures that have rendered those disks unusable (duplex disk failure).

The overall objective of this procedure is to have the AM running in the root configuration on the system moving head disks (MHD). If the AM was booted from a disk that was loaded from tape, the AM is running on the backup root partitions. The backup root partitions are normally used for recovery from tape situations; therefore, it is necessary to copy the backup root partitions to the root partitions and reboot the AM. If the AM was booted from a disk that was a software backup disk, namely MHD14/MHD15, the system MHDs must be restored to normal and the software backup disk returned to backup status.

The small computer system interfaces (SCSI) MHDs are available in three sizes: the 322-MB (J3T027AB-1, List 1), the 600-MB (J3T027AB-1, List 1,2), and the 1-GB (J3T027AB-1, List 1,3). The system disk is required to be a 600-MB disk. For an office that experiences a duplex failure of an SCSI 322-MB disk pair, a 600-MB or a 1-GB disk may be substituted for the 322-MB disk. For a duplex failure of an SCSI 600-MB disk pair, a 1-GB disk may be substituted for the 600-MB disk. In either of these cases, the larger disk can be initially utilized with a **RST:MHD:UCL** command. After the disk is recovered, the equipment configuration data base (ECD) will require updating for the new disk size.

Once the office is processing calls and has stabilized, the AM and disks should be returned to a duplex configuration. Also, the AM backout indicator on master control center (MCC) Page 110 should be returned to normal. This is accomplished by first clearing the recent change log files and then clearing the AM recent change backout indicator. Also, SM/SM-2000 office dependent data (ODD) of the same vintage as the AM ODD must be loaded in from tape so there is consistency between the AM and SM/SM-2000 ODDs.

If no MHD2/MHD3 text tape (SM/SM-2000 text tape) at the same software update level as the AM text restored from the backup media is available, install an older SM text tape now and obtain a tape of the same software update level as the AM text to install later. The backout last overwrite (BOLO) feature may not be usable following an AM recovery from tape or software backup (SWBU) disk and will not be usable if MHD2/MHD3 must be replaced with a new disk.

This procedure guides the craft to the other procedures to perform actions according to Table 2.2-1 .

Table 2.2-1 Typical Post AM Recovery

AM RECOVERY FROM:	RECOVERY ACTION [a]			
	SM TEXT, PUMP SMs	SM TEXT, SM ODD PUMP SMs	RECOVER BASE MHD	RESTORE ROOT & REBOOT
Original Disk				Z
AM Text Tape	X			X
AM Text and ODD Tapes		X		X
SWBU Disk		X	X	Z

Notes:

a.

Where: X = Actions that are required.

Z = Actions that are required if AM recovered on the backup root.

The following is a summary of this procedure:

- If AM recovered from a software backup disk, namely MHD14 or MHD15, inhibit Scan Points.
- Recover the volume table of contents (VTOC) of any outboard MHD that is new or duplex failed and initialize automatic message accounting (AMA) Disk Writer.
- Recover the SM/SM-2000 text on the second disk pair if necessary to maintain consistent software update levels between AM text and SM/SM-2000 text.
- If AM ODD recovered from backup tape or disk, restore SM/SM-2000 ODD from SM/SM-2000 ODD tape(s).
- Pump any service impaired SM/SM-2000s.
- Restore primary MHDs.
- If AM recovery was from a software backup disk (MHD14 or MHD15), restore that disk to spare status.
- Allow Power Switch Monitor scanning of software backup disks.
- Restore control units (CU) and all MHDs to duplex.
- LATER: If SM/SM-2000 text or ODD reloaded from tape, initialize all remaining SM/SM-2000s during a period of low traffic.
- LATER: If the AM recovered on the backup root file system, copy backup partitions to root partitions. Then after duplexing the disks, reboot the AM on root configuration with 53.

PROCEDURE

1. Inhibit diagnostic sources until disk restore activities are complete. Type in the following messages:

   INH:DMQ:SRC=ADP;
   INH:AUD=SODD,FULL;

2. Clear any active diagnostics from the system. Type in the following message:

   OP:DMQ;

   Response: **REQUEST ACTIVE**
   DFC 1 RST
   REQUEST WAITING
   MHD 2 RST
   INHIBIT SOURCES
   ADP

3. If disk file controller (DFC) or MHD actions are active or waiting, type in the following message:

   STP:DMQ:aaa=x,zzzzzz;

   Where: aaa = **DFC** or **MHD**.
   x = Unit number of DFC or MHD.
   zzzzzz = **ACTIVE** and/or **WAITING**.............

4. Was the AM booted on either MHD14/MHD15 ?

   If **YES**, continue with the next step.
   If **NO**, proceed to Step 12.

5. Inhibit AUTO SPARE DISK feature.

   Type and enter Poke **799** on MCC Page 178.

   Response on MCC Page 178:
   AUTO SPARE DISK IS INHIBITED FOR THIS OFFICE.

   Response on MCC Page 123:
   AUTO MHD CONFIGURATION OFF
   or
   MHD CONFIG INHIBITED, SEE PAGE 178.

6. If office was booted using MHD14, continue with the next step.

   If office was booted using MHD15, proceed to Step 10.

7. Type in the following messages:

   INH:SCSD:GRPN=v,DUPID=0,PT=0;
   INH:SCSD:GRPN=v,DUPID=0,PT=1;

   Where: v = **PRSWMHD0**, if AM is a 3B20D.
   v = **MHD0**, if AM is a 3B21D.

   Response: **INH SCSD GRPN x DUPID 0 PT 0 COMPLETED**
   INH SCSD GRPN x DUPID 0 PT 1 COMPLETED

   Where x = **PRSWMHD0**
   or
   MHD0

8. Type in the following message:

   INH:SCSD:GRPN=v DUPID=0,PT=0;
   INH:SCSD:GRPN=v,DUPID=0,PT=1;

   Where: v = **PRSMHD14**, if AM is a 3B20D.
   v = **MHD14**, if AM is a 3B21D.

   Response: **INH SCSD GRPN x DUPID 0 PT 0 COMPLETED**
   INH SCSD GRPN x DUPID 0 PT 1 COMPLETED

   Where: x = **PRSMHD14**
   or
   MHD14

9. Was the office booted using MHD15?

If **YES**, continue with the next step.
If **NO**, proceed to Step 12.

10. Type in the following messages:

INH:SCSD:GRPN=v,DUPID=1,PT=0;
INH:SCSD:GRPN=v,DUPID=1,PT=1;

Where: v = **PRSWMHD1**, if AM is a 3B20D.

v = **MHD1**, if AM is a 3B21D.

Response: **INH SCSD GRPN x DUPID 1 PT 0 COMPLETED**
INH SCSD GRPN x DUPID 1 PT 1 COMPLETED

Where x = **PRSWMHD1**
or
MHD1

11. Type in the following messages:

INH:SCSD:GRPN=v,DUPID=1,PT=0;
INH:SCSD:GRPN=v,DUPID=1,PT=1;

Where: v = **PRSMHD15**, if AM is a 3B20D.
v = **MHD15**, if AM is a 3B21D.

Response **INH SCSD GRPN x DUPID 1 PT 0 COMPLETED**
INH SCSD GRPN x DUPID 1 PT 1 COMPLETED

Where x = **PRSMHD15**
or
MHD15

12. On MCC Page 123, are any MHD pairs shown as duplexed failed?

If **YES**, use Procedure 2.2.1 to recover MHDs, and return to next step.

If **NO**, continue with the next step.

13. Verify software update levels of AM text (/no5text) and SM/SM-2000 text (/no5text/im).

Type in the following message:

OP:VERSION;

Response:

```
OP STATUS COMPLETED
OP VERSION          (Date - Time)
```

```
PARTITION          VERSION        BWM
ECD                5ex(x)xx.xx
/                  5ex(x)xx.xx    BWMnn-nnnn
/no5text           5ex(x)xx.xx    BWMnn-nnnn
/no5text/im        5ex(x)xx.xx    BWMnn-nnnn
```

14. Are the software update levels of /no5text and /no5text/im the same?

    If **YES**, continue with the next step.

    If **NO**, use Procedure 2.2.2 to recover SM/SM-2000 Text, and return to next step.

15. ***NOTE:*** **ALL** disks containing SM/SM-2000 ODD must be recovered from tape if any of the following conditions exist:

    (a) AM ODD recovered on an MHD restored from AM ODD backup tapes.

    (b) AM recovered on an MHD restored from a software backup disk, namely MHD14/MHD15.

    (c) Any outboard MHD containing SM/SM-2000 ODD was duplexed failed so that the SM/SM-2000 ODD on that disk is known to be bad.

    Do any of the previous conditions (a through c) exist?

    If **YES**, use Procedure 2.2.3 to recover SM/SM-2000 ODD and return to next step.

    If **NO**, continue with the next step.

16. Obtain status from Pages 141-144, or type in the following message:

    OP:SYSSTAT;

    Response: **OP SYSSTAT SUMMARY xxxx REPORT**
    SM x rrrrr

    Where: rrrrr = SM Off-Normal Status.

17. Using the response from the previous step, are there any SM/SM-2000s not running as indicated by a progress mark status of the following:

    Any Init-in-progress state?
    INIT ISOL
    COMM LOST
    ISOLATED
    STNDALONE

    If **YES**, continue with the next step.
    If **NO**, proceed to Step 20.

18. Type in the following message:

    INIT:SM=a[&&b][-]...,FI,BCST[,LSM][,HSM][,RSM][,ORM][,TRM][,c][,d][,e][,f][,g];

    For software releases prior to 5E12, type in message:

INIT:SM=a[&&b],FI,BCST[,LSM][,HSM][,RSM][,ORM][,TRM];

For each individual SM/SM-2000, type in the following message:

INIT:SM=a,FI,BCST;

Where: **a** = SM number.
b = Optional upper SM limit.
[-]... = Optional additional SMs or ranges.
c = BASIC or CNFG000 (SM basic configuration).
d = STANDARD or CNFG001 (SM standard configuration).
e = LOADED or CNFG002 (SM loaded configuration).
f = SIGNALING or CNFG003 (SM signaling configuration).
g = SM2000 or CNFG2K00 (SM-2000 configuration).

Response: Each SM/SM-2000 will report on the ROP that an initialization has occurred. The form on the report will be as follows:

INIT SM=x LVL=FI SUMMARY EVENT = yyyy
CALL PROCESSING DOWNTIME=h:m:s
CALLS LOST: STABLE=ss TRANSIENT=tt

19. Have all the selected SM/SM-2000s in the office been initialized?

If **YES**, continue with the next step.
If **NO**, repeat Step 18 to initialize the next range of SM/SM-2000s that was previously selected.

20. Clear forces on MHD and allow the CU to be restored.
On EAI page, type and enter commands **21**, **23**, and **13**.

21. Allow DFC and MHD diagnostics again and restore MHDs to duplex operation.
Type in the following message:

ALW:DMQ:SRC=ADP;

22. Restart diagnostics if necessary. Type in the following message:

OP:DMQ;

23. If MHD diagnostics are not active or waiting, type in the following message:

RST:MHD=x:UCL;

Where: x = MHD Number.

Response: **RST MHD x TASK y MSG STARTED**
RST MHD x IN PROGRESS (will be output every 2 minutes)
RST MHD x COMPLETED

24. If the office is equipped with a software backup (includes ABD) disk (MHD14/MHD15), was the AM booted on it?

If **YES**, use Procedure 2.2.4 to recover the system MHDs, and return to next step.

If **NO**, continue with the next step.

25. Type in the following message:

RST:CU=a;

Where: a = Out-of-service (OOS) CU on Page 111/112.

26. Was either SM/SM-2000 text (per Procedure 2.2.2) or SM/SM-2000 ODD (per Procedure 2.2.3) reloaded from tape?

If **YES**, use Procedure 6.6 to off-line pump and switch any SM/SM-2000 not previously pumped and then return to the next step.

If **NO**, continue with the next step.

27. On the EAI page, is the **INH** indicator for **Inh Hdw Chk** or **Inh Sft Chk** backlighted?

If **YES**, type and enter Pokes **35** and **37**.

If **NO**, continue with the next step.

28. On the EAI page, is the **Backup Root** indicator **SET**?

If **YES**, use Procedure 2.2.5 to recover root file system, and return to next step.

If **NO**, continue with next step.

29. Type in the following message:

ALW:AUD=SODD,FULL;

30. Reschedule ODD Backup.

Type in the following message:

BKUP:ODD:EVERY=a,AT=b;

Where: a = Number of days between ODD backups.
b = Time of day in hours and minutes (for example 2330 = 11:30 p.m.).

31. Return to the AUTO SPARE DISK feature.

Update the SPARE DISK feature on MCC Page 178
(Reference: 235-105-110, *System Maintenance Requirements and Tools*).

32. If the switch is configured with an ASM, then recovery of the ASM may also need to be performed as part of system recovery. See
235-105-220,*Corrective Maintenance Procedures*, for the ASM procedures.

33. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 2.2.1: RESTORE DUPLEX FAILED MHDs

OVERVIEW

In addition to restoring the duplex failed outboard MHDs, the AMA streams are reconfigured on those disks and partitions that are remounted.

PROCEDURE

1. Select the first duplex failed disk pair.
2. Is the disk drive being restored a newly installed disk drive/disk platter?

   If **YES**, continue with the next step.
   If **NO**, proceed to Step 4.
3. Format and verify the MHD. Type in the following message:

   INIT:MHD=x:VFY[:NEW];

   Where: x = MHD number to be restored.
   Use **:NEW** if 340-MB storage module device (SMD) disk drive.
   Do not use **:NEW** if 300-MB disk drive or SCSI-disk drive.

   Response: **INIT MHD x STARTED**
   INIT MHD x IN PROGRESS (Every 2 minutes)
   INIT MHD x COMPLETED (After 15-30 minutes)
4. Type in the following message:

   EXC:ENVIR:UPROC,FN="/etc/rcvtoc",ARGS=x;

   Where: x = MHD number to be restored.

   Response: **EXC ENVIR UPROC COMPLETED**
   vcp: disk copy completed
   vcp: disk copy completed
   /etc/rcvtoc VTOC READ AND COMPARE SUCCESSFUL
5. Type in the following message:

   RST:MHD=x;
   RST:MHD=x:UCL; [If a larger SCSI drive (600-MB/1-GB) is replacing a smaller SCSI drive (322-MB/600-MB)]

   Where: x = Value used in the previous step.

   Response: **RST MHD x TASK y MSG STARTED**
   RST MHD x IN PROGRESS
   RST MHD x COMPLETED

6. Did the disk restored in the previous step complete successfully?

   If **YES**, proceed to Step 8.
   If **NO**, continue with the next step.

7. Have both disks of the pair been tried?

   If **YES**, **STOP. DO NOT CONTINUE. Seek technical assistance.**
   If **NO**, replace ***x*** with ***x's*** mate and repeat from Step 2.

8. Are there any other MHD pairs that are duplex failed?

   If **YES**, select the next duplex failed disk pair and repeat from Step 2.
   If **NO**, continue with the next step.

9. Type in the following message:

   EXC:ENVIR:UPROC,FN="/etc/ptnmount";

   Response: **PRM_x E800 00xx xxxx 00xx xx xx xx**
   EXC ENVIR UPROC /etc/mount COMPLETED

   Possible Failing Responses:
   REPT FSINIT FAILED TO MOUNT - /dev/xxxxxx /yyyy/zzzz
   failed fsaudit mount /dev/xxxxxx /yyyy/zzzz: errno=xx
   PRM_x E800 0001 0001 FFxx xx xx xx
   EXC ENVIR UPROC STOPPED
   /etc/mount: Unknown error

   NOTE: These failing messages are from mounting file systems that were not initialized on the newly installed disks.

10. Type in the following message:

    EXC:ENVIR:UPROC,FN="/etc/mntuxabf";

    Response: **PRM_x E800 00xx xxxx 002B xx xx xx**
    EXC ENVIR UPROC /etc/mntuxabf COMPLETED

11. Type in the following message:

    EXC:ENVIR:UPROC,FN="/etc/smoddX";

    Where: **X** = "rt" number of the failing disk pair from Table 2.2.1-1 .

Table 2.2.1-1 MHD Disk Pairs

MHD Pairs	"X"
MHD2/MHD3	1
MHD4/MHD5	2
MHD6/MHD7	3
MHD8/MHD9	4
MHD10/MHD11	5
MHD12/MHD13	6

12. The AMA partitions must now be cleaned up.

Determine AMA configuration. Type in the following message:

OP:AMA:STREAM;

Response: **REPT AMA STREAM INDICATOR IS a**

Where: a = ST1, ST2, or DUAL.

13. Initialize AMA disk writer.

Type in the following message:

INIT:AM,AMDWn,FPI;

Note: If a = **DUAL** in the previous step, the command must be entered for each stream (n = **1** and **2**).

Where: n = **1**, if a = **ST1** in the ``OP AMA STREAM ...'' previous response.
n = **2**, if a = **ST2** in the ``OP AMA STREAM ...'' previous response.

Response:

REPT AMA DISK WRITER FOR STREAM STn
RECORDING TO DISK SUSPENDED
REPT AMA DISK WRITER FOR STREAM STn TERMINATION CODE 2
REPT AMA DISK WRITER FOR STREAM STn ERROR CODE 6
REPT AMA DISK WRITER FOR STREAM STn INITIALIZATION COMPLETE
REPT AMA DISK WRITER FOR STREAM STn
RECORDING TO DISK RESUMED

14. Return to Procedure 2.2 .

Procedure 2.2.2: RESTORE SM/SM-2000 TEXT ON OUTBOARD MHDs

OVERVIEW

This procedure uses the RDLDFT program to install the SM/SM-2000 text backup tape on outboard MHDs (MHD2/MHD3).

NOTE 1: The SM/SM-2000 text tape used to load MHD2/MHD3 should be at the same software update level of the AM text just booted. If the
SM/SM-2000 text is not at the same software update level, install it anyway, but obtain and install an SM/SM-2000 text tape that is at the same level as the AM /no5text partition as soon as possible.

NOTE 2: The RDLDFT program must be executed from a supplementary trunk and line work station (STLWS) or an RC/V terminal. ***Do not*** execute the RDLDFT program at the MCC.

PROCEDURE

1. At the MCC, type and enter the folowing:

   ALW:FILESYS,ACCESS=644,FN="/no5text/rcv/rccntl";

   Response: **ALW FILESYS ACCESS COMPLETED**

2. Type and enter the following:

   STOP:EXC,ANY,FN="/no5text/rcv/rccntl",UCL;

   Response: **STOP EXC ANY COMPLETED**
   REPT ULARP ATTEMPTING TO RESTART RCCNTL

   NOTE: This response may appear several times on the ROP.

3. Type and enter the following:

   ALW:FILESYS,ACCESS=644,FN="/etc/cron.app";

   Response: **ALW FILESYS ACCESS COMPLETED**

4. Type and enter the following:

   STOP:EXC,ANY,FN="/etc/cron.app",UCL;

   Response: **STOP EXC ANY COMPLETED**
   REPT ULARP ATTEMPTING TO RESTART CRONAPP

   NOTE: This response may appear several times on the ROP.

5. Type and enter the following:

OP:SYSSTAT,SM=1&&192;

Response **OP SYSSTAT SUMMARY**

6. For all SM/SM2000s that have a status of INITIALIZING, type and enter the following:

SET:ISOL,SM=x;

Where: x is the SM/SM2000 number.

Response SET ISOL SM x COMPLETED

7. ***NOTE:*** The following commands must be executed from a Supplementary Trunk Line Work Station (STLWS) or an RC/V terminal. **Do not** execute the RDLDFT program at the MCC.

If at STLWS, enter poke **120** to access the "message" display page. If at RC/V terminal, or if STLWS Page **120** is already displayed, continue with next step.

8. Determine if you will be using a multivolume DAT format tape or a single volume format tape.

If single volume formatted tape backup, then continue with Step 10.

If multivolume DAT formatted backup, then continue with the next step.

9. Mount the tape on the tape drive.

At the MCC, type and enter the following:

DUMP:BKTAPE:TD="x"

Where: x = Pathname of the tape special device file.

Response: **REPT DKDIP MESSAGE**
DUMP BKTAPE TD x STARTED

For each logical volume on the tape, the following response appears:

Response: **REPT DKDIP MESSAGE**
DUMP BKTAPE TD x IN PROGRESS

```
SESSION  VOLUME  NAME  BLOCKS  SOURCE  DATE
   a        b      c     d        e      f
```

Where: a = Backup session number.
b = Logical volume number.
c = Logical volume name.
d = Number of blocks for the logical volume.
e = Source disk(s) logical volume was written from.
f = Date logical volume was written.

After all logical volumes have been processed, the following response appears:

Response: **REPT DKDIP MESSAGE**
DUMP BKTAPE TD x COMPLETED
CUMULATIVE BLOCKS a

Where: a = Cumulative number of blocks for all logical volumes.

Note the session number and volume number of the SM TEXT backup to be read into the partitions.

10. At the command prompt, start the load disk from tape program.

    Enter the following message: **RCV:MENU:RDLDFT;**

    Response: The following is printed:

```
Please enter the tape drive number.
Please enter the number '0' for tape drive MT0 or
             the number '1' for tape drive MT1, etc.:
```

11. At the RDLDFT display prompt, enter the drive number (0, 1, etc.) to be used.

    Response:

```
Please enter the letter 'x' for SM TEXT or
             the letter 's' for SM ODD:
```

12. At the RDLDFT display prompt, enter **x** to load SM Text.

    Response: The following is printed:

```
What tape volume format is to be used?
Please enter 'm' for Multivolume format or
             's' for Single-volume format:
```

13. At the RDLDFT display prompt, enter the volume format.

    Select if multivolume format or single volume format.

    If single volume format, enter **s** and then continue with Step 16.

    If multivolume tape format, enter **m** and then continue with the next step.

    Response:

```
Please enter session number:
```

14. At the RDLDFT display prompt, enter the session number [1-9] from Step 9.

    Response:

```
Please enter volume number:
```

15. At the RDLDFT display prompt, enter **3** the volume number for SM Text.

Response:

```
What tape density is to be used?
Please enter the number '8' for low density or
             the number '0' for high density:
```

16. At the RDLDFT display prompt, enter **0** the high tape density identifier.

NOTE: The 6250BPI tape device identifier is /dev/mt00. The tape device identifier should be the same as the density identifier on the SM/SM-2000 text backup tapes.

17. Once the tape density identifier has been selected, the following statement will be displayed. Observe the statement, then continue with next step.

```
RDLDFT: SM TEXT tape sequence chosen for /dev/vtoc1 on /dev/mtxx
RDLDFT: Please mount the first backup tape on the tape drive
        and insure that the ONLINE button is ON.
Please enter 'go' after the tape is mounted:
```

NOTE: If this statement is not received within a few seconds, monitor ROP for REPT FMGR UMOUNT FAILED output message and seek technical assistance to identify process that is blocking UNMOUNT of SM text file system.

18. Make sure the SM/SM-2000 text tape is mounted, ensure that the tape drive **ONLINE** button is **ON**, then enter the following: **go**.

NOTE: As the tape is being loaded to disk, a tape load forward progressing dot will appear on the terminal approximately every 30 seconds. Once the tape load has completed, the following message will be printed.

RDLDFT COMPLETED
RCV MENU RDLDFT COMPLETED

19. Was the following display the response?

```
Please mount the next backup tape.
Please enter 'go' after the tape is mounted:
```

If **YES**, return to Step 18 to mount and load the next tape in the tape load sequence (SM Text with same VTOC as first tape).

If **NO**, continue with next step.

20. Was the RDLDFT COMPLETED message received?
If **YES**, SM/SM-2000 text has been loaded. Continue with next step.
If **NO** , seek technical assistance.

21. Type and enter the following:

OP:SYSSTAT,SM=1&&192;

Response: **OP SYSSTAT COMPLETED**

22. For each SM/SM2000 that has a status of ISOLATED, type and enter the following:

    CLR:ISOL,SM=x;

    Where: x is the SM/SM2000 number.

    Response: **CLR ISOL SM x COMPLETED**

23. Type and enter the following:

    ALW:FILESYS,ACCESS=755,FN="/etc/cron.app";

    Response **ALW FILESYS ACCESS COMPLETED**

24. Type and enter the following:

    ALW:FILESYS,ACCESS=755,FN="/no5text/rcv/rccntl";

    Response: **ALW FILESYS ACCESS COMPLETED**

25. Type and enter the following:

    INIT:ULARP;

    Response: **OK**
    REPT ULARP ATTEMPTING TO RESTART CRONAPP

    NOTE: This response may appear several times on the ROP.

    NOTE: The AM and CMPs may be running on a different version of /no5text than the SM/SM-2000s. Procedure 2.2 synchronizes the SM/SM-2000 incore memory, if required, with the AM and CMPs by initializing all of the SM/SM-2000s. This is performed in two stages. Those SM/SM-2000s that are not in-service now are initialized immediately. All the remaining SM/SM-2000s should be initialized during a low traffic period.

26. Go to Procedure 2.2, Step 15.

Procedure 2.2.3: RESTORE SM/SM-2000 ODD ON OUTBOARD MHDs

OVERVIEW

This procedure uses the RDLDFT program to install SM/SM-2000 ODD backup tapes on outboard MHDs.

CAUTION: The SM/SM-2000 ODD tapes used must have been made in the same software update release backup session as the AM ODD tape which was used in the recovery.

NOTE: The RDLDFT program must be executed from a supplementary trunk and line work station (STLWS) or an RC/V terminal. ***Do not*** execute the RDLDFT program at the MCC.

PROCEDURE

1. At the MCC, type and enter the following:

   ALW:FILESYS,ACCESS=644,FN="/no5text/rcv/bkcntl";

   Response: **ALW FILESYS ACCESS COMPLETED**

2. Type and enter the following:

   STOP:EXC,ANY,FN="/no5text/rcv/bkcntl",UCL;

   Response: **STOP EXC ANY COMPLETED**
   REPT ULARP ATTEMPTING TO RESTART BKCNTL

   NOTE: This response may appear several times on the ROP.

3. Type and enter the following:

   OP:SYSSTAT,SM=1&&192;

   Response: **OP SYSSTAT COMPLETED**

4. For all SM/SM2000s that have a status of INITIALIZING, type and enter the following:

   SET:ISOL,SM=x;

   Where: x is the SM/SM2000 number.

   Response: **SET ISOL SM x COMPLETED**

5. ***NOTE:*** The following commands must be executed from a Supplementary Trunk and Line Work Station (STLWS) or an RC/V terminal. **Do not** execute the RDLDFT program at the MCC.

If at STLWS, enter poke **120** to access the "message" display page. If at RC/V terminal, or if STLWS Page **120** is already displayed, continue with next step.

6. Determine if you will be using a multivolume DAT format tape or a single volume format tape.

   If single volume formatted tape backup, then continue with Step 8.

   If multivolume DAT formatted backup, then continue with the next step.

7. Mount the tape on the tape drive.

   At the MCC, type and enter the following:

   DUMP:BKTAPE:TD="x"

   Where: x = Pathname of the tape special device file.

   Response: **REPT DKDIP MESSAGE**
   DUMP BKTAPE TD x STARTED

   For each logical volume on the tape, the following response appears:

   Response: **REPT DKDIP MESSAGE**
   DUMP BKTAPE TD x IN PROGRESS

```
SESSION  VOLUME  NAME  BLOCKS  SOURCE  DATE
   a        b      c      d       e      f
```

   Where: a = Backup session number.
   b = Logical volume number.
   c = Logical volume name.
   d = Number of blocks for the logical volume.
   e = Source disk(s) logical volume was written from.
   f = Date logical volume was written.

   After all logical volumes have been processed, the following response appears:

   Response: **REPT DKDIP MESSAGE**
   DUMP BKTAPE TD x COMPLETED
   CUMULATIVE BLOCKS a

   Where: a = Cumulative number of blocks for all logical volumes.

   Note the session number and volume number of the SM ODD backup to be read into the partitions.

8. At the command prompt, start the load disk from tape program.

   Enter the following message: **RCV:MENU:RDLDFT**

   Response: The following is printed:

```
Please enter the tape drive number.
Please enter the number '0' for tape drive MT0 or
                the number '1' for tape drive MT1, etc.:
```

9. At the RDLDFT display prompt, enter the drive number (0, 1, etc.) to be used.

   Response:

```
Please enter the letter 'x' for SM TEXT or
             the letter 's' for SM ODD:
```

10. At the RDLDFT display prompt, enter **s** to load SM ODD.

    Response: The following is printed:

```
What tape volume format is to be used?
Please enter 'm' for Multivolume format or
             's' for Single-volume format:
```

11. At the RDLDFT display prompt, enter the volume format.

    Select if multivolume format or single volume format.

    If single volume format, enter **s** and then continue with Step 14.

    If multivolume tape format, enter **m** and then continue with the next step.

    Response:

```
Please enter session number:
```

12. At the RDLDFT display prompt, enter the session number [1-9] from Step 7.

    Response:

```
Please enter volume number:
```

13. At the RDLDFT display prompt, enter the volume number [4-9] from Step 7.

    Response:

```
What tape density is to be used?
Please enter the number '8' for low density or
             the number '0' for high density:
```

14. At the RDLDFT display prompt, enter **0** the high tape density identifier.

    NOTE: The 6250BPI tape device identifier is /dev/mt00. The tape device identifier should be the same as the density identifier on the SM/SM-2000 text backup tapes.

15. At the RDLDFT display prompt, enter the VTOC to be used.

    NOTE: The VTOC selected should be the same as the "/dev/vtoc**X**" (where **X** = 1-6) that is listed on the SM/SM-2000 ODD tape to be loaded.

    Response:


```
What vtoc is to be used?
Please enter ONLY one number for the below choices:

           1      for /dev/vtoc1
           2      for /dev/vtoc2
           3      for /dev/vtoc3
           4      for /dev/vtoc4
           5      for /dev/vtoc5
           6      for /dev/vtoc6:
```

16. Once the VTOC has been selected, the following statement will be displayed. Observe the statement, then continue with the next step. If this statement is not received within a few seconds, then monitor ROP for REPT FMGR UMOUNT FAILED output message and seek technical assistance to identify process that is blocking UNMOUNT of SM ODD file system.

```
RDLDFT: SM ODD tape sequence chosen for /dev/vtoc1 on /dev/mtxx
RDLDFT: Please mount the first backup tape on the tape drive
        and insure that the ONLINE button is ON.
Please enter 'go' after the tape is mounted:
```

17. Make sure the SM/SM-2000 ODD backup tape is mounted, ensure that the tape drive **ONLINE** button is **ON**, then enter the following: **go**.

    NOTE: As the tape is being loaded to disk, a tape load forward progression dot will appear on the terminal every 30 seconds. Once the tape load has completed, the following messages will be printed:

    RDLDFT COMPLETED
    RCV MENU RDLDFT COMPLETED

18. Was the following display produced?

```
Please mount the next backup tape.
Please enter 'go' after the tape is mounted:
```

    If **YES**, return to Step 17 to mount and load the next tape in the tape load sequence (SM ODD tape with same VTOC as first tape).

    If **NO**, continue with the next step.

19. Was the **RDLDFT COMPLETED** message received?

    If **YES**, the tape load using the VTOC selected in Step 15 has completed; continue with the next step.

    If **NO**, **seek technical assistance**.

20. Are there more MHD pairs to be restored from SM/SM-2000 ODD backup tapes (SM ODD tape with different VTOC)?

    If **YES**, repeat from Step 8.

    If **NO**, observe note, then continue with next step.

21. Type and enter the following:

ALW:FILESYS,ACCESS=755,FN="/no5text/rcv/bkcntl";

Response: **ALW FILESYS ACCESS COMPLETED**

22. Type and enter the following:

    INIT:ULARP;

    Response: **OK**
    REPT ULARP ATTEMPTING TO RESTART BKCNTL

    NOTE: This response may appear several times on the ROP.

23. Type and enter the following:

    OP:SYSSTAT,SM=1&&192;

    Response: **OP SYSSTAT COMPLETED**

24. For all SM/SM2000s that have a status of ISOLATED, type and enter the following:

    CLR:ISOL,SM=x;

    Where: x is the SM/SM200 number.

    Response: **CLR ISOL SM x COMPLETED**

    NOTE: The recent change (RC) and Customer-Originated Recent Change (CORC) log files in the system are no longer consistent with the ODD just read in from tape, the ODD backup schedule is out of date, and the AM and CMP RC BKOUT indicators **may** be set. The next few steps will resolve any inconsistency problems. Continue with next step.

25. Enter the commands to clear the RC and CORC log files (AM, CMP, and SM/SM-2000) and to restart the logging process.

    To clear files, enter the following:
    EXC:ENVIR:UPROC,FN="/no5text/bkup/clrlg";

```
Response:     EXC ENVIR UPROC /no5text/bkup/clrlg COMPLETED
                      rm: log directory

OR

Response:     EXC ENVIR UPROC STOPPED  (If log files do not exist)
                      rm  *  non-existent
```

    To restart logging process, enter the following:

STP:EXC:ANY,FN="/no5text/rcv/lglog",UCL;

Response: **REPT ULARP ATTEMPTING TO RESTART LGLOG xx**
STOP EXC ANY COMPLETED

26. Enter the command to clear the ODD backup schedule.

    To clear schedule, enter the following:
    CLR:ODDBKUP;

    Response: **CLR ODDBKUP COMPLETED**

27. If the RC backout indicator is highlighted **in the center** of the AM and/or CMP "RC BKOUT" box (Display Pages 110, 1850, and 1851), enter the applicable message to clear the indicator. If the box center indicator is not highlighted, continue with next step.

    NOTE: The execution of the ODD recovery process using the SKIPLOG parameter will set the data delivery bit that informs the processor (AM, CMP, or SM) that there are no ODD files to recover forward. The SKIPLOG parameter should only be used in the context of this procedure. Using the SKIPLOG parameter outside the context of this procedure may cause data base inconsistency problems.

    - To clear AM RC-BKOUT box, enter the following:
      EXC:ODDRCVY=SKIPLOG,AM;
    - To clear CMP=0-0 RC-BKOUT box, enter the following:
      EXC:ODDRCVY=SKIPLOG,CMP=0-0;
    - To clear CMP=1-0 RC-BKOUT box, enter the following:
      EXC:ODDRCVY=SKIPLOG,CMP=1-0;

    Expected Response:
    Indicator in the center of "RC BKOUT" box clears.

28. If the RC backout indicator is hightlighted **at the top** of the AM and/or CMP "RC BKOUT" box (Display Pages 110, 1850, and 1851), enter the applicable poke command to clear the indicator. If the box top indicator is not highlighted, continue with next step.

    To clear RC BKOUT lamp on AM Display Page **110**, enter the following poke: **521**.

    To clear RC BKOUT lamp on CMP Display Page **1850**, enter the following poke: **507**.

    To clear RC BKOUT lamp on CMP Display Page **1851**, enter the following poke: **507**.

    Expected Responses: **Indicator at top of "RC BKOUT" box clears.**

29. Observe the note, then return to Procedure 2.2 , Step 16.

    NOTE: The AM and CMPs may be running on a different version of the ODD than the SM/SM-2000s are on; therefore, recent changes must be inhibited until **all** of the SM/SM-2000s have been initialized. Procedure 2.2 will initialize the SM/SM-2000s in two stages. Those SM/SM-2000s that are not in-service now are initialized immediately. All the remaining SM/SM-2000s should be initialized during a low-traffic period.

Procedure 2.2.4: POST RECOVERY USING MHDs 14 AND 15

OVERVIEW

Once the office is operating normally, the software backup disk must be returned to the original configuration (backup status) and the system MHDs must be restored to normal. The identities of the primary disk (MHD0 or MHD1) and the software backup disk (MHD14 or MHD15) must be exchanged. To achieve this, if the Alternate Boot Disk was used to boot the system, then the CFR:DUPLEXDISKS command must be used. Otherwise, the identities must be changed manually. The primary disk will take the identity of the software backup disk and the software backup disk will take the identity of the primary disk.

If the office is equipped with the Alternate Boot Disk feature (ABD), perform Steps 24 through 43. Otherwise, perform Steps 1 through 23.

PROCEDURE

1. Which software backup disk, MHD14 or MHD15, was used to recover the office?

   If MHD14, continue with the next step.
   If MHD15, proceed to Step 13.

2. On MCC page 123, restore MHD 1 if it is not active. Type in the following message:

   RST:MHD=1;

3. Verify SCSI-MHD 1. Type in the following message:

   VFY:MHD=1;

   Response: **VFY MHD 1 COMPLETED**

   NOTE: If MHD does not verify successfully, **DO NOT CONTINUE**.

4. Type in the following message:

   RMV:DFC=0;

   Response: **DFC 0, MHD 0, MHD 14 and all other MHDs under DFC 0 are removed.**

5. Power down both MHD0 and MHD14.

6. Change MHD0 ID-Switch to **0** and change MHD14 ID-Switch to **3**.

7. Power up MHD0 and MHD14.

8. Force DFC to recognize new ID-Switch arrangement. Type in the following messages:

   RST:DFC=0;

   Response: **RST DFC 0**
   RST SBUS 0
   RST SBUS 2

RST MHD 0 TASK y MSG STARTED
RST MHD 0 IN PROGRESS (will be output every 2 minutes)
RST MHD 0 COMPLETED
RST MHD 2 IN PROGRESS
RST MHD 2 COMPLETED
RST MHD x IN PROGRESS
RST MHD x COMPLETED
RST MHD 14 TASK y MSG STARTED
RST MHD 14 IN PROGRESS
RST MHD 14 COMPLETED

Where x = other even-equipped MHDs

9. Did the restoral of MHD0 and MHD14 complete successfully?

   If **YES**, continue with next step.
   If **NO**, **seek technical assistance**.

10. Type in the following messages:

    ALW:SCSD:GRPN=v,DUPID=0,PT=0;
    ALW:SCSD:GRPN=v,DUPID=0,PT=1;

    Where: v = PRSWMHD0, if AM is a 3B20D.
    v = MHD0, if AM is a 3B21D.

    Response: **ALW SCSD GRPN x DUPID 0 PT 0 COMPLETED**
    ALW SCSD GRPN x DUPID 0 PT 1 COMPLETED

    Where: x =**PRSWMHD0**
    or
    MHD0.

11. Type in the following messages:

    ALW:SCSD:GRPN=v,DUPID=0,PT=0;
    ALW:SCSD:GRPN=v,DUPID=0,PT=1;

    Where: v = PRSMHD14, if AM is a 3B20D.
    v = MHD14, if AM is a 3B21D.

    Response: **ALW SCSD GRPN x DUPID 0 PT 0 COMPLETED**
    ALW SCSD GRPN x DUPID 0 PT 1 COMPLETED

    Where: x =**PRSMHD14**
    or
    MHD14.

12. Return to Procedure 2.2 , Step 25.

13. On MCC page 123, restore MHD 0 if it is not active. Type in the following message:

    RST:MHD=0;

14. Verify SCSI-MHD 0. Type in the following message:

    VFY:MHD=0;

    Response: **VFY MHD 0 COMPLETED**

    Note: If MHD does not verify successfully, **DO NOT CONTINUE**.

15. Type in the following message:

    RMV:DFC=1;

    Response: **DFC 1, MHD 1, MHD 15 and all other MHDs under DFC1 are removed.**

16. Power down both MHD1 and MHD15.
17. Change MHD0 ID-Switch to **0** and change MHD14 ID-Switch to **3**.
18. Power up MHD1 and MHD15.
19. Force DFC to recognize new ID-Switch arrangement. Type in the following message:

    RST:DFC=1;

    Response:
    RST DFC1
    RST SBUS 1
    RST SBUS 3
    RST MHD 1 TASK y MSG STARTED
    RST MHD 1 IN PROGRESS (will be output every 2 minutes)
    RST MHD 1 COMPLETED
    RST MHD 3 IN PROGRESS
    RST MHD 3 COMPLETED
    RST MHD x IN PROGRESS
    RST MHD x COMPLETED
    RST MHD 15 TASK y MSG STARTED
    RST MHD 15 IN PROGRESS
    RST MHD 15 COMPLETED

    Where: x = other odd-equipped MHDs

20. Did the restoral of MHD1 and MHD15 complete successfully?

    If **YES**, continue with the next step.
    If **NO**, **seek technical assistance**.

21. Type in the following messages:

    ALW:SCSD:GRPN=v,DUPID=1,PT=0;
    ALW:SCSD:GRPN=v,DUPID=1,PT=1;

    Where: v = PRSWMHD1, if AM is a 3B20D.
    v = MHD1, if AM is a 3B21D.

Response: **ALW SCSD GRPN x DUPID 1 PT 0 COMPLETED**
ALW SCSD GRPN x DUPID 0 PT 1 COMPLETED

Where x = **PRSWMHD1**
or
MHD1

22. Type in the following messages:

ALW:SCSD:GRPN=v,DUPID=1,PT=0;
ALW:SCSD:GRPN=v,DUPID=1,PT=1;

Where: v = PRSMHD15, if AM is a 3B20D.
v = MHD15, if AM is a 3B21D.

Response: **ALW SCSD GRPN x DUPID 1 PT 0 COMPLETED**
ALW SCSD GRPN x DUPID 1 PT 1 COMPLETED

Where: x =
PRSMHD15
or
MHD15.

23. Return to Procedure 2.2, Step 25.

24. Which software backup disk, MHD14 or MHD15, was used as ABD to recover the office?

If MHD14, continue with the next step.
If MHD15, proceed to Step 34.

25. On MCC page 123, restore MHD 1 if it is not active. Type in the following message:

RST:MHD=1;

26. Once MHD 1 is restored, verify SCSI-MHD 1. Type in the following message:

VFY:MHD=1;

Response: **VFY MHD 1 COMPLETED**

NOTE: If MHD does not verify successfully, **DO NOT CONTINUE**.

27. Type in the following message:

RMV: DFC=0;

Response: **DFC 0, MHD 0, MHD 14 and all other MHDs under DFC 0 are removed.**

28. Type in the following message:

CFR:DUPLEXDISKS

Response: **CFR DUPLEXDISKS COMPLETED**

29. Force DFC 0 to recognize new ID-Switch arrangement. Type in the following messages:

    RST:DFC=0;

    Response: **RST DFC 0 COMPLETED**
    RST SBUS 0 COMPLETED
    RST SBUS 2 COMPLETED
    RST MHD 0 TASK y MSG STARTED
    RST MHD 0 IN PROGRESS (will be output every 2 minutes)
    RST MHD 0 COMPLETED
    RST MHD 2 IN PROGRESS
    RST MHD 2 COMPLETED
    RST MHD x IN PROGRESS
    RST MHD x COMPLETED
    RST MHD 14 TASK y MSG STARTED
    RST MHD 14 IN PROGRESS
    RST MHD 14 COMPLETED

    Where: x = other even-equipped MHDs

30. Did the restoral of MHD0 and MHD14 complete successfully?

    If **YES**, continue with next step.
    If **NO**, **seek technical assistance**.

31. Type in the following messages:

    ALW:SCSD:GRPN=MHD0,DUPID=0,PT=0;
    ALW:SCSD:GRPN=MHD0,DUPID=0,PT=1;

    Response: **ALW SCSD GRPN MHD0 DUPID 0 PT 0 COMPLETED**
    ALW SCSD GRPN MHD0 DUPID 0 PT 1 COMPLETED

32. Type in the following messages:

    ALW:SCSD:GRPN=MHD14,DUPID=0,PT=0;
    ALW:SCSD:GRPN=MHD14,DUPID=0,PT=1;

    Response: **ALW SCSD GRPN MHD14 DUPID 0 PT 0 COMPLETED**
    ALW SCSD GRPN MHD14 DUPID 0 PT 1 COMPLETED

33. Return to Procedure 2.2 .

34. On MCC page 123, restore MHD 0 if it is not active. Type in the following message:

    RST:MHD=0;

35. Once MHD 0 is restored, verify SCSI-MHD 0. Type in the following message:

    VFY:MHD=0;

Response: **VFY MHD 0 COMPLETED**

Note: If MHD does not verify successfully, **DO NOT CONTINUE**.

36. Type in the following message:

    RMV:DFC=1;

Response: **DFC 1, MHD 1, MHD 15 and all other MHDs under DFC1 are removed.**

37. Type in the following message:

    CFR:DUPLEXDISKS

Response: **CFR DUPLEXDISKS COMPLETED**

38. Force DFC 1 to recognize new ID-Switch arrangement. Type in the following messages:

    RST:DFC=1;

Response: **RST DFC 1 COMPLETED**
RST SBUS 1 COMPLETED
RST SBUS 3 COMPLETED
RST MHD 1 TASK y MSG STARTED
RST MHD 1 IN PROGRESS (will be output every 2 minutes)
RST MHD 1 COMPLETED
RST MHD 3 IN PROGRESS
RST MHD 3 COMPLETED
RST MHD x IN PROGRESS
RST MHD x COMPLETED
RST MHD 15 TASK y MSG STARTED
RST MHD 15 IN PROGRESS
RST MHD 15 COMPLETED

Where: x = other odd-equipped MHDs.

39. Did the restoral of MHD1 and MHD15 complete successfully?

    If **YES**, continue with next step.
    If **NO**, **seek technical assistance**.

40. Type in the following messages:

    ALW:SCSD:GRPN=MHD1,DUPID=1,PT=0;
    ALW:SCSD:GRPN=MHD1,DUPID=1,PT=1;

Response: **ALW SCSD GRPN MHD1 DUPID 1 PT 0 COMPLETED**
ALW SCSD GRPN MHD1 DUPID 1 PT 1 COMPLETED

41. Type in the following messages:

ALW:SCSD:GRPN=MHD15,DUPID=1,PT=0;
ALW:SCSD:GRPN=MHD15,DUPID=1,PT=1;

Response: **ALW SCSD GRPN MHD15 DUPID 1 PT 0 COMPLETED**
ALW SCSD GRPN MHD15 DUPID 1 PT 1 COMPLETED

42. Return to Procedure 2.2 .

Procedure 2.2.5: RECOVERY FROM BROOT CONFIGURATION

PROCEDURE

1. **CAUTION:** The AM is currently running on the backup root configuration. Therefore, ECD recent changes should not be made to the root or rootdmly copies of the ECD/SG data base until this procedure is completed.

NOTE: The following steps must be performed during a low-traffic period. The objective is to have the AM running on the root configuration. This is accomplished by copying the backup root partitions to the root partitions and booting the AM.

2. Type in the following message:

   DUMP:FILE:ALL,FN="/no5text/bkup/prim.ptn";

   Response: **DUMP FILE ALL COMPLETE**
   Contents of **/no5text/bkup/prim.ptn** printed.

3. Type in the following message:

   DUMP:FILE:ALL,FN="/no5text/bkup/bkup.ptn";

   Response: **DUMP FILE ALL COMPLETE**
   Contents of **/no5text/bkup/bkup.ptn** printed.

4. Do contents of **/no5text/bkup/prim.ptn** and **/no5text/bkup/bkup.ptn** agree line-for-line with those in Table 2.2.5-1 ?

   If **YES**, continue with the next step.
   If **NO**, **STOP. DO NOT CONTINUE. Seek technical assistance.**

5. ***Note:*** Both MHD0 and MHD1 must be duplexed at this point.

   Type in the following messages:

   COPY:PTN:ALL,SRC="/no5text/bkup/bkup.ptn",
   DEST="/no5text/bkup/prim.ptn";

   Response: **RMV MHD x TASK y MSG STARTED**
   RMV MHD x COMPLETED
   COPY PTN FILE COMPLETED
   xxxx BLOCKS COPIED (repeated 4 times)
   RST MHD x TASK y MSG STARTED
   RST MHD x IN PROGRESS (will be output every 2 minutes)
   RST MHD x COMPLETED

6. On EAI page, type and enter command **31** to clear the backup configuration.

7. On EAI page, type and enter command **53** to boot the AM.

8. Is the response to the previous step **boot?**

If **YES**, type and enter **y** and continue.

If **NO**, continue with the next step.

9. Did the initialization complete?

   If **YES**, continue with the next step.

   If **NO**, analyze the initialization failure.

10. Return to Procedure 2.2 .

Table 2.2.5-1 Contents of /no5text/bkup/primptn & bkup.ptn

prim.ptn	bkup.ptn
/dev/root	/dev/broot
/dev/etc	/dev/betc
/dev/db	/dev/bdb
/dev/boot	/dev/bboot

Procedure 2.3: PERFORM OFFICE RECOVERY USING MHDs 14 AND 15

OVERVIEW

This procedure is to be used in an in-service office to recover the Administrative Module (AM) with duplex failed system moving head disk (MHD) subsystem (MHD0 and MHD1). The software backup disk, MHD14/MHD15 (includes ABD), used in this procedure should be the one most recently made. This procedure deals with selecting a software backup disk and recovering a system disk and AM call processing from that disk. The CMP is also repumped to be consistent with the AM. This procedure can utilize the software backup disk if the Auto Disk configuration feature has changed the configuration of a system disk (MHD0/MHD1).

NOTE: This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], before starting this procedure.

After the AM call processing is recovered by this procedure, Procedure 2.2 must be used to return the office to a normal configuration. Since the AM office dependent data (ODD) was restored from the backup disk, the Recent Change log files and AM ODD may no longer be consistent. The SM/SM-2000 ODD must be reloaded from tape, the log files must be cleared and the switching module/switching module-2000 (SM/SM-2000s) must be pumped. When backup tapes are loaded, a text mismatch may be created between the AM, SM/SM-2000, and CNI Ring. The CNI Ring may need a full pump with either an AM boot parameter or manual CNI initialization. The software backup disks are used only for recovering MHD0 and MHD1 and are not intended to replace MHD0 and MHD1. Therefore, the scan points on the system disks and the software backup disk (includes ABD) are inhibited rather than reassigned during the recovery process. If the backup disk is to be used for an extended time, the scan points should be reassigned using the practice that exchanges the backup disk with a system disk.

PROCEDURE

1. If this office is equipped with the ABD feature, perform Procedure 2.3.2 — Perform Office Recovery Using An Alternate Boot Disk. Otherwise, continue with Procedure 2.3.1 — Perform Office Recovery Using Software Backup.

Procedure 2.3.1: PERFORM OFFICE RECOVERY USING SOFTWARE BACKUP DISK

OVERVIEW

The following is an overview of the steps performed by this procedure:

- Select MHD14 or MHD15 (software update level of no5text partition on the software backup disk should be the same as the smtext partition now on MHD2/MHD3 or the same as the recovery tape to be used to recover MHD2/MHD3).
- Reset ID Switches between MHD0 (or MHD1) and MHD14 (or MHD15).
- On EAI page, select CU and desired MHD.
- Boot AM and back out recent changes (RCs).
- Repump CMP.
- The following post AM recovery actions are performed by Procedure 2.2 .
  - Inhibit Scan Points.
  - Recover the vtoc of any outboard MHD that is new or duplex failed.
  - Initialize AMA Disk Writer.
  - Depending on software update levels between AM text and SM/SM-2000 text, recover the SM/SM-2000 text on the second disk pair if necessary.
  - Restore SM/SM-2000 ODD from SM/SM-2000 ODD tape(s).
  - Clear RC Logs and RC Backout flag.
  - If SM/SM-2000s are not running, initialize those SM/SM-2000s one by one.
  - Restore opposite primary MHD (from MHD14/MHD15).
  - Return ID Switches to original MHDs (thus returning MHD14/MHD15 to spare status).
  - Restore disk file controller (DFC) to restore original MHD0/MHD1 disks to duplex.
  - Allow PRSW scanning.
  - Restore MHDs and CUs to duplex.
  - Initialize all remaining SM/SM-2000s during low traffic.

PROCEDURE

1. Observe the information provided in Notes 1 through 4:

   NOTE 1: This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], before starting this procedure.

NOTE 2: In the event that errors are detected during this procedure, take appropriate corrective action using the 235-600-750, *Output Message Manual*, as a first-level reference; and then, if necessary, seek technical assistance. When the boot fails with PRM messages (see 235-600-601) indicating duplex failures, refer to Analyze and Control the Repair of CM Duplex Hardware Failures Procedures (Procedure 5.2).

NOTE 3: If the Auto MHD configuration has a software backup disk (MHD14 or MHD15) configured as a system disk, it may contain a boot image that can be used in this procedure.

NOTE 4: If the Auto MHD configuration has a software backup disk (MHD14 or MHD15) configured as a nonsystem disk, it does not contain a boot image and cannot be used in this procedure. Also, this Auto MHD configuration is lost at boot time.

2. Determine which software backup disk has the most recent information. If there is only one software backup disk, it is the most recent copy.

   If **MHD14** has the most recent copy, continue with next step.

   If **MHD15** has the most recent copy, proceed to Step 14.

3. Power down both MHD0 and MHD14.

4. Exchange the identities of the primary disk (MHD0) and the software backup disk (MHD14). The primary disk takes the identity of the software backup disk, and the software backup disk takes the identity of the primary disk.

   If **SCSI**, change MHD0 ID-Switch to **3** and change MHD14 ID-Switch to **0**.

5. Power up both MHD0 and MHD14.

6. On the EAI page, type and enter commands **10** and **20** to select **CU0** and **Pri Disk** (MHD0).

7. On the EAI page, type and enter command **42;h;54;** to initialize the AM.

8. Did the EAI page respond with **Boot?**

   If **YES**, type and enter **y** and continue.

   If **NO**, proceed to next step.

9. Did the AM initialization complete (Page 111/112 displayed)?

   If **YES**, proceed to Step 25.

   If **NO**, continue with the next step.

10. On the EAI page, type and enter commands **11** and **22** to select **CU1** and **Sec Disk** (MHD0).

11. On the EAI page, type and enter command **42;h;54;** to initialize the AM.

12. Did the EAI page respond with **Boot?**

    If **YES**, type and enter **y** and continue.

If **NO**, proceed to next step.

13. Did the AM initialization complete (Page 111/112 displayed)?

    If **YES**, proceed to Step 25.

    If **NO**, then **seek technical assistance** or consult PRM Manual 235-600-601.

14. ***NOTE:*** Attempting recovery with MHD15.

    Power down both MHD1 and MHD15.

15. Exchange the identities of the primary disk (MHD1) and the software backup disk (MHD15). The primary disk takes the identity of the software backup disk, and the software backup disk takes the identity of the primary disk.

    If **SCSI**, change MHD1 ID-Switch to **3** and change MHD15 ID-Switch to **0**.

16. Power up both MHD1 and MHD15.

17. On the EAI page, type and enter commands **11** and **20** to select **CU1** and **Pri Disk** (MHD1).

18. On the EAI page, type and enter command **42;h;54;** to initialize the AM.

19. Did the EAI page respond with **Boot?**

    If **YES**, type and enter **y** and continue with the next step.

    If **NO**, continue with the next step.

20. Did the AM initialization complete (Page 111/112 displayed)?

    If **YES**, proceed to Step 25.

    If **NO**, continue with the next step.

21. On the EAI page, type and enter commands **10** and **22** to select **CU0** and **Sec Disk** (MHD1).

22. On the EAI page, type and enter command **42;h;54;** to initialize the AM.

23. Did the EAI page respond with **Boot?**

    If **YES**, type and enter **y** and continue with the next step.

    If **NO**, continue with the next step.

24. Did the AM initialization complete (Page 111/112 displayed)?

    If **YES**, continue with the next step.

    If **NO**, then **seek technical assistance** or consult PRM Manual 235-600-601.

25. Set RCBKOUT and repump the standby CMP. Enter Pokes **407** and **923** on Page 1851.

    Response: On Page **1851**, **MATE STAT** display becomes **BACKOUT**.

26. Hard switch CMPs.

Type in the following message: **SW:CMP=0-0,UCL**

Response: **SW CMP=0-0 COMPLETED**

27. Set RCBKOUT and repump the other CMP. Enter Pokes **407** and **923** on Page 1851.

    Response: **MATE STAT** display becomes **BACKOUT**.

28. The AM (and CMP) are now running on the backup software disk with a different AM ODD. Do post AM recovery actions to recover the SM/SM-2000 ODD and return to the original system MHDs. (See Procedure 2.2 .)

Procedure 2.3.2: PERFORM OFFICE RECOVERY USING AN ALTERNATE BOOT DISK

OVERVIEW

The following is an overview of the steps performed by this procedure:

- Select an alternate boot disk (software update level of no5text partition on the ABD should be the same as the smtext partition now on MHD2/MHD3 or the same as the recovery tape to be used to recover MHD2/MHD3).
- On EAI page, select CU and desired MHD.
- Boot AM and back out recent changes (RCs).
- Repump CMP.
- The following post AM recovery actions are performed by Procedure 2.2 .
  - Inhibit Scan Points.
  - Recover the vtoc of any outboard MHD that is new or duplex failed.
  - Initialize AMA Disk Writer.
  - Depending on software update levels between AM text and SM/SM-2000 text, recover the SM/SM-2000 text on the second disk pair if necessary.
  - Restore SM/SM-2000 ODD from SM/SM-2000 ODD tape(s).
  - Clear RC Logs and RC Backout flag.
  - If SM/SM-2000s are not running, initialize those SM/SM-2000s one by one.
  - Restore opposite primary MHD (from ABD).
  - Return ABD to spare status.
  - Restore disk file controller (DFC) to restore original MHD0/MHD1 disks to duplex.
  - Allow PRSW scanning.
  - Restore MHDs and CUs to duplex.
  - Initialize all remaining SM/SM-2000s during low traffic.

PROCEDURE

1. Identify which software backup disk (MHD 14 or 15) to boot.
   The most recent software backup disk may be identified by the following command:

   OP: ABD:

Response:				
	OP: ABD COMPLETED			
	MHD	STATUS	REASON	DATE

0	xxx	xxxxxxx	xxxxxx
1	xxxx	xxxxxxx	xxxxxx
.			
.			
.			
14	xxx	xxxxxx	xxxxxx
15	xxx	xxxxxxx	xxxxxx

where MHD column is MHD number. STATUS column indicates if the disk is bootable (Yes) or not (No). REASON column indicates why it is not bootable and DATE column shows the last time the disk was updated.

If no MHD 14 and 15 are equipped or if they are equipped but not bootable, stop and discontinue the rest of the procedure.

If the secured feature ID is not set to ON, the command **OP: ABD** will stop and give you a message indicating that the Alternate Boot Disk is unavailable. Stop and contact the operating office.

2. On the MCC, push the EAI key to display the EAI screen.
   Look at the EAI screen and verify that it has fields 16, 28, and 29.

   If **YES**, continue with the next step.
   If **NO**, the ABD feature is not active (disabled). Stop and contact the operating office.

3. The system may be booted from one of the four combinations of CU 0/1 and MHD 14/15. To select one of the combinations, perform the actions according to Table 2.3.2-1 .

Table 2.3.2-1 Combinations of CU 0/1 and MHD 14/15

CU	ABD	Actions to Perform
0	**14**	Poke **10** to force CU 0 online; Poke **28**, at the prompt enter ABD# **14**: Poke **20** to set primary disk.
0	**15**	Poke **10** to force CU 0 online; Poke **28**, at the prompt enter ABD# **15**: Poke **22** to set secondary disk.
1	**14**	Poke **11** to force CU 1 online; Poke **28**, at the prompt enter ABD# **14**: Poke **22** to set secondary disk.
1	**15**	Poke **11** to force CU 1 online; Poke **28**, at the prompt enter ABD# **15**: Poke **20** to set primary disk.

4. On the EAI screen, type and enter **42; h; 54;** to initialize the AM. EAI responds with **boot**? (**y/n**). Enter "**y**".

   Wait for system to stablize.
   Use Procedure 8.1 to verify that call processing has been restored.

5. Verify ABD configuration.

   As an example, if MHD 14 was selected as ABD, CU 0 forced online, and primary disk was set:

   On MCC page 123:
   Disk Config MHD(s) 14,0
   DFC 0 should display MHD 14 as active and ESSENTIAL
   DFC 1 should display MHD 1 as Out of Service (OOS)
   On MCC page 111/112:
   EAI STATUS off-normal indicator is on (back-lit)
   AM indicator is NORMAL (back-lit) in the System Status Area

6. Does the initialization complete?

   If **YES**, continue with Step 7.
   If **NO**, repeat the procedure with the other combinations of CU/software backup disk. If all combinations fail to recover the system, **seek technical assistance**.

7. Set RCBKOUT and repump the standby CMP. Enter Pokes **407** and **923** on Page 1851.

   Response: On Page 1851, **MATE STAT** display becomes **BACKOUT**.

8. Hard switch CMPs.

   Type in the following message:

   SW: CMP=0-0,UCL;

   Response: **SW CMP=0-0 COMPLETED**

9. Set RCBKOUT and repump the other CMP. Enter Pokes **407** and **923** on Page 1851.

   Response: **MATE STAT** display becomes **BACKOUT**.

10. The AM (and CMP) are now running on the alternate boot disk with a different AM ODD. Do post AM recovery actions to recover the SM/SM-2000 ODD and return to the original system MHDs. **See Procedure 2.2 .**

Procedure 2.4: PERFORM OFFICE DEAD START RECOVERY

OVERVIEW

The intent of this procedure is to use the Load Disk From Tape (LDFT) program to perform a dead start of the *5ESS*®-2000 switch. When using this procedure, AM call processing is interrupted for the duration required to load the backup tape(s) and to successfully initialize the AM. This procedure should **only be used if** all other conventional recovery methods have been exhausted [such as, all CU to MHD configurations on root and backup root (broot), and if equipped, recovery from software backup disk). Although this procedure interrupts AM call processing for the duration of the tape load, it may be used to recover from a duplex failed system disk (MHD0 and MHD1) if the office is not in full DIOP.

NOTE: This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], before starting this procedure.

Offices equipped with a 3B21D DAT drive are able to store all of the media required to dead start the office on one DAT. Before starting this procedure, secure the software media needed to dead start the office (TOP, AM text, SM/SM-2000 text, AM ODD, SM/SM-2000 ODD). Prior to the 5E10 software release, five or more tapes were required to dead start an office. Each tape [9-track or Digital Audio Tape (DAT)] was made as a single volume tape (one logical volume per tape). In some instances, two tapes were required to backup one logical volume, such as SM ODD

Procedure 2.4.1 is for all offices that are on a pre-5E10 software release or for 5E10 offices that use single volume formatted backup tapes (9-track tape drive). Procedure 2.4.2 is for offices on a 5E10 or later software release that use multivolume formatted DAT backups. Procedures 2.4.1 and 2.4.2 attempt to recover the office by loading the latest backup version of the office software media onto disk, then booting the AM.

If the AM fails to recover, the next latest backup is loaded. Once the AM recovers, the users are directed to Procedure 2.4.3 to perform the post AM tape load recovery steps. Once all of the applicable steps in this procedure have been performed, the user is directed to Procedure 2.2 of this document to perform the Post AM Recovery Cleanup.

Document 235-600-601, *Processor Recovery Messages (PRM)*, should be used to decode any failure PRMs. If the AM boot fails because of a Communication Module (CM) duplex failure, refer to Procedure 5.2 , Analyze and Control the Repair of CM Duplex Hardware Failures. In the event that errors are detected during this procedure, **seek technical assistance**.

PROCEDURE

1. Use the following list of procedures to perform a dead start recovery:

   (a) Procedure 2.4.1 — Dead Start with Single Volume Formatted Tapes (9-track or DAT).

   (b) Procedure 2.4.2 — Dead Start with Multivolume Formatted DATs.

   (c) Procedure 2.4.3 — Post AM Tape Load Recovery.

Procedure 2.4.1: DEAD START WITH SINGLE VOLUME FORMATTED TAPES

OVERVIEW

This procedure is only for offices that use single volume formatted backup tapes to dead start the office (all offices on a pre-5E10 software release or 5E10 offices that use 9-track tapes). The steps in this procedure loads AM text first; then if needed, loads the AM ODD.

NOTE: This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], before starting this procedure.

PROCEDURE

1. Retrieve the most recent set of backup tapes (TOP; AM and SM text; AM and SM ODD), and the next to the most recent set.

   NOTE: When retrieving backup tapes, the AM text backup must be at the same software update level as the SM text backup, and the AM ODD backup must have been created at the same time as the SM ODD backup (same date stamped on label).

2. Select a configuration from Table 2.4.2-1 to use for the tape load. Then on the EAI page, enter the EAI command values that are associated with the configuration you selected.

   NOTE: Enter one EAI command value at a time; and when prompted, enter **y** to *FORCE* the CU selected online.

   Enter commands per the indicated responses:

Response to:	10 or 11	**Force?** [y or n], enter **y**
	Force=y	**FONL** backlighted next to the CU forced
	20 or 22	**SET** backlighted next to disk selected (**PRI or SEC**)
	30	**SET** backlighted next to Backup Root
	33	**CLR** backlighted to Min-Config

3. Mount TOP tape on tape drive, then ensure the tape drive is online.

4. On the EAI page, enter the poke command to start the tape load (Ldtape).

   If tape is on tape drive 0, enter the following poke: **55**.

   If tape is on tape drive 1, enter the following poke: **56**.

5. Was the response, **Boot?** or **Backup Root Set! Boot?**

   If **YES**, enter **y**, then look for **PRM_x E151 993B 10AD 10AD** (observe EAI PRM field or ROP).

   If **NO**, try another configuration, or **seek technical assistance**.

6. Was **PRM_x E15x 993B 10Ad 10AD** displayed (or printed)?

   If **YES**, continue with next step.

   If **NO**, analyze any failure PRMs. **PRM-x F0da zz**00 identifies a problem. (If zz = 27, 28, 29, or 2A, the TOP media may be bad.) Repeat from Step 2 (try another configuration or TOP tape), or **seek technical assistance**.

7. Remove TOP tape from tape drive and mount the first AM text backup tape.

8. Is the MHD you are loading ***new*** (just been replaced)?

   If **YES**, continue with next step.

   If **NO**, proceed to Step 10.

9. Enter the application parameter (42_i) to initialize (erase all data) the selected MHD.

   Set application parameter, enter the following: **42**.

   Enter the following parameter type: **i**.

   NOTE: This step should only be performed if the MHD selected in Step 2 has not been active in the system (new disk). Once this step is executed, AM text and AM ODD **must** be reloaded. If a larger SCSI drive is replacing a smaller drive (such as, 600-MB MHD replaced by a 1-GB MHD), make a note that ECD changes must be entered after system recovery.

10. Load AM text. On the EAI page, enter the poke command to load tape (Ldtape).

    If tape is on tape drive 0, enter the following poke: **55**.

    If tape is on tape drive 1, enter the following poke: **56**.

11. Was the response, **Boot?** or **Backup Root Set! Boot?**

    If **YES**, enter **y**, then look for the tape load completion PRM.

    If **NO**, re-enter poke or **seek technical assistance.**

    NOTE: The following PRMs provide information on the LDFT. If the tape load completion or mount next tape PRM follows the tape load progression PRM, continue with next step. If it does not, **seek technical assistance**.

    - Tape Version: **PRM_x E151 54**xx xxxx xxxx xx xx xx
    - Tape Load Progression: **PRM_x E151 57**xx xxxx xxxx xx xx xx
    - Mount Next Tape: **PRM_x E151 58**xx xxxx xxxx xx xx xx
    - Tape Load Completion: **PRM_x E151 59**xx xxxx xxxx xx xx xx
    - Tape Load Problem: **PRM_x F151** xxxx xxxx xxxx xx xx xx
    - Disk Initialization PRM: **PRM_x E151 88**xx xxxx xxxx xx xx xx

12. Did the tape load completion PRM follow the progression PRMs?

    If **YES**, AM text has been loaded. The CU to MHD configuration used to load tapes must not change, backup root must remain set, and Min-Config must remain cleared. Go to Step 14.

    If **NO**, continue with next step.

13. Did the mount next tape PRM follow the progression PRMs?

    If **YES**, unmount the AM text tape, mount the next AM text tape, then repeat from Step 10.

    If **NO**, analyze any failure PRMs, **seek technical assistance.**

14. Is the AM ODD on the MHD just loaded known to be bad (was the MHD just initialized)?

    If **YES**, the AM ODD must be loaded onto the same MHD that was selected in Step 2 (same MHD as AM text). Go to Step 18.

    If **NO**, continue with next step.

15. If communications to the SMs is known to be bad, set hardware and software checks.

    To set software checks, on EAI page, enter the following poke: **34**.

    To set hardware checks, on EAI page, enter the following poke: **36**.

16. It is time to BOOT the AM. On EAI page, enter the following poke: **54**.

Response	**Backup Root Set! Boot?** (y/n)
Enter	**y** (then continue with next step)

NOTE: The AM starts its initialization sequence. If the initialization is successful, the MCC 111/112 page is displayed. If a boot failure is encountered, analyze the failure PRM.

17. Did the AM initialization complete (Page 111/112 displayed)?

    If **YES**, the AM has booted with only AM text being loaded from backup tape. Go to Procedure 2.4.3 .

    If **NO**, the AM has failed to recover after loading the AM text backup tape(s)! Analyze any PRM failures. Either the text is bad, the AM ODD is bad, or there is a hardware problem. If text is bad, return to Step 2 and load the next latest AM text; or, continue with next step and reload the AM ODD.

18. Mount TOP tape on tape drive, then ensure the tape drive is online.

19. On the EAI page, enter the poke command to load tape (Ldtape).

    If tape is on tape drive 0, enter the following poke: **55**.

    If tape is on tape drive 1, enter the following poke: **56**.

20. Was the response, **Boot?** or **Backup Root Set! Boot?**

    If **YES**, enter **y**, then look for **PRM_x E151 993B 10AD 10AD** (observe EAI PRM field or ROP).

    If **NO**, re-enter poke or **seek technical assistance**.

21. Was **PRM_x E15x 993B 10Ad 10AD** displayed (or printed)?

    If **YES**, continue with next step.

    If **NO**, analyze any failure PRMs or **seek technical assistance.**

NOTE: PRM-x **F0da zz**00 0000 0000 xx xx xx indicates a problem reading the tape. (If zz = 27, 28, 29, or 2A, the TOP media may be bad.)

22. Remove TOP tape from tape drive and mount the first AM ODD backup tape.

23. On EAI page, enter the application to prepare the disk for the AM ODD tape.

    Set application parameter, enter the following poke: **42**.

    Select parameter type, enter the following: **d**.

24. On EAI page, enter the poke command to load tape (Ldtape).

    If tape is on tape drive 0, enter the following poke: **55**.

    If tape is on tape drive 1, enter the following poke: **56**.

25. Was the response, **Boot?** or **Backup Root Set! Boot?**

    If **YES**, enter **y**, then look for the tape load completion PRM.

    If **NO**, re-enter poke or **seek technical assistance**.

    NOTE: The following PRMs provide information on the tape load. If the tape load completion or mount next tape PRM follows the tape load progression PRM, continue with next step. If it does not, **seek technical assistance**.

Tape Version	**PRM_x E151 54** xx xxxx xxxx xx xx xx
Tape Load Progression	**PRM_x E151 57**xx xxxx xxxx xx xx xx
Mount Next Tape	**PRM_x E151 58**xx xxxx xxxx xx xx xx
Tape Load Completion	**PRM_x E151 59**xx xxxx xxxx xx xx xx
Tape Load Problem	**PRM_x F151** xxxx xxxx xxxx xx xx xx

26. Did the tape load completion PRM follow the progression PRM?

    If **YES**, AM ODD has been loaded. The CU to MHD configuration used to load tapes must not change, backup root must remain set, and Min-Config must remain cleared. Go to Step 28.

    If **NO**, continue with next step.

27. Did the mount next tape PRM follow the progression PRM?

    If **YES**, unmount the AM ODD tape, mount the next AM ODD tape, then repeat from Step 24.

    If **NO**, analyze any failure PRMs or **seek technical assistance**.

28. If communications to the SMs is known to be bad, set hardware and software checks.

    To set software checks, on EAI page, enter the following poke: **34**.

    To set hardware checks, on EAI page, enter the following poke: **36**.

29. It is time to BOOT the AM. On EAI page, enter the following poke: **54**.

Response	**Backup Root Set! Boot?** (y/n)
Enter	**y** (then continue with next step)

    NOTE: The AM starts its initialization sequence. If the initialization is successful, the MCC 111/112 page is displayed. If a boot failure is encountered, analyze the failure PRM.

30. Did the AM initialization complete (Page 111/112 displayed)?

If **YES**, then the AM has booted with AM text and AM ODD being loaded from backup tape. Go to Procedure 2.4.3 to perform the post AM tape load recovery.

If **NO**, the AM has failed to recover after loading the latest AM text and AM ODD backup tape! When possible, try another CU to MHD configuration with the next latest AM text backup tape(s). Repeat from Step 2.

Procedure 2.4.2: DEAD START WITH MULTIVOLUME FORMATTED DATs

OVERVIEW

This procedure uses multivolume formatted DAT to dead start the office. The steps in this procedure loads AM text first, then if needed, loads the AM ODD. This procedure assumes that the AM has failed to boot using all CU to MHD configurations on root and backup root.

NOTE: This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], before starting this procedure.

PROCEDURE

1. Retrieve the most recent backup DAT(s) that contain a copy of AM/SM text and ODD.

   NOTE: A multivolume DAT should contain all of the software media needed to dead start the office (TOP, AM/SM text, and AM/SM ODD logical volumes).

2. Select a configuration from Table 2.4.2-1 to use for the tape load. Then on the EAI page, enter the EAI command values that are associated with the configuration you selected.

Table 2.4.2-1 Select A Configuration For The Tape Load

NUMBER	CONFIGURATION	EIA COMMANDS
1	CU 0 - Pri Disk (MHD0)	10 20 30 33
2	CU 0 - Sec Disk (MHD1)	10 22 30 33
3	CU 1 - Pri Disk (MHD1)	11 20 30 33
4	CU 1 - Sec Disk (MHD0)	11 22 30 33

Enter commands and observe the indicated responses:

Response to:	10 or 11	**Force** [y or n], enter **y**
	Force=y	**FONL** backlighted next to the CU forced
	20 or 22	**SET** backlighted next to disk selected **(PRI or SEC)**
	30	**SET** backlighted next to Backup Root
	33	**CLR** backlighted next to Min-Config

3. Insert the DAT backup that contains AM text into the DAT drive (UN376 pack).

4. On the EAI page, enter the poke command to load tape (Ldtape).

   If DAT is in DAT drive 0, enter the following poke: **55**.

   If DAT is in DAT drive 1, enter the following poke: **56**.

5. Was the response ***Boot?*** or ***Backup Root Set! Boot?***

   If **YES**, enter **y**, look for **PRM-x E151 3300** (observe EAI PRM field or ROP).

   If **NO**, try another configuration (repeat Step 2) or **seek technical assistance**.

6. Was **PRM-x E151 3300** or **PRM_x E151 35**xx displayed (or printed)?

   If **YES**, the TOP tape load was successful; continue with next step.

If **NO**, analyze any failure PRMs. PRM-x **F0da zz**00 identifies a problem. (If zz = 27, 28, 29, or 2A, the TOP media may be bad.) Repeat from Step 2 (try another configuration or DAT) or **seek technical assistance**.

7. Does the multivolume DAT contain more than one backup session?

   If **YES**, continue with the next step.

   If **NO**, go to Step 10.

8. Enter the application parameter to output the DAT header.

   Enter the following poke: **42**.

   Enter the following parameter type: **h**.

   NOTE: Be patient. A series of PRMs should be displayed (or printed) that list the backup sessions and logical volumes on the DAT. Decode the record the DAT session/volume numbers. Once the header dump is completed, PRMs print that indicate the tape load program is waiting for the next request. The volume numbers, which are fixed values, correspond to the following logical volumes:

   Waiting For Next Request: **PRM_x E151 33xx EEEE EEEE)**

   DAT Header Info: **PRM_x E151 35yy mmdd SSvv**

   Where: **SS** = Session number.
   vv = Volume number.
   mm = Month (in hex) of session.
   dd = Day (in hex) of session.
   yy = Year (in hex).

   Where **vv**: 0 = TOP TAPE
   1 = AM TEXT
   2 = AM ODD
   3 = SM TEXT
   4 = SM ODD1
   5 = SM ODD2
   6 = SM ODD3
   7 = SM ODD4

9. Was the DAT header information displayed (or printed)?

   If **YES**, wait for the next request PRM; then continue with next step.

   If **NO**, enter EAI poke **43** (clear application parameters), then repeat from Step 4. If tape read problems continue, **seek technical assistance**.

10. Has the MHD you selected for the tape load just been installed?

    If **YES**, continue with next step.

    If **NO**, proceed to Step 11.

11. Enter the application parameter to initialize the selected MHD.

Enter the following poke: **42**.

Enter the following parameter type: **i**.

NOTE: This step should only be performed if the MHD selected in Step 2 was not active in the system (new MHD). Once this step is executed, AM text and AM ODD ***must*** be reloaded.

12. Enter the parameters for the AM text session/volume you want loaded (perform the following substeps, then observe Notes 1, 2 and 3).

 (a) Enter the following poke: **42**

 (b) Enter the following parameter type (session): **s**

 Observe the session PRM_x **E151 3373 FFEE EEEE** displayed on the EAI page.

 (c) Enter the following poke: **42**

 (d) Enter the session number for the AM text you want loaded: **1**

 Observe the session PRM_x **E151 3331 FF01 EEEE** displayed on the EAI page. (See Note 1.)

 (e) Enter the following poke: **42**

 (f) Enter the following parameter type (volume): **v**

 Observe the volume PRM_x **E151 3376 FF01 FFEE** displayed on the EAI page.

 (g) Enter the following poke: **42**

 (h) Enter the following volume number (AM text = 1): **1**

 Observe the volume PRM_x **E151 3331 FF01 FF01** displayed on the EAI page.

 (i) Observe PRM_x **E151 3600 FF01 FF01**.

Sample Volume Search Results: PRM_x E151 **36xx** FF**ss** FF**vv**

Where: **xx** = 00 for volume was found.
xx = ff for volume was not found.
ss = Session number entered.
vv = Volume number entered.

NOTE 1: Step 12.d assumes that this is a single session multivolume DAT. If other session is to be used, enter the correct session number.

NOTE 2: If the session/volume request PRM is never printed, enter EAI **poke 43** to clear all application parameters, then repeat this step.

NOTE 3: If the volume was found, it takes approximately 20 minutes to load AM text. A progression PRM prints while the tape is being loaded. If the volume is not found, check the values entered or select another session/volume, or **seek technical assistance**.

Tape Version	PRM_x **E151 54**xx xxxx xxxx xx xx xx
Tape Load Progression	PRM_x **E151 57**xx xxxx xxxx

Tape Load Completion	PRM_x **E151 59**xx xxxx xxxx
Ready for Next Request	PRM_x **E151 33xx EEEE EEEE** hh hh hh
Tape Load Problem	PRM_x **E151** xxxx xxxx xxxx
Disk Initialization	PRM_x **E151 88**xx xxxx xxxx

13. Did the tape load completion PRM print after the progression PRMs?

    If **YES**, AM text has been loaded. The CU to MHD configuration used to load AM text must not change, backup root must remain set, and Min-Config must remain cleared. Continue with next step.

    If **NO**, analyze any failure PRMs. **Seek technical assistance.**

14. Is the AM ODD on the MHD just loaded known to be bad (was the MHD just initialized or replaced)?

    If **YES**, the AM ODD must be loaded onto the same MHD that was selected in Step 2 (same MHD as AM text). Go to Step 17.

    If **NO**, continue with next step.

15. If communications to the SM/SM-2000s is known to be bad, set hardware and software checks.

    To set software checks, on the EAI page, enter the following poke: **34**.

    To set hardware checks, on the EAI page, enter the following poke: **36**.

16. It is time to BOOT the AM. On EAI page, enter the following poke: **54**.

Response:	**Backup Root Set! Boot** (yn)
Enter:	**y** (then continue with next step)

NOTE: The AM starts its initialization sequence. If the initialization is successful, the MCC 111/112 page is displayed. If a boot failure is encounter, analyze the failure PRM.

17. Did the AM initialization complete (Page 111/112 displayed)?

    If **YES**, then the AM has booted with only AM text being loaded from backup tape. Go to Procedure 2.4.3 to perform the post AM text tape load recovery steps.

    If **NO**, the AM has failed to recover after reloading the AM text. Either the AM text loaded is bad, the AM ODD is bad, or there is a hardware problem. Try a different text volume (repeat from Step 2) or continue with next step and load the AM ODD.

18. With DAT that contains the AM ODD in DAT drive, enter the EAI parameters to load AM ODD (perform the following substeps, then observe Notes 1, 2, and 3).

    (a) Enter the following poke: **42**

    (b) Enter the following parameter type (database): **d**

    Observe the database PRM_x E151 **3364 EEEE EEEE** displayed on the EAI page.

    (c) Enter the following poke: **42**

    (d) Enter the following parameter type (session): **s**

    Observe the session PRM_x E151 **3373 FFEE EEEE** displayed on the EAI page.

    (e) Enter the following poke: **42**

(f) Enter session number for the AM ODD you want loaded: **1**

Observe the session PRM_x E151 **3331 FF01 EEEE** displayed on the EAI page. (See Note 1.)

(g) Enter the following poke: **42**

(h) Enter the following parameter type (volume): **v**

Observe the volume PRM_x E151 **3376 FF01 FFEE** displayed on the EAI page.

(i) Enter the following poke: **42**

(j) Enter the following volume number or AM ODD: **2**

Observe the volume PRM_x E151 **3332 FF01 FF02** displayed on the EAI page.

(k) Observe the volume search PRM_x **E151 3600 FF01 FF02**.

Sample volume search results PRM_x E151 **36xx** FF**ss** FF**vv.**

Where: **xx** = 00 for volume was found.
xx = ff for volume was not found.
ss = Session number entered.
vv = Volume number entered.

NOTE 1: Step 18.f assumes that this is a single session multivolume DAT. If other session is to be used, enter the correct session number.

NOTE 2: If the session/volume request PRM is never printed, enter EAI **poke 43** to clear all application parameters, then repeat this step.

NOTE 3: If the volume was found, it takes approximately 10 minutes to load the AM ODD. A progression PRM prints while the tape is being loaded. If the volume is not found, check the values entered or select another session/volume, or **seek technical assistance**.

Tape Version	PRM_x **E151 54**xx xxxx xxxx xx xx xx
Tape Load Progression	PRM_x **E151 57**xx xxxx xxxx xx xx xx
Tape Load Completion	PRM_x **E151 59**xx xxxx xxxx xx xx xx
Ready for Next Request	PRM_x **E151 33xx EEEE EEEE** hh hh hh
Tape Load Problem	PRM_x **E151** xxxx xxxx xxxx xx xx xx

19. Did the tape load completion PRM follow the progression PRMs?

If **YES**, the AM ODD has been loaded from backup tape. The CU to MHD configuration used to load the AM ODD must not change, backup root must remain set, and Min-Config must remain cleared. Continue with next step.

If **NO**, analyze any failure PRMs. **Seek technical assistance.**

20. If communications to the SM/SM-2000s is known to be bad, set hardware and software checks.

To set software checks, on the EAI page, enter the following poke: **34**.

To set hardware checks, on the EAI page, enter the following poke: **36**.

21. At this point in the procedure, the loading of the AM ODD, or AM text and ODD has been completed. On the EAI page, enter the application parameter to backout AM recent changes.

    Set application parameter, enter the following poke: **42**.

    Enter the following parameter type: **h** (backout AM recent changes).

    NOTE: The reason for requesting the backout of AM recent changes is that any recent change log files which may exist on the disk are inconsistent with the ODD disk image just read into the system.

22. It is time to BOOT the AM. On EAI page, enter the following: **54**.

Response:	**Backup Root Set! Boot** (yn)
Enter:	**y** (then continue with next step)

    NOTE: The AM starts its initialization sequence. If the initialization is successful, the MCC 111/112 page is displayed. If a boot failure is encounter, analyze the failure PRM.

23. Did the AM initialization complete (Page 111/112 displayed)?

    If **YES**, then the AM has booted with AM ODD and/or AM text being loaded from backup tape. Go to Procedure 2.4.3 to perform the post AM tape load recovery.

    If **NO**, analyze any failure PRMs, try to recovery using the next to the latest logical volume (repeat from Step 2).

Procedure 2.4.3: POST AM TAPE LOAD RECOVERY

PROCEDURE

1. Did the AM recover with only AM text loaded? If **YES**, continue with next step.
   If **NO**, proceed to Step 8 if AM text and ODD was loaded.

2. Clear files that point to temporary copies of CMP text files, enter the following:

   clr:filesys,file,fn="/update/tmpcmp1"

   clr:filesys,file,fn="/update/cmppmap1"

   Response: **CLR FILESYS FILE COMPLETED**

   or

   CLR FILESYS FILE STOPPED

   rm: /update/tmpcmp1 non-existent

   or

   CLR FILESYS FILE STOPPED

   rm: /update/cmppmap1 non-existent

3. The AM has booted with only AM text being loaded from backup tape. Use the following commands to determine which ODD partition contains the most recent AM ODD file (ODD1 or ODD2).

   Enter the following:

   dump:file:all,fn="/no5odd/data0/bk.aimrc"

   Response: **DUMP FILE ALL COMPLETED**

   x no5dodd**x** is the current disk odd

   Where: **x** = Indicator of previously active odd (1 or 2).

   NOTE: When the system booted, the ODD1 partitions were loaded. However, the system may have been running on ODD2 before the recovery. If the system was running on the ODD2 partition, the pointers to the AM ODD file must be switched, and the AM must be booted.

4. Was the "no5dodd**1**" partition previously active?

   If **YES**, proceed to Step 12 and repump the standby CMP.
   If **NO**, and if "no5dodd2" was previously active, continue with next step.

5. Enter the commands to switch the pointers. Wait for the completed messages to print before continuing.

   copy:filesys:file,src="/no5text/rcv/aimrc",dest="/no5text/rcv/aimrc.tmp"

   copy:filesys:file,src="/no5text/rcv/aimrc2",dest="/no5text/rcv/aimrc"

   copy:filesys:file,src="/no5text/rcv/aimrc.tmp",dest="/no5text/rcv/aimrc2"

Response: **COPY FILESYS FILE COMPLETED**

clr:filesys:file,fn="/no5text/rcv/aimrc.tmp"

Response: **CLR FILESYS FILE COMPLETED**

6. This step reboots the AM. On EAI page, enter the following poke: **53**.

Response:	**Boot** or **Backup Root Set! Boot**
Enter:	**y** (the continue with next step)

7. Did the AM initialization complete (Page 111/112 displayed)?

   If **YES**, continue with the next step.
   If **NO**, analyze the initialization failure (**seek technical assistance**).

8. Was the AM/CMP ODD reloaded from tape (RC BACKOUT box on MCC Page 110 is backlighted)?

   If **YES**, continue with next step.
   If **NO**, proceed to Step 10.

9. Set RC backout on the active and the standby CMP [perform Substeps (a) and (b)].

   (a) On Page **1850**, enter the following poke: **407**.

   (b) On Page **1851**, enter the following poke: **407**.

10. Repump the standby CMP. On Page **1851**, enter the following poke: **923**.

11. Was the CMP initialization successful?

    If **YES**, continue with next step.
    If **NO**, **seek technical assistance**.

12. Hard switch the CMPs.

    At message command prompt, enter the following: **sw:cmp=0-0,ucl**.

13. Did the switch complete?

    If **YES**, continue with next step.
    If **NO**, **seek technical assistance**.

14. Repump the other CMP. On Page **1851**, enter the following poke: **923**.

15. Was the standby CMP initialization successful?

    If **YES**, continue with next step.
    If **NO**, **seek technical assistance**.

16. The AM and CMP are now running on the backup root file system with a different AM text, or AM text and AM ODD. Go to Procedure 2.2 to perform the post AM recovery cleanup. Procedure 2.2 will synchronize the text (AM with SM/SM-2000) and the ODD if needed, perform partition copies (broot to root), and boot the office back to the primary root file system.

Procedure 2.5: RECOVER ODD DISK IMAGE FROM TAPE

OVERVIEW

This procedure is for recovering office dependent data (ODD). This procedure loads the disk image of administrative module (AM) ODD on the system disks moving head disk 0 and moving head disk 1 (MHD0/MHD1) and switching module/switching module-2000 (SM/SM-2000) ODD on the outboard disks from the office backup tapes. This procedure requires booting the AM with a level 53 initialization. Duplex-failed outboard disk pairs are restored. Recovery of automatic message accounting (AMA) only disks is also covered by this procedure.

> ***NOTE 1:*** This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], before starting this procedure.

NOTE 2: Small computer systems interface (SCSI) moving head disks (MHD) are available in three sizes: the 322-MB (J3T027AB-1, List 1), the 600-MB (J3T027AB-1, List 1,2), and the 1-GB (J3T027AB-1, List 1,3). The required the system disk is a 600-MB disk. For an office that experiences a duplex failure of an SCSI 322-MB or 600-MB disk pair, a 600-MB/1-GB disk may be substituted for the smaller disk and utilized with a **RST:MHD:UCL** command. After the disk is recovered, the equipment configuration data base (ECD) requires updating.

Before a decision is made to recover the ODD from tape, one or more attempts should be made to recover the system from the on-line ODD disk image. If recovery fails using the existing on-line ODD disk image, there are two alternatives for recovering the system. The first alternative is to use the procedure provided here which recovers only the ODD disk image from tape. The second alternative is to use the office dead-start recovery procedure which recovers the software of the entire system from tape. If there are indications that the ODD is corrupted, the ODD disk image recovery should be attempted first; otherwise, the office dead-start recovery is needed.

Since the AM ODD is restored from the backup tape, the Recent Change log files may no longer be consistent with the recovered ODD. Log files must be cleared and recent changes must be backed out of all SM/SM-2000s. The communication module processor (CMP) must be repumped. As a last resort, use the full office recovery procedures.

The following is a summary of this procedure:

- Determine present ODD backup schedule and clear that schedule.
- Inhibit Recent Changes (RCs).
- If /dev/no5dodd2 is active, then do the following:
  - Perform an AM ODD Backup
- Clear RC Logs and RC Backout flag.
- Load AM ODD tape(s).
- Point /no5text/rcv/aimrc to odd1.
- Boot with 53.
- Repump CMP.

- Restore SM/SM-2000 ODD from SM/SM-2000 ODD tape(s).
- If SM/SM-2000s are not running, initialize those SM/SM-2000s one by one.
- Remaining SM/SM-2000s must be initialized to make AM and SM/SM-2000 ODD consistent; initialize them during low traffic.
- Allow RCs.
- Turn on the automatic ODD backup schedule again, as appropriate.
- Perform ODD Backup.

PROCEDURE

1. Observe the information provided in Notes 1 through 3:

   NOTE 1: This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], before starting this procedure.

   NOTE 2: In the event errors are detected during this procedure, take appropriate corrective action using the output message manual as a first-level reference; then, if necessary, **seek technical assistance**.

   NOTE 3: After entering the OP:BKUPSTAT message, record the day and the time that the automatic backup was scheduled to be performed. The automatic backup is rescheduled at the end of this procedure.

2. Type in the following message:

   OP:BKUPSTAT;

   NOTE: An **NG** may come out if automatic backup is not scheduled.

   Response: **OP BKUPSTAT EVERY a AT b**

   Where: a = Number of days between backups.
   b = Time.

3. Type in the following message:

   CLR:ODDBKUP;

4. Obtain the latest AM ODD and SM/SM-2000 ODD backup tapes.

5. Inhibit RC. Type in the following messages:

   INH:CORC;

   INH:RC;

   INH:REORG;

INH:AUD=SODD,FULL;

6. Access MCC Page **120**.

7. To find which partitions are inactive, type in the following message:

   DUMP:FILE:ALL,FN="/no5text/rcv/aimrc";

   Response: **DUMP FILE ALL COMPLETED**
   x **no5dodd1**x **is the current disk odd**

   Where: x = Indicator of active odd (1 or 2).

8. Is **no5dodd1** the active ODD shown in the previous step?

   If **NO**, continue with the next step.

   If **YES**, proceed to Step 12.

9. Perform an AM ODD Backup to change active ODD partition. Type in the following message:

   BKUP:ODD,AM;

   NOTE: If there are failures in this step, proceed to the next step.

   Response: **BKUP ODD AM COMPLETED**
   BKUP ODD COMPLETED

10. Type in the following message:

    DUMP:FILE:ALL,FN="/no5text/rcv/aimrc";

    Response: **DUMP FILE ALL COMPLETED**
    1 no5dodd1 is the current disk odd

11. Was **no5dodd1** printed in the previous step?

    If **YES**, proceed to Step 12.

    If **NO**, seek technical assistance.

12. Unmount the active partition (/dev/no5aodd1). Type in the following message:

    INH:FILESYS:UMOUNT,FN="/dev/no5aodd1";

    Response: **INH FILESYS UMOUNT COMPLETED**

13. ***NOTE:*** The RC and customer-originated recent change (CORC) log files in the system are no longer consistent with the ODD. The AM Backout indicator should be returned to normal. This is accomplished by first clearing the RC and CORC recent change log files (AM and SM/SM-2000) and then clearing the AM recent change backout indicator.

    Type in the following message:

EXC:ENVIR:UPROC,FN="/no5text/bkup/clrlg";

Response: **EXC ENVIR UPROC /no5text/bkup/clrlg COMPLETED**
rm: cni directory
rm: log directory

OR

EXC ENVIR UPROC STOPPED (If log files do not exist)
rm * non-existent

14. Load AM ODD. Type in the following message:

DUMP:FILE:ALL,FN="/no5text/bkup/aodd.ptn";

Response: **DUMP FILE ALL COMPLETE**
Contents of **/no5text/bkup/aodd.ptn** printed.

15. Does contents of **/no5text/bkup/aodd.ptn** agree line-for-line with Table 2.5-1 .

Table 2.5-1 Contents of /no5text/bkup/aodd.ptn

/dev/no5aodd1 /dev/no5dodd1

If **YES**, continue with the next step.

If **NO**, **seek technical assistance**.

16. Type in the following message:

COPY:FILESYS:FILE,SRC="/no5text/bkup/aodd.ptn", DEST="/tmp/aodd.ptn";

Response: **COPY FILESYS FILE COMPLETED**

17. Determine if you are using a multivolume DAT format tape or a single volume format tape.

If single volume formatted tape backup, then continue with Step 20.

If multivolume DAT formatted backup, then continue with the next step.

18. Mount the tape on the tape drive.

At the MCC, type and enter the following:

DUMP:BKTAPE:TD="x"

Where: x = Pathname of the tape special device file.

Response: **REPT DKDIP MESSAGE**
DUMP BKTAPE TD x STARTED

For each logical volume on the tape:

Response: **REPT DKDIP MESSAGE**
DUMP BKTAPE TD x IN PROGRESS
DUMP BKTAPE TD x IN PROGRESS

SESSION	VOLUME	NAME	BLOCKS	SOURCE	DATE
a	b	c	d	e	f

Where: a = Backup session number.
b = Logical volume number.
c = Logical volume name.
d = Number of blocks for the logical volume.
e = Source disk(s) logical volume was written from.
f = Date logical volume was written.

After all logical volumes have been processed:

Response: **REPT DKDIP MESSAGE**
DUMP BKTAPE TD x COMPLETED
CUMULATIVE BLOCKS a

Where: a = Cumulative number of blocks for all logical volumes.

Note the session number and volume number of the AM ODD backup to be read into the AM ODD partitions.

19. At the MCC, type and enter the following:

EXC:ENVIR:UPROC,FN="/etc/mkdsk",
ARGS="-i*x*"-"-d/dev/vtoc"-"-p/tmp/aodd.ptn"-"-s*y*"-"-v*z*";

Where: *x* = Pathname of the tape special device file.
y = Session number of AM ODD backup to be read.
z = Volume number of AM ODD backup to be read.

Response: **EXC ENVIR UPROC /etc/mkdsk COMPLETED**

Continue with Step 22.

20. Mount the AM ODD backup tape on the tape drive.

21. Read the AM ODD backup tape into the ODD partitions, type in the following message:

EXC:ENVIR:UPROC,FN="/etc/mkdsk",
ARGS="-i/dev/mt00"-"-d/dev/vtoc"-"-p/tmp/aodd.ptn";

Response: **EXC ENVIR UPROC /etc/mkdsk COMPLETED**

22. Was the set of AM ODD backup tapes read into the AM ODD partitions successfully?

If **YES**, continue with the next step.

If **NO**, **seek technical assistance**.

23. Type in the following message:

CLR:FILESYS:FILE,FN="/tmp/aodd.ptn";

Response: **CLR FILESYS FILE COMPLETED**

24. Type in the following message:

    CLR:FILESYS:FILE,FN="/no5text/rcv/aimrc.tmp";

    Response: **CLR FILESYS FILE COMPLETED**

25. On EAI page, type and enter command **53** to boot the AM.

    Response: **boot? (y/n)**

26. Type and enter the following: **y**

27. Did the AM initialization complete successfully?

    If **YES**, continue with the next step.

    If **NO**, analyze the initialization failure.

28. Repump the standby CMP. Enter Poke **923** on Page 1851.

    Response: On Page **1851**, **MATE STAT** display becomes **POSTINIT**.

29. Hard switch CMPs. Type in the following message:

    SW:CMP=0-0,UCL

    Response: **SW CMP=0-0 COMPLETED**

30. Repump the other CMP. Enter Poke **923** on Page 1851.

    Response: On Page **1851**, **MATE STAT** display becomes **POSTINIT**.

31. The AM and CMP are now running on the root file system with an AM ODD from a back-up tape. Go to Procedure 2.2 to perform post AM recovery cleanup. Procedure 2.2 is used to load the SM/SM2000 ODD from tape.

Procedure 2.6: RECOVER NONSYSTEM DISKS

OVERVIEW

This procedure is for recovering duplex failed nonsystem outboard disks or for reload of SM/SM-2000 text or ODD when an administrative module (AM) text or ODD reload is not required. Specifically, this procedure recovers the volume table of contents (VTOC), disk partitions not backed up on tape or any automatic message accounting (AMA) collection partitions.

The SM/SM-2000 text on moving head disk 2 and moving head disk 3 (MHD2/MHD3) is recovered from the SM/SM-2000 text backup tape. If no SM/SM-2000 text tape of the same software update as the AM text is available, install an older tape now and obtain, if possible, a tape of the same software update level as the AM text (/no5text partition) to install later.

The SM/SM-2000 ODD on MHD2/MHD3 or other outboard disk pair is recovered from the SM/SM-2000 ODD backup tape and then overlaid with the SM/SM-2000 ODD from the in-service SM/SM-2000s. Recovery of the SM/SM-2000 ODD with this procedure requires operational SM/SM-2000s.

This procedure assumes that the AM text on MHD0 and MHD1 is operational. As a last resort, use the full office recovery or full ODD recovery procedures.

The following is a summary of this procedure:

- If a duplexed failed moving head disk (MHD) pair contains SM/SM-2000 ODD that must be recovered and there are any SM/SM-2000s that are not functional from tape, go to ODD recovery procedure (Procedure 2.5).
- Recover the VTOC of any outboard MHD that is new or duplex failed.
- Remount partitions.
- Initialize AMA Disk Writer.
- If MHD2/3, load SM/SM-2000 text tape.
- If MHD2/3 or other ODD MHD pair, load SM/SM-2000 ODD tape.
- If MHD2/3 or other ODD MHD pair, backup ODD from SM/SM-2000s to disk.
- If there are any SM/SM-2000s now running at a different software update level than the SM/SM-2000 text that was just installed that should be reinitialized, initialize them during low traffic.

NOTE: In the event errors are detected during this procedure, take appropriate corrective action using the 235-600-750, *Output Message Manual*, as a first-level reference; then, if necessary, **seek technical assistance**.

PROCEDURE

1. On master control center (MCC) Pages 123 and 125, are any duplexed failed ODD MHD pairs that require recovery from backup tapes?

   If **YES**, continue with the next step.

   If **NO**, proceed to Step 4.

2. Obtain status from Pages 141-144, or type in the following message:

OP:SYSSTAT;

Response: **OP SYSSTAT SUMMARY xxxx REPORT**
SMx rrrrr

Where: rrrrr = SM/SM-2000 Dynamic Off-Normal Status.

3. Using the response from the previous step, are there any SM/SM-2000s not running as indicated by a progress mark status of the following:

Any Init-in-progress state?
INIT ISOL
COMM LOST
ISOLATED
STNDALONE

If **YES**, **STOP**; go to ODD recovery procedure (Procedure 2.5).

If **NO**, continue with the next step.

4. Inhibit RC.

Type in the following message:

INH:CORC;

INH:RC;

INH:REORG;

INH:AUD=SODD,FULL;

5. Select the first failed pair.

6. Is the disk drive being restored a newly installed disk drive/disk platter?

If **YES**, continue with the next step.

If **NO**, proceed to Step 8.

7. If the new MHD is MHD2 or MHD3, then the backout last overwrite (BOLO) feature is not usable. **Seek technical assistance** if a software update must be backed out.

Format and verify the MHD. Type in the following message:

INIT:MHD=x:VFYyyyy;

Where: x = MHD number to be restored.
yyyy = **:NEW** if 340-MB disk drive.
yyyy does not exist if 300-MB or small computer system interface (SCSI) disk drive.

Response: **INIT MHD x STARTED**
INIT MHD x IN PROGRESS (Every 2 minutes)

INIT MHD x COMPLETED (After 15-30 minutes)

8. Type in the following message:

EXC:ENVIR:UPROC,FN="/etc/rcvtoc",ARGS=x;

Where: x = MHD number to be restored.

Response: **EXC ENVIR UPROC /etc/rcvtoc COMPLETED**
vcp: disk copy completed.
vcp: disk copy completed.
/etc/rcvtoc VTOC READ AND COMPARE SUCCESSFUL

9. Type in the following message:

RST:MHD=x;
RST:MHD=x:UCL; (If a larger SCSI drive [600-MB/1-GB] is replacing a smaller SCSI drive [322-MB/600-MB])

Where: x = Value used in previous step.

Response: **RST MHD x TASK y MSG STARTED**
RST MHD x IN PROGRESS
RST MHD x COMPLETED

10. Did the disk restore in the previous step complete successfully?

If **YES**, proceed to Step 12.
If **NO**, continue with the next step.

11. Have both disks of the pair been tried?

If **YES**, **STOP. DO NOT CONTINUE. Seek technical assistance.**
If **NO**, replace ***x*** with ***x's*** MATE and repeat from Step 6.

12. Are there any other MHD pairs that are duplexed failed?

If **YES**, select the next failed pair and repeat from Step 6.
If **NO**, continue with the next step.

13. Type in the following message:

EXC:ENVIR:UPROC,FN="/etc/mntuxabf";

Response: **PRM_x E800 00xx xxxx 002B xx xx xx**
EXC ENVIR UPROC /etc/mntuxabf COMPLETED

14. Type in the following message:

EXC:ENVIR:UPROC,FN="/etc/ptnmount";

Response: **PRM_x E800 00xx xxxx 00xx xx xx xx**
EXC ENVIR UPROC /etc/ptnmount COMPLETED

Possible Failing Responses:

REPT FSINIT FAILED TO MOUNT - /dev/xxxxxx /yyyy/zzzz
failed fsaudit mount /dev/xxxxxx /yyyy/zzzz: errno=xx
PRM_x E800 0001 0001 FFxx xx xx xx
EXC ENVIR UPROC STOPPED
/etc/mount: Unknown error

NOTE: These failing messages are from mounting file systems that were not initialized on the newly installed disks.

15. Type in the following message:

EXC:ENVIR:UPROC,FN="/etc/smoddX";

Where: x = "rt" number of the failing disk pair from Table 2.6-1 .

Table 2.6-1 Disk Pairs for MHD

MHD PAIRS	"X"
MHD2/MHD3	1
MHD4/MHD5	2
MHD6/MHD7	3
MHD8/MHD9	4
MHD10/MHD11	5
MHD12/MHD13	6

Response: **PRM_x E800 00xx xxxx 0027 xx xx xx**
EXC ENVIR UPROC COMPLETED

16. The AMA partitions must now be cleaned up.
Determine AMA configuration. Type in the following message:

OP:AMA:STREAM;

Response: **REPT AMA STREAM INDICATOR IS a**

Where: a = ST1, ST2, or DUAL.

17. Initialize AMA disk writer.

Type in the following message:

INIT:AM,AMDWn,FPI;

NOTE: If a = **DUAL** in the previous step, the command must be entered for each stream (n = **1** and **2**).

Where: n = **1**, if a = **ST1** in the "OP AMA STREAM ..." previous response.
n = **2**, if a = **ST2** in the "OP AMA STREAM ..." previous response.

Response:

REPT AMA DISK WRITER FOR STREAM STn
RECORDING TO DISK SUSPENDED
REPT AMA DISK WRITER FOR STREAM STn TERMINATION

CODE 2
REPT AMA DISK WRITER FOR STREAM STn ERROR CODE 6
REPT AMA DISK WRITER FOR STREAM STn INITIALIZATION COMPLETE
REPT AMA DISK WRITER FOR STREAM STn
RECORDING TO DISK RESUMED

18. Verify software update levels of AM text (/no5text) and SM/SM-2000 text (/no5text/im).

Type in the following message:

OP:VERSION;

Response:

```
OP STATUS COMPLETED
OP VERSION          (Date - Time)
PARTITION           VERSION         BWM
ECD                 5ex(x)xx.xx
/                   5ex(x)xx.xx     BWMnn-nnnn
/no5text            5ex(x)xx.xx     BWMnn-nnnn
/no5text/im         5ex(x)xx.xx     BWMnn-nnnn


DISK CONFIGURATION: cc
```

Where: cc = 63 (600M/300M) or 66 (600M/600M) configuration.

19. Is the software update level of /no5text partition the same as the /no5text/im partition?

If **YES**, continue with the next step.

If **NO**, proceed to Step 21.

20. Is the SM/SM-2000 text known to be corrupt?

If **YES**, continue with the next step.

If **NO**, proceed to Step 35.

21. ***NOTE:*** The following RDLDFT command must be entered from a supplementary trunk and line work station (STLWS) or a recent change/verify (RC/V) terminal. The MCC terminal ***cannot*** be used for this function.

Is the command to be entered from an STLWS?

If **YES**, clear the screen with a **120** poke.

If **NO**, continue with the next step.

22. Determine if a multivolume DAT format tape or a single volume format tape is to be used.

If single volume formatted tape backup, proceed to Step 24.

If multivolume DAT formatted backup, then continue with the next step.

23. Mount the tape on the tape drive.

At the MCC, type and enter the following:

DUMP:BKTAPE:TD="x"

Where: x = Pathname of the tape special device file.

Response: **REPT DKDIP MESSAGE**
DUMP BKTAPE TD x STARTED

For each logical volume on the tape:

Response: **REPT DKDIP MESSAGE**
DUMP BKTAPE TD x IN PROGRESS

```
SESSION  VOLUME  NAME  BLOCKS  SOURCE  DATE
   a       b      c      d       e      f
```

Where: a = Backup session number.
b = Logical volume number.
c = Logical volume name.
d = Number of blocks for the logical volume.
e = Source disk(s) logical volume was written from.
f = Date logical volume was written.

After all logical volumes have been processed:

Response: **REPT DKDIP MESSAGE**
DUMP BKTAPE TD x COMPLETED
CUMULATIVE BLOCKS a

Where: a = Cumulative number of blocks for all logical volumes.

NOTE: Record the session number and volume number of the SM TEXT backup to be read into the partitions. This information is required for input in later steps of this procedure.

24. **CAUTION:** If the tape to be mounted for the SM/SM-2000 text tape is from another office, then the other office must be the same disk configuration as indicated by the OP:VERSION message. Loading an SM/SM-2000 tape from another office also overlays all site specific files in /dev/unixabf.

At the command prompt, start the load disk from tape program. Enter the following message:
RCV:MENU:RDLDFT;

Response:

```
Please enter the tape drive number.
Please enter the number '0' for tape drive MT0 or
             the number '1' for tape drive MT1, etc.:
```

NOTE: If this response ***does not*** occur, **seek technical assistance**.

25. At the RDLDFT display prompt, enter the tape drive number (0, 1, etc.).

Response:

```
Please enter the letter 'x' for SM TEXT or
             the letter 's' for SM ODD:
```

NOTE: If this response ***does not*** occur, **seek technical assistance**.

26. At the RDLDFT display prompt, enter **x** to load SM Text.

Response:

```
What tape volume format is to be used?
Please enter 'm' for Multivolume format or
             's' for Single-volume format:
```

NOTE: If this response ***does not*** occur, **seek technical assistance**.

27. At the RDLDFT display prompt, enter the volume format, per the following options:

If single volume format, enter **s**.

If multivolume format, enter **m**.

28. If **s** is entered for single volume tape format, proceed to Step 33.

If **m** is entered for multivolume tape format, then continue with the next step.

29. At the RDLDFT display prompt, enter the session number from Step 23.

30. At the RDLDFT display prompt, enter **3**.

This is the volume number for SM Text.

The following is the expected response:

```
What tape density is to be used?
Please enter the number '8' for low density or
             the number '0' for high density:
```

NOTE: If this response ***does not*** occur, **seek technical assistance**.

31. At the RDLDFT display prompt, enter **0**.

32. After mounting the tape, type and enter the following: **go**.

Response: **.........** (One dot every 30 seconds)

33. Was the following terminal display produced?

```
     Please mount the next backup tape.
```

```
Please enter 'go' after the tape is mounted:
```

If **YES**, repeat from Step 32.

If **NO**, continue with the next step.

34. Was the set of SM/SM-2000 text backup tapes read into the /dev/vtoc1 text partitions successfully as indicated by the **RDLDFT: Completed** message?

    If **YES**, continue with the next step.

    If **NO**, **seek technical assistance**.

35. Is the SM/SM-2000 ODD on disk known to be corrupt?

    If **YES**, continue with the next step.

    If **NO**, proceed to Step 51.

36. Install SM/SM-2000 ODD disk image from backup SM/SM-2000 ODD tapes.

    Is the command to be entered from an STLWS?

    If **YES**, clear the screen with a **120** poke.

    If **NO**, continue with the next step.

    NOTE: The following RDLDFT command must be entered from an STLWS or an RC/V terminal. The MCC terminal ***cannot*** be used for this function.

37. At the command prompt, start the load disk from tape program.

    Enter the following message: **RCV:MENU:RDLDFT;**

    Response:

```
Please enter the tape drive number.
Please enter the number '0' for tape drive MT0 or
             the number '1' for tape drive MT1, etc.:
```

NOTE: If this response ***does not*** occur, **seek technical assistance**.

38. At the RDLDFT display prompt, enter the tape drive number (0, 1, etc.).

    Response:

```
Please enter the letter 'x' for SM TEXT or
             the letter 's' for SM ODD:
```

NOTE: If this response ***does not*** occur, **seek technical assistance**.

39. At the RDLDFT display prompt, enter **s** to load SM ODD.

    Response:

```
What tape volume format is to be used?
Please enter 'm' for Multivolume format or
             's' for Single-volume format:
```

NOTE: If this response ***does not*** occur, **seek technical assistance**.

40. At the RDLDFT display prompt, enter the volume format, per the following options:

    If single volume format, enter **s**.
    If multivolume format, enter **m**.

41. If **s** is entered for single volume tape format, proceed to Step 44.
    If **m** is entered for multivolume tape format, then continue with the next step.

42. At the RDLDFT display prompt, enter the session number [1-9] from Step 23.

43. At the RDLDFT display prompt, enter the volume number [4-9] from Step 23.

44. At the RDLDFT display prompt, enter **0**.

    This is the high density tape identifier.

45. Type and enter the following: **[1-6]**.

    This is the VTOC number of the SM ODD tape to be loaded.

46. After mounting the tape, type and enter the following: **go**.

    Response: **.........** (One dot every 30 seconds)

47. Was the following terminal display produced?

```
Please mount the next backup tape.
Please enter 'go' after the tape is mounted:
```

If **YES**, repeat from Step 46.

If **NO**, continue with the next step.

48. Was the set SM/SM-2000 ODD backup tapes read into the ODD partitions successfully as indicated by the **RDLDFT: Completed** message?

    If **YES**, continue with the next step.

    If **NO**, **seek technical assistance**.

49. Are there more MHD pairs to be restored from SM/SM-2000 ODD backup tapes?

    If **YES**, repeat from Step 37.

    If **NO**, continue with the next step.

50. The AM is currently running on a different version of the ODD than the SM/SM-2000s are running on. To correct this situation, copy all the SM/SM-2000 ODDs in the office to disk.

Type in the following message:

BKUP:ODD,FULL;

Response: **BKUP ODD COMPLETED**

51. ***NOTE:*** The AM may be currently running at a different software update level than the SM/SM-2000 text just installed from tape. To correct this situation, an SM/SM-2000 text tape of the correct software update level should be found and installed. Until that time, those SM/SM-2000s that are not in service now must be initialized at this time. If there are SM/SM-2000s that are now running at a different software update level than the SM/SM-2000 text just installed from tape, they should be initialized during a low-traffic period.

Obtain status from Pages 141-144, or type in the following message:

OP:SYSSTAT;

Response: **OP SYSSTAT SUMMARY xxxx REPORT**
SMx rrrrr

Where: rrrrr = SM/SM-2000 Dynamic Off-Normal Status.

52. Using the response from the previous step, are there any SM/SM-2000s not running as indicated by a progress mark status of the following:

Any Init-in-progress state?
INIT ISOL
COMM LOST
ISOLATED
STNDALONE

If **YES**, continue with the next step.

If **NO**, proceed to Step 55.

53. Type in the following message for each range of selected SM/SM-2000s.

INIT:SM=a[&&b][-]...,FI,BCST[,LSM][,HSM][,RSM][,ORM][,TRM][,c][,d][,e][,f][,g];

For software releases prior to 5E12, type in message:
INIT:SM=a&&b,FI,BCST[,LSM][,HSM][,RSM][,ORM][,TRM];

For each individual SM/SM-2000, type in the following message:

INIT:SM=a,FI,BCST;

Where: **a** = SM/SM-2000 number.
b = optional upper SM limit.
[-]... = optional additional SMs or ranges.
c = BASIC or CNFG000 (SM basic configuration)
d = STANDARD or CNFG001 (SM standard configuration)
e = LOADED or CNFG002 (SM loaded configuration)
f = SIGNALING or CNFG003 (SM signaling configuration)
g = SM2000 or CNFG2K00 (SM-2000 configuration)

Response: Each SM/SM-2000 reports on the ROP that an initialization has occurred. The form of the report is as follows:

INIT SM=x LVL=FI SUMMARY EVENT = yyyy
CALL PROCESSING DOWNTIME=h:m:s
CALLS LOST: STABLE=ss TRANSIENT=tt

54. Have all the selected SM/SM-2000s in the office been initialized?

    If **YES**, proceed with the next step.

    If **NO**, repeat the previous step to initialize the SM/SM-2000s.

55. Are there any SM/SM-2000s that have not been initialized in Step 53 but are stable?

    If **YES**, use Procedure 6.6 .

    If **NO**, continue with the next step.

56. Allow RC.

    Type in the following messages:

    ALW:CORC;

    ALW:RC;

    ALW:REORG;

    ALW:AUD=SODD,FULL;

57. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3. POWER

GENERAL

This section contains the description and the procedures for recovering the system after a power loss or power interruption.

Procedure 3.1: DETERMINE THE SOURCE AND IMPACT OF A POWER PROBLEM

OVERVIEW

The intent of this procedure is to identify the source of a *5ESS*®-2000 switch power problem. When working a power-related service outage, it is strongly recommended that several technicians be onsite to assist with any manual recovery task. Use local policies to determine when to dispatch maintenance personnel to site. Once the source of the problem has been identified, and when needed, refer to Procedure 3.2 for guidelines on establishing a power-related recovery plan.

CAUTION: The duration of a power-related service outage is dependent on the return of the power source, procedural awareness, and the number of support staff available to assist with any manual recovery task. This procedure is associated with a service outage, therefore, the craft person should seek technical assistance per local procedures and/or contact the Electronic Switching Action Center (ESAC). If the problem persists or if manual action is necessary, the craft person or the technical support center should contact Lucent Technologies support [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)].

PROCEDURE

1. Do you know the source of the power problem?

   If **YES**, proceed to Step 6.

   If **NO**, continue with the next step.

2. Can the MCC and/or the STLWS be used to review the system status indicators?

   If **YES**, continue with the next step.

   If **NO**, proceed to Step 4.

3. Use the MCC and ROP to identify the source of the problem. If available, use the Switching Control Center (SCC) to perform a keyword search on patterns such as FUSE, POWER, PWR, and BPSC. Use the following MCC display pages:

105/106 page	Building Power Alarm Status
1400,x page	RSM/ORM Building Power Alarm Status
110/111 page	AM Unit Summary
115	CM Unit Summary
118	CNI Unit Summary
141 through 144 pages	SM/SM-2000 Operation State Summary
1010,x page	SM/SM-2000 Unit Summary
1200,x page	DLI/NLI Unit Summary

   Use the following Manual Input Commands:

op:sysstat,ucl	Global status of office
op:oos	AM out-of-service list
op:cfgstat,sm=x,oos,nofe	SM/SM-2000 out-of-service list
op:cfgstat,cm,oos	CM out-of-service list

4. Perform a visual inspection of the 5ESS-2000 switch hardware cabinets as well as the office power plant. Look for power/fuse alarms (observe the following notes). Once the inspection has been completed, continue with the next step.

NOTE 1: Power for the 5ESS-2000 switch originates at the office power plant (rectifiers/battery backup), gets distributed at the Primary Power Distribution Bay (PPDB) by circuit breaker or fuse Over-current Protection Devices (OPDs), then is fed downstream to the Secondary Power Distribution Bay (SPDB). The SPDB can be either a Power Control Fuse Distribution (PCFD) power bus or a Global Power Distribution Frame (GPDF) power bus. Power is fed further downstream from the SPDB, feeds power further downstream to the Application hardware cabinets [AM, CM, SM/SM-2000, and CNI Ring Node (RN)].

NOTE 2: The application cabinets are equipped with either a Fuse Filter Unit (FFU) or a Modular Fuse Filter Unit (MFFU). Almost all of the cabinets have a fuse alarm LED on the outside top of the cabinet. If the cabinet fuse alarm LED is lighted, open the cabinet doors and check for a blown fuse. In addition, each MFFU fuse position has a fuse alarm LED next to it that lights when the MFFU fuse clears (opens/blows). If more than one MFFU LED is lighted, there is a possibility that there is an upstream power problem at the PCFD/GPDF, or at the power plant. Check for a blown PCFD/GPDF fuse, or for a tripped/opened power plant Over-current Protection Device (OPD).

NOTE 3: Although it is important to visually inspect the application hardware cabinets for power alarms, there may be a case where a fuse alarm or power converter alarm light-emitting diode (LED) fails to illuminate because the fuse/converter has become defective. If you suspect a power problem, and if the LEDs are not lighted (or the fans in the cabinets are not functioning), use diagnostics and/or voltage measurements to confirm whether the unit backplane is receiving its source voltage. If voltage is not present, the FFU/MFFU fuse or the PCFD/GPDF fuse may be defective.

5. Has the source of the problem been identified?

   If **YES**, continue with the next step.

   If **NO**, **seek technical assistance**.

6. If you reached this step, the source of the problem has been identified. Use the following procedures to provide resolution to the power problem:

   (a) Procedure 3.2 — Power-Related System Recovery Decisions

   (b) Procedure 3.3 — PCFD Power Restoration

   (c) Procedure 3.4 — GPDF Power Restoration

   (d) Procedure 3.5 — Power-up *5ESS*®-2000 Switch Application Hardware Units

   (e) Procedure 3.6 — Replace Blown FFU or MFFU Fuses

   (f) Procedure 3.7 — Power Down *5ESS*®-2000 Switch

   (g) Procedure 3.8 — Automatic Power Recovery (APR) Feature (for offices which are compliant with APR)

   (h) Procedure 3.9 — Hardware Conditioning, APR Compliant Units, and Power Distribution.

Procedure 3.2: POWER-RELATED SYSTEM RECOVERY DECISIONS

OVERVIEW

The intent of this procedure is to assist *5ESS*®-2000 switch support personnel with establishing a recovery plan for responding to a power-related service outage. This procedure is divided into several procedures that are based on different power recovery scenarios. Each procedure describes the manual tasks that are required to restore service and identifies the step-by-step procedure where the specific task is executed. If the source of the problem is not known, refer to Procedure 3.1 . To power down the host or remote office, go to Procedure 3.7 .

When responding to a major power problem, support personnel must first determine if the affected units/circuits are sensative to in-rush current. Circuits that are sensative to in-rush current must be prepared for the return of power before voltage is restored to the unit. This pre-power restoration step is sometimes referred to as the unit power-up sequence or hardware conditioning. Circuits that must be conditioned for the return of power are not compatible with the Automatic Power Recovery (APR) feature. When needed, refer to Procedure 3.9 for information on unit hardware conditioning, APR units, and power distribution.

CAUTION: The duration of a power-related service outage is dependent on the return of the power source, procedural awareness, and the number of support staff available to assist with any manual recovery task. This procedure is associated with a service outage, therefore, the craft person should seek technical assistance per local procedures and/or contact the Electronic Switching Action Center (ESAC). If the problem persists or if manual action is necessary, the craft person or the technical support center should contact Lucent Technologies support [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)].

PROCEDURE

1. Use the applicable procedure to formulate a recover execution plan for responding to a power plant problem or a problem at the office Secondary Power Distribution Bay (PCFD/GPDF).

   (a) Procedure 3.2.1 — System-Wide Power Outage at Host *5ESS*®-2000 Switch Office

   (b) Procedure 3.2.2 — Remote Site (RSM/ORM/EXM) Is Without Power

   (c) Procedure 3.2.3 — Low Voltage - Battery Discharge at Host or Remote *5ESS*®-2000 Switch Offices

   (d) Procedure 3.2.4 — Low Voltage - System Recovery for Host or Remote *5ESS*®-2000 Switch Offices

   (e) Procedure 3.2.5 - One or More Primary Power Distribution Bay Over-current Protection Devices (fuses/circuit breakers) Have Cleared.

Procedure 3.2.1: SYSTEM-WIDE POWER OUTAGE AT HOST *5ESS*®-2000 SWITCH OFFICE

OVERVIEW

The following steps assume that all of the Over-current Protection Devices (fuses/circuit breakers) in the host office power plant Primary Power Distribution Bay (PPDB) are opened (which means, power has been removed from the switch).

CAUTION: DO NOT return the power plant circuit breakers, or reinsert any fuses until all of the applicable pre-power restoration steps have been performed. Failure to adhere to the applicable pre-power restoration steps and unit power-up steps mays cause equipment damage.

PROCEDURE

1. Is the host office compliant with the APR Feature?

   If **YES**, go to Procedure 3.8 and prepare the office for an automatic recovery.

   If **NOT SURE**, go to Procedure 3.9 and determine if the office is APR compliant.

   If **NO**, continue with the next step.

2. At the affected secondary power distribution bay (PCFD or GPFD), perform the applicable substep, and then continue with the next step.

   (a) For each affected **PCFD** cabinet, unseat all PCFD fuses and separate them into groups based on fuse type. Always unseat the indicator (pilot) fuses first, the load fuse second, and the filter fuses last.

   (b) For each affected **GPDF**, unseat all GPDF load fuses, and then filter fuses.

3. At the hardware application cabinets, and when applicable, use the following substeps to prepare the units that are sensative to in-rush current for the return of power.

   (a) Only **for LUs without APR compatible hardware:** For each LU that is not equipped with **all TN1058C grids,** unseat the TN831 gdxacc pack first, the TN832 second, and then unseat all grids. When needed, see Procedure 3.3.5 .

   (b) Only for **ISLUs powered by a PCFD cabinet:** If a 2-amp (ED-82930-30, G1) charge circuit is equipped, unseat the fuses in the ISLU cabinet that power the ISLU. If a 15-amp (ED-82950-30, G2) charge circuit is equipped, no manual action is required. When needed, see Procedure 3.3.6 .

   (c) Only for **PSUs equipped with non-B or non-C suffixed PHs:** Unseat all non-B or non-C suffixed **PH** circuit packs. When needed, see Procedure 3.3.7 .

   (d) For **CNI "Ring Node" cabinets:** Unseat all of the circuit packs and power converters in the Ring Node cabinet. When needed, see Procedure 3.3.3 or Procedure 3.3.3 .

   (e) Only **for 340 MHD drives:** Release the start button, and then **turn off** the **MHD** circuit breaker switch (next to the disk drive). When needed, see Procedure 3.3.3 .

4. At the power plant, restore power to the PCFD/GPDF (reset the PPDB circuit breakers to the **ON** position, and/or re-insert the PPDB fuses).

NOTE: This step assumes that all of the applicable pre-power restoration steps have been performed, and that the problem which caused the host to shut down has been resolved.

5. Restore PCFD or GPDF power to the AM Bus-A and Bus-B power buses, and then continue with the next step. If the units (CUs/IOPs/DFCs/MHDs) are powered by a PCFD, perform Substep (a), and then Substep (b). If the units are powered by a GPDF, perform Substep (c).

   (a) For PCFD buses: Charge, and then reinsert the PCFD filter fuses. When needed, see Procedure 3.3.2 .

   (b) For PCFD buses: Charge, reinsert the PCFD load, and then indicator fuses. When needed, see Procedure 3.3.3 .

   (c) For GPDF buses: Insert the GPDF filter fuses, and then the GPDF load fuses. When needed, see Procedure 3.4.2 .

6. Power-up the AM units (CUs/IOPs/DFCs/MHDs). When needed, see Procedure 3.5 .

7. Did the AM start its initialization cycle ("Start of CU Recovery" message printed followed by progression PRMs)?

   If **YES**, continue with the next step.

   If **NO**, check AM power and make sure the voltage at the power plant is stable somewhere above -45 volts. When needed, **seek technical assistance**.

8. Restore PCFD or GPDF power to the CM and CNI Ring Node Bus-A and Bus-B power buses, and then continue with the next step. If the units are powered by a PCFD, perform Substep (a), and then Substep (b). If the units are powered by a GPDF, perform Substep (c):

   (a) For PCFD buses: Charge, and then reinsert the PCFD filter fuses. When needed, see Procedure 3.3.2 .

   (b) For PCFD buses: Charge, reinsert the PCFD load, and then indicator fuses. When needed, see Procedure 3.3.3 .

   (c) For GPDF buses: Insert the GPDF filter fuses, and then the GPDF load fuses. When needed, see Procedure 3.4.2 .

9. Power-up the CM (MSGS/ONTC) and CNI Ring Node units. When needed, see Procedure 3.5 .

10. This step initializes the AM, CM, and if applicable the CNI Ring Node. At the MCC, use the following EAI poke commands to force a CU to MHD configuration and to inhibit hardware and software checks, and then to initialize the AM with the boot parameter that isolates the SM/SM-2000s (42_B_54). When needed, see Procedure 4.7 (EAI poke Commands).

    (a) Clear the EAI display, enter EAI poke: **14**

    (b) Force the active CU online, enter EAI poke: **12**

    (c) Select the primary disk, enter EAI poke: **20**

    (d) Inhibit hardware checks, enter EAI poke: **34**

    (e) Inhibit software checks, enter EAI poke: **36**

(f) Select application parameter, enter EAI poke: **42**

(g) Enter parameter to isolate SM-2000s, enter EAI poke: **b**

(h) Select the AM initialization type, enter EAI poke: **54**

(i) When prompted, enter **y** to start the AM initialization cycle.

NOTE: If the AM boot is successful, the MCC 111/112 page will be displayed. If the boot is not successful, exhaust all CU to MHD boot configurations and check for AM/CM power problems. When possible, have one team investigate the cause of the boot failure while another team focus on powering-up the SM/SM-2000 complexes. Once the AM recovers, continue with the next step.

11. Restore PCFD or GPDF power to the SM/SM-2000 Bus-A and Bus-B power buses, and then continue with the next step. For each SM/SM-2000 that is powered a PCFD, perform Substep (a), and then Substep (b). For each SM/SM-2000 that is powered by a GPDF, perform Substep (c). When possible, restore power to the SM/SM-2000s that provides essential services first (such as, E911).

CAUTION: Only use the applicable procedure when inserting unit fuses as indicated in the following substeps.

(a) For PCFD buses: Charge, and then reinsert the PCFD filter fuses. When needed, see Procedure 3.3.2 .

(b) For PCFD buses: Charge, reinsert the PCFD load, and then indicator fuses. When needed, refer to Procedure 3.3 to determine how to proceed.

(c) For GPDF buses: Insert the GPDF filter fuses, and then the GPDF load fuses. When needed, see Procedure 3.4.2 .

12. At the SM cabinets where PCFD or GPDF power was just restored, power-up the SM/SM-2000s peripheral first, power-up the DLIs/RLIs second, and the MCTSIs last. When needed, see Procedure 3.5 for unit power-up steps.

CAUTION: Alway adhere to the applicable power-up steps in Procedure 3.5 when inserting any LU packs that were unseated. Failure to do so could cause equipment damage.

13. If you have reached this point, the AM boot was successful, and power has been restored to at least one SM/SM-2000. At the MCC/STLWS, enter poke 120 to access the message input display page, and then continue with the next step.

14. Use the applicable substep to clear isolation on one SM\SM-2000 or on a range of SM\SM-2000s. Once isolation has been cleared, initialize the SM/SM-2000s that are powered-up to the operational state.

NOTE: Monitor the progress of the recovery. When restoring a range of SM\SM-2000s, the SM/SM-2000s that do not have power are queued for an initialization once the MCTSI controllers are powered-up. If a complex fail to initialize, check for power or disk access problems, and make sure that the link interface circuits that are associated with the affected SM/SM-2000 are active (DLI/NLI).

(a) To clear isolation and pump one SM/SM-2000, enter the following messages (where *x* = one SM/SM-2000):

— **clr:isol,sm=** *x*

— **init:sm=** *x***, fi, pump**

(b) To clear isolation and pump a range of SM/SM-2000s, enter the following messages (where *x* = lowest and *y* = highest SM/SM-2000):

— **clr:isol,sm=** *x***&&***y*

— **init:sm=** *x***&&***y***, fi, bcst**

15. Once the SM/SM-2000s recover, refer to Procedure 8.2 to monitor the status of call processing. If a complex fails to initialize, refer to the applicable procedure in this document to resolve the initialization failure.

Procedure 3.2.2: REMOTE SITE (RSM/ORM/EXM) IS WITHOUT POWER

OVERVIEW

The following steps assume that all of the Over-current Protection Devices (fuses/circuit breakers) in the remote office power plant Primary Power Distribution Bay (PPDB) are opened (which means, power has been removed from the switch).

CAUTION: DO NOT return the power plant circuit breaker, or reinsert any fuses until all of the applicable pre-power restoration steps have been performed. Failure to adhere to the applicable pre-power restoration steps and unit power-up steps mays cause equipment damage.

PROCEDURE

1. Is the Remote office (RSM/ORM/EXM) compliant with the APR Feature?

   If **YES**, go to Procedure 3.8 and prepare the office for an automatic recovery.

   If **NOT SURE**, refer to Procedure 3.9 and determine if the remote is APR compliant.

   If **NO**, continue with the next step.

2. At the affected secondary power distribution bay (PCFD or GPFD), perform the applicable substep, and then continue with the next step.

   (a) For each affected **PCFD** cabinet, unseat all PCFD fuses and separate them into groups based on fuse type. Always unseat the indicator (pilot) fuse first, the load fuse second, and unseat the filter fuses last.

   (b) For each affected **GPDF**, unseat all GPDF load, and then filter fuses.

3. At the hardware application cabinets, and when applicable, use the following substeps to prepare the units that are sensative to in-rush current for the return of power.

   (a) Only **for LUs without APR compatible hardware:** For each LU that is not equipped with **all TN1058C grids**, unseat the TN831 and TN832 gdxacc packs, and then all grids according to the LU pack removal sequence. When needed, see Procedure 3.3.5 .

   (b) Only for **ISLUs powered by a PCFD cabinet:** If a 2-amp (ED-82930-30, G1) charge circuit is equipped, unseat the fuses in the ISLU cabinet that power the ISLU. If a 15-amp (ED-82950-30, G2) PCFD charge circuit is equipped, no manual action is necessary. When needed, see Procedure 3.3.6 .

   (c) Only for **PSUs equipped with non-B or non-C suffixed PHs:** Unseat all non-B or non-C suffixed **PH** circuit packs. When needed, see Procedure 3.3.7 .

4. At the power plant, restore power to the affected PCFDs or GPDFs (reset the PPDB circuit breakers to the ON position and/or re-insert the PPDB fuses).

   NOTE: This step assumes that all of the applicable pre-power restoration steps have been performed, and that the problem which caused the remote to shut down has been resolved.

5. Isolate the affected remote. To isolate, use the MCC/STLWS 1800,*x* page (where *x* = the affected remote SM/SM-2000). Perform the following command:

- On the 1800,x page, enter poke: **403**

6. Restore PCFD or GPDF power to the remote Bus-A and Bus-B power buses, and then continue with the next step. If the remote is powered by a PCFD, perform Substep (a), and then Substep (b). If the remote is powered by a GPDF, perform Substep (c).

   CAUTION: Only use the applicable procedure when inserting unit fuses or when reinserting any unit circuit packs. Once an SM/SM-2000 complex has been powered-up, perform the actions described in Step 7 and 8.

   (a) For PCFD buses: Charge, and then reinsert the PCFD filter fuses. When needed, see Procedure 3.3.2 .

   (b) For PCFD buses: Charge, reinsert the PCFD load, and then indicator fuses. When needed, see Procedure 3.3.3 .

   (c) For GPDF buses: Insert the GPDF filter fuses, and then the GPDF load fuses. When needed, see Procedure 3.4.2 .

7. Power-up the remote. When needed, see Procedure 3.5 .

   CAUTION: Always adhere to the applicable power-up procedure in Procedure 3.5 when inserting any LU packs that were unseated. Failure to do so could cause equipment damage.

8. At the MCC/STLWS 1800,*x* page (where *x* = the affected remote SM/SM-2000), clear isolation and then initialize the remote to the operational state. Perform the following commands:

   - On the 1800,*x* page, enter poke: **503**
   - On the 1800,*x* page, enter poke: **923**

9. Once the remote returns to the operational state, refer to Procedure 8.2 to monitor the status of call processing. If the remote fails to initialize, refer to the applicable procedure in this document to resolve the initialization failure.

Procedure 3.2.3: LOW VOLTAGE - BATTERY DISCHARGE AT HOST OR REMOTE *5ESS*®-2000 SWITCH OFFICES

OVERVIEW

This procedure is only for low-battery voltage situations, when for whatever reason, the battery backup power source is discharging. This procedure assumes that the Over-current Protection Devices (OPDs) at power plant Primary Power Distribution Bay (PPDB) are not cleared (tripped/opened). If all of the PPDB OPDs are opened, exit this procedure and go to Procedure 3.2.1 and prepare the host office for the return of power, or Procedure 3.2.2 to prepare the remote. When needed, **seek technical assistance**.

The *5ESS*®-2000 switch continues to support the call processing function as long as the battery backup power source does not discharge below -42 volts. Once below -42 volts, it is strongly recommended that the load on the batteries be removed. While it is recommended that the load on the batteries be removed, the decision when to do so and at what voltage level is based on local practices.

PROCEDURE

1. Has the switch call processing function been disrupted?

   If **YES**, continue with the next step.

   If **NO**, go to Procedure 3.7.1 to slow the rate of battery discharge. If Procedure 3.7.1 has already been executed, continue with the next step.

2. Proceed based on the applicable substep.

   (a) If the battery voltage is **below -42** volts (when viewed at the power plant), continue with Step 3 (or -45.5 at the PCFD/GPDF; or -39.5 at the *5ESS*®-2000 switch application cabinet unit level).

   (b) If the battery voltage is **above -42** volts and if the application units are powered-up, decode any interrupts or failure AM processor recovery messages. When needed, **seek technical assistance**.

3. Have the units begun to shut down?

   If **YES**, continue with the next step.

   If **NO**, observe the caution, and then continue with the next step.

   CAUTION: Any unit that has not shut down continues to drain current. At some point, the operating company must decide to remove the battery load or risk cell reversal. The risk of battery cell reversal is dependent on the manufacturer.

4. Is the affected office automatic power recovery (APR) compliant?

   If **YES**, exit this procedure and proceed to Procedure 3.8 .

   If **NO**, continue with next step.

5. Do you want to remove the battery load?

   CAUTION 1: If the battery load is not removed, the office is at risk of blowing fuses as the voltage continues to decrease (as voltage decreases, the current, through a unit that does not shut down, increases and in some cases may exceed the fuse rating). Removing the battery load could extend the service restoration by one or more hours (PCFD or GPDF fuses must be reinserted).

CAUTION 2: If the rectifier output voltage increases before the load is removed or before the units that are sensative to in-rush current are prepared for the return of power, the power surge could cause damage to 5ESS-2000 switch hardware. The further the power plant voltage drops below -42 volts, the greater the risk.

If **YES**, go to Procedure 3.7 .

If **NO**, continue with the next step.

6. If you have reached this step, the switch is not processing calls, and the decision was made to leave the load on the batteries. At this time, the units that are sensative to in-rush current should be conditioned for the return of power. At the *5ESS*®-2000 switch cabinet line-up perform the applicable substep. Once the units have been conditioned, continue with the next step.

   (a) Only **for LUs without APR compatible hardware:** For each LU that is not equipped with **all TN1058C grids,** unseat the TN831 gdxacc pack first, the TN832 second, and then unseat all grids. When needed, see Procedure 3.3.5 .

   (b) Only for **ISLUs powered by a PCFD cabinet:** If a 2-amp (ED-82930-30, G1) charge circuit is equipped, unseat the fuses in the ISLU cabinet that power the ISLU. If a 15-amp (ED-82950-30, G2) charge circuit is equipped, no manual action is required. When needed, see Procedure 3.3.6 .

   (c) Only for **PSUs equipped with non-B or non-C suffixed PHs:** Unseat all non-B or non-C suffixed **PH** circuit packs. When needed, see Procedure 3.3.7 .

   (d) For **CNI "Ring Node" cabinets:** Unseat all of the circuit packs and power converters in the Ring Node cabinet. When needed, see Procedure 3.3.3 or see Procedure 3.4.1 .

   (e) Only **for 340 MHD drives:** Release the start button, and then **turn off** the **MHD** circuit breaker switch (next to the disk drive). When needed, see Procedure 3.3.3 .

7. If you have reached this step, the units that are sensative to in-rush have been conditioned for the return of power. Proceed to Procedure 3.2.4 and prepare for the recovery of the system.

Procedure 3.2.4: LOW VOLTAGE - SYSTEM RECOVERY FOR HOST OR REMOTE *5ESS*®-2000 SWITCH OFFICES

OVERVIEW

This procedure is only intended to recover an office that encountered a problem that caused the switch to shut down due to a low-power plant voltage. This procedure was created for the situations where the customers are not able or choose not to follow the recommended recovery steps for responding to a low-battery plant voltage. Lucent Technologies has always recommended that the load be removed from the switch once the power plant voltage drops below -42 volts. The reason for the recommendation is to protect the power plant and the *5ESS*®-2000 switch from power surges that could cause equipment damage. Although some offices have been able to minimize the duration of the recovery by deviating from the recommended recovery steps, any decision to do so should be made by the operating company with knowledge that any of the following could occur if the battery load is not removed:

- The further the batteries discharge below -42 volts, the greater the risk of battery cell reversal. There is also the possibility that the rectifiers could become damaged if rectifier power is restored to the batteries while the batteries are in deep discharge.
- The Power Control Fuse Distribution (PCFD) bays are equipped with a capacitor charge circuit. The charge circuit is used to charge the filter capacitors in the application cabinets (AM, CM, SM/SM-2000, and CNI Ring Node). A sudden increase of voltage to the filter capacitors could cause the PCFD fuses to clear (open/trip) as well as the fuses in the application cabinets.

CAUTION 1: It is assumed that the person who executes this procedure understands the risk of not removing the battery load before restoring power if the voltage is below -42 volts. This procedure also assumes that the power plant rectifiers are in a state where they **WILL NOT** cause the rectifiers DC output voltage to increase if the commercial A/C voltage, or the standby plant A/C generator voltage, is available as an input voltage for the rectifiers.

CAUTION 2: The use of this procedure in situations where the voltage is below -42 volts may cause fuses to clear and/or damage to the application hardware circuits. When possible, it is strongly recommended that replacement fuses and replacement circuit packs (such as, spare line unit packs and power unit packs) be available for the recovery.

PROCEDURE

1. Is the power plant voltage below -42 volts?

   If **YES**, continue with the next step.

   If **NO**, proceed to Step 5.

2. Are you sure you ***DO NOT*** want to remove the battery load?

   If **YES**, continue with the next step.

   If **NO**, exit this procedure and proceed to Procedure 3.2.3 — Low Voltage - Battery Discharge at the Host or Remote Offices.

3. At the hardware application cabinets, and when applicable, use the following substeps to prepare the units that are sensative to in-rush current for the return of power.

(a) Only **for LUs without APR compatible hardware:** For each LU that is not equipped with **all TN1058C grids,** unseat the TN831 gdxacc pack first, the TN832 second, and then unseat all grids. When needed, see Procedure 3.3.5 .

(b) Only for **ISLUs powered by a PCFD cabinet:** If a 2-amp (ED-82930-30, G1) charge circuit is equipped, unseat the fuses in the ISLU cabinet that power the ISLU. If a 15-amp (ED-82950-30, G2) charge circuit is equipped, no manual action is required. When needed, see Procedure 3.3.6 .

(c) Only for **PSUs equipped with non-B or non-C suffixed PHs:** Unseat all non-B or non-C suffixed **PH** circuit packs. When needed, see Procedure 3.3.7 .

(d) For **CNI "Ring Node" cabinets:** Unseat all of the circuit packs and power converters in the Ring Node cabinet. When needed, see Procedure 3.3.3 or Procedure 3.4.1 .

(e) Only **for 340 MHD drives:** Release the start button, and then **turn off** the **MHD** circuit breaker switch (next to the disk drive). When needed, see Procedure 3.3.3 .

4. This step has been reached because the power plant voltage is at some level below -42 volts, and the units that are sensative to in-rush current have been prepared for the power surge. When ready to increase the battery voltage, observe the following ***Caution***, perform the action described in the following step, and then continue with the next step.

   CAUTION: This step should not be performed without the approval of the operating companies management (the decision should be based on local practices).

   At the office power plant, systematically increase the power level by phasing in one power plant rectifier at a time. This means, power-up one rectifier and let the system absorb its power output. Wait approximately 1 minute, and then power-up another rectifier. Continue this systematic method until all of the rectifiers have been returned to the online state.

5. Did the rectifier shut down?

   If **YES**, the rectifier may be defective, or there is a problem that affected the rectifiers DC output bus. **Seek technical assistance**.

   If **NO**, continue with the next step.

6. Are there any power plant PPDB circuit breakers/fuses or PCFD/GPDF fuses in the cleared state?

   If **YES**, use Procedures 3.3 and 3.4 to resolved the problem, and then repeat to this step.

   If **NO**, continue with the next step.

7. Are there any application cabinet (AM, CM, SM/SM-2000, or CNI-RN) fuses blown?

   If **YES**, use Procedure 3.6 to resolve the problem, and then continue with the next step.

   If **NO**, continue with the next step.

8. Proceed based on the applicable case:

   - To power-up and initialize the **Host Office**, continue with Step 9.
   - To power-up and initialize the **Remote Office**, continue with Step 18.

9. At the Host Office, use the following substeps to power-up at least one SM/SM-2000, and then continue with

the next step.

NOTE: At least one SM/SM-2000 must be powered-up in order for the AM to successfully initialize. Although only one SM/SM-2000 is necessary, it is recommended to continue this power-up activity in parallel with the CM, CNI, and AM power-up. When needed, see Procedure 3.5 for the unit specific power-up procedure.

(a) Power-up the SM/SM-2000 peripheral units (for example, LUs, DLTUs, IDCUs, etc.).

(b) Power-up the SM DLI/RLIs.

(c) Power-up the SM/SM-2000 MCTSIs.

10. Power-up the CM units. When needed, see Procedure 3.5 .

11. Power-up the CNI units. When needed, see Procedure 3.5 .

12. Power-up the AM by performing the following substeps, and then continue with the next step.

NOTE: If known, use Substep (c) to configure the DFC that controls the most reliable disk. The disk that was powered down gracefully during Procedure 3.7 (if performed) is more than likely the most reliable disk. (If even MHDs, power-up DFC #0. If odd MHDs, power-up DFC #1).

(a) Power-up the MCC.

(b) Power-up the MHDs.

(c) Select and power-up the DFC that is deemed to be the most reliable.

(d) Power-up the IOPs.

(e) Power-up the CUs.

13. Use the following substeps to manually initialize the AM, CM, and CNI Ring Node, and then continue with the next step.

NOTE: Individual/groups of SM/SM-2000s are automatically initialized as SM/SM-2000s establish communication to the AM/CM.

(a) At the MCC, access the EAI page.

(b) Clear the EAI display, enter CMD: **14**

(c) Force the active CU online, enter CMD: **12**

(d) Select application parameter, enter CMD: **42**

(e) Enter parameter to initialize CNI and CM, enter parameter: **9**

(f) Select the AM initialization type, enter CMD: **54**

(g) Confirm request, enter boot (y/n): **y**

14. Did the AM complete its initialization sequence?

If **YES**, continue with next step.

If **NO**, observe the following note and **seek technical assistance**.

NOTE: Decode failing Processor Recovery Message (PRM) to identify cause of initialization failure. System escalation may be able to reconfigure to a working configuration.

15. Access SM/SM-2000 summary display Pages 141, 142, etc. Have any SM/SM-2000s started and completed its initialization sequence?

    If **YES**, continue with next step.

    If **NO**, observe the following note.

    NOTE: For each SM/SM-2000 that fails to start and complete its initialization sequence, verify the SM/SM-2000 has power, and then use Procedures 6.2 and 6.3 to find and correct SM/SM-2000 problem(s). Once the problem(s) have been resolved, continue with the next step.

16. Access the CNI display Page 118. Did the CNI Ring Nodes return to the in-service active state?

    If **YES**, continue with the next step.

    If **NO**, go to Procedure 7.1 and control the repair of a CNI failure. When needed, **seek technical assistance**.

17. Monitor the status of the recovery. Use Procedures 6.2 and 6.3 to resolve any SM/SM-2000 initialization failure. Once an SM/SM-2000 completes it initialization cycle, refer to Procedure 8.2 and determine if call processing has been restored. When needed, **seek technical assistance**. You have completed this procedure!

18. Use the applicable unit power-up steps in Procedure 3.5 to power-up the remote SM/SM-2000 units.

19. At the MCC/STLWS 1800,*x* page, where *x* = the affected remote SM/SM-2000s, clear isolation and then initialize the remote.

    - On the 1800,*x* page, enter poke: **503**
    - On the 1800,*x* page, enter poke: **923**

20. Once the remote returns to the operational state, refer to Procedure 8.2 to monitor the status of call processing. If the remote fails to initialize, refer to the applicable procedure in this document to resolve the initialization failure.

Procedure 3.2.5: ONE OR MORE PRIMARY POWER DISTRIBUTION BAY OVER-CURRENT PROTECTION DEVICES HAVE CLEARED

OVERVIEW

The following steps assumes that one or more power plant Primary Power Distribution Bay (PPDB) Over-current Protection Devices (OPDs) are in the cleared state (tripped/opened). This means, the power plant OPD that supply power downstream to the Secondary Power Distribution Bay is in the tripped or opened state [that is, either a Global Power Distribution Frame (GPDF) power bus or a Power Control Fuse Distribution (PCFD) power bus].

NOTE: In order to expedite the recovery, it is recommended that more than one technicians be onsite to assist with any manual recovery actions. When possible, one person should focus on preparing the circuits that are sensitive to in-rush current for the return of power while another person focuses on restoring power to the affected PCFD and/or GPDF power buses.

PROCEDURE

1. Prepare the affected PCFD bus(es) or the GPDF bus(es) for the return of power.

   - Correlate the affected power plant OPD (fuse/circuit breaker) with a PCFD/GPDF power bus.
   - Unseat all fuses in the bus without power. If a PCFD bus, unseat the indicator fuses first, load fuses second, and the filter fuses last. If a GPDF bus, unseat the load fuses first, and the filter fuses last.

2. Does the affected power plant OPD supply power to a unit that is sensative to in-rush current?

   NOTE: Step 3, Substeps (a) through (e) identifies the units that are sensative to in-rush current.

   If **YES**, continue with next step.

   If **NO**, proceed to Step 4.

3. When applicable, use the following substep to identify and prepare the units that are sensative to in-rush current for the return of power, and then continue with the next step.

   (a) Only **for LUs without APR compatible hardware:** For each LU that is not equipped with **all TN1058C grids,** unseat the TN831 and TN832 gdxacc packs, and then all grids according to the LU pack removal sequence. When needed, see Procedure 3.3.5 .

   (b) Only for **ISLUs powered by a PCFD cabinet:** If a 2-amp (ED-82930-30, G1) charge circuit is equipped, unseat the fuses in the ISLU cabinet that power the ISLU. If a 15-amp (ED-82950-30, G2) PCFD charge circuit is equipped, no manual action is necessary. When needed, see Procedure 3.3.6 .

   (c) Only for **PSUs equipped with non-B or non-C suffixed PHs:** Unseat all non-B or non-C suffixed **PH** circuit packs. When needed, see Procedure 3.3.7 .

   (d) For **CNI "Ring Node" cabinets:** Unseat all of the circuit packs and power converters in the Ring Node cabinet. When needed, see Procedure 3.3.3 or Procedure 3.4.1 .

   (e) Only **for 340 MHD drives:** Release the start button, and then **turn off** the **MHD** circuit breaker switch (next to the disk drive). When needed, see Procedure 3.3.3 .

4. Use the following substeps to reinsert SPDB fuses. For each affected PCFD bus, perform Substeps (a) through (c). For each affected GPDF bus, perform Substep (d). Once power is restored, continue with the next step.

   (a) Charge, and then reinsert the PCFD filter fuses into the affected PCFD power bus. When needed, see Procedure 3.3.2 .

   (b) Charge, reinsert the PCFD load, and then indicator fuses into the affected PCFD power bus. When needed, see Procedures 3.3.3 .

   (c) Power-up the affected units. When needed, see Procedure 3.5 .

   (d) Restore GPDF power to the backplane of the affected unit by inserting the GPDF fuses into the affected GPDF power bus(es). Be sure to observe all cautions. Once the fuse are inserted, power-up the affected units. When needed, see GPDF Procedure 3.4 and/or the Application Unit Power-up Procedure 3.5 .

5. If application hardware cabinet unit fuses are blown, refer to Procedure 3.6 .

6. Restore the units to the operational state. Once operational, refer to Procedure 8.2 to monitor the status of call processing.

Procedure 3.3: PCFD POWER RESTORATION

OVERVIEW

This procedure restores power to the *5ESS*®-2000 switch application units that are without power because of a blown Power Control Fuse Distribution (PCFD) bus panel fuse(s), or because one or more PCFD power plant Over-current Protection Devices (OPDs) are in the cleared state (are tripped/opened). This procedure is divided into seven procedures that are based on a specific PCFD power restoration task. Procedure 3.3.1 restores power to a PCFD bus that does not have power because its power plant OPD has cleared. The other procedures will condition the application units for the return of power when applicable, and reinserts PCFD fuses. When needed, **seek technical assistance**.

CAUTION 1: There are steps in this procedure that require support personnel to unseat fuses and/or circuit packs prior to restoring power. When restoring PCFD power, always adhere to the applicable power restoration steps in Procedure 3.3 . Failure to do so may result in equipment damage.

CAUTION 2: The duration of a power-related service outage is dependent on the return of the source power, procedural awareness, and the number of support staff available to assist with any manual recovery tasks. Power-related service outages should always be escalated to the next level of support and to the appropriate technical support organization in Lucent Technologies.

PROCEDURE

1. Use the following list of procedures to restore PCFD power:

   (a) Procedure 3.3.1 — PCFD Power Plant Circuit Is Tripped/Opened

   (b) Procedure 3.3.2 — PCFD Filter Fuse Alarm/Replacement

   (c) Procedure 3.3.3 — PCFD Load Fuse Replacement for All Units Except LUs, ISLUs/RISLUs, and PSUs

   (d) Procedure 3.3.4 — PCFD Load Fuse Replacement for LU3s With APR Grids

   (e) Procedure 3.3.5 — PCFD Load Fuse Replacement for LUs with Non-APR Grids

   (f) Procedure 3.3.6 — PCFD Load Fuse Replacement for ISLUs/RISLUs

   (g) Procedure 3.3.7 — PCFD Load Fuse Replacement for PSUs.

Procedure 3.3.1: PCFD POWER PLANT CIRCUIT IS TRIPPED/OPENED

OVERVIEW

This section restores power to a PCFD power bus that does not have voltage because its power plant circuit has cleared. The PCFD cabinet number along with the power bus number should be stamped next to the ower plant Over-current Protection Device (OPD). If at least one side of an AM and/or CM bus panel has power, restore power to the SM/SM-2000s first, and then focus on restoring power to the other complexes. If power has been removed from both sides of a PCFD bus panel (that is, A1-side and B1-side), and if the AM and/or CM is affected, restore power to the AM and/or CM first.

CAUTION: DO NOT repair a power/battery plant OPD that is in the cleared state until after the PCFD fuses (indicator, load, and filter) that are associated with the affected power bus have been unseated (Step 2).

PROCEDURE

1. Associate the PCFD bus(es) that do not have voltage with its power plant OPD, and then continue with the next step.
2. Use Substep (a) and (b) to prepare the PCFD bus(es) without power for in-rush current.
   (a) For each affected load fuse position, unseat the indicator fuse first, and the load fuse second.
   (b) Once the load and indicator fuses are unseated, unseat the filter fuses.
3. Restore power to the bus(es), and then continue with the next step.
   - If the affected power plant OPD is a circuit breaker, move the lever on the circuit breaker from the tripped to **OFF** position, and then back to the **ON** position.
   - If the affected power plant OPD is a fuse, re-insert a good fuse.
4. Once power has been restored to the affected bus(es), refer to the appropriate procedure to reinsert PCFD fuses. The fuse procedures are as follows:
   - Procedure 3.3.2 — PCFD Filter Fuse Alarm/Replacement
   - Procedure 3.3.3 — PCFD Load Fuse Replacement for All Units Except LUs, ISLUs/RISLUs, and PSUs
   - Procedure 3.3.4 — PCFD Load Fuse Replacement for LU3s With Only APR Grids (LU3 equipped with all TN1058Cs)
   - Procedure 3.3.5 — PCFD Load Fuse Replacement for Model 1 and 2 LUs, and LU3s that are not equipped with all TN1058Cs
   - Procedure 3.3.6 — PCFD Load Fuse Replacement for ISLUs/RISLUs
   - Procedure 3.3.7 — PCFD Load Fuse Replacement for PSUs.

Procedure 3.3.2: PCFD FILTER FUSE ALARM/REPLACEMENT

OVERVIEW

Use this section to replace blown (or reinsert good) PCFD filter fuses. DO NOT use this procedure to insert load fuses. Failure to adhere to the applicable load fuse insertion procedure can result in equipment damage.

PROCEDURE

1. Does the affected PCFD power bus with the filter fuse(s) to be replaced (or re-inserted) have power?

   If **YES**, continue with the next step.

   If **NOT SURE**, go to the power plant and determine if the Over-current Protection Device that powers the affected PCFD power bus is in the cleared state (tripped/opened).

   If **NO**, refer to Procedure 3.3.1 .

2. Use the following substeps to charge the affected filter fuse position(s), and then continue with the next step.

   NOTE: If the filter alarm LED goes off and then goes active, the filter fuse may not have been reinserted within the 6-second threshold. Repeat Step 2. If the LED does not go off, replace the fuse. If the LED still fails to go off, check the power plant for a cleared OPD.

   (a) If the fuse(s) in the affected position(s) has not been unseated, unseat it.

   (b) At the PCFD control panel, pull outward on the **CHG PROBE** and insert the probe into the affected filter fuse position.

   (c) Use one hand to push and hold inward on the **CAP CHG TEST** switch; the **CAP CHG** LED lights (red) and goes off. Once the red LED goes off, remove the **CHG PROBE** quickly and use the other hand to insert the **30 amp filter fuse** within 6 seconds.

3. If you have reached this step, the affected PCFD filter fuse position has been charged, the filter fuses have been inserted, and the fuse alarm has been retired. When warranted, refer to the applicable PCFD load fuse replacement procedure.

Procedure 3.3.3: PCFD LOAD FUSE REPLACEMENT FOR ALL UNITS EXCEPT LUs, ISLUs/RISLUs, AND PSUs

OVERVIEW

Use this procedure to replace blown (or reinsert good) PCFD load fuses that power all *5ESS*®-2000 switch units except LUs, ISLUs/RISLUs, or PSU. DO NOT insert a PCFD load or indicator fuse until after the affected fuse position has been charged, and when applicable, the units that are sensative to in-rush current have been conditioned for the return of power.

PROCEDURE

1. Proceed based on the applicable case.
   - If the affected load fuse does not power a 340 MHD, proceed to Step 4.
   - If the affected load fuse powers the CNI Ring Node (RN) cabinet, proceed to Step 2.
   - If the affected load fuse powers a 340-SMD MHD, proceed to Step 3.
2. Prepare the circuits in the CNI RN cabinet that are without power for in-rush current by unseating the affected circuit packs and power converter(s), and then continue with Step 4.
3. Prepare the affected 340-SMD MHD for the return of -48 volt power by performing Substeps (a) and (b), and then proceed to Step 4.

   (a) At the affected 340-SMD MHD, release the MHD **start** switch.

   (b) At the MHD power converter (next to MHD), set the circuit breaker switch to the **OFF** position.
4. Use the following substeps to charge the affected PCFD load fuse position(s), and then continue with the next step.

   NOTE: If the indicator fuse blows, either the fuses were defective, the **CAP CHG TEST** switch was released before the load fuse was inserted, or there is a problem at the unit cabinet level. When needed, **seek technical assistance**.

   (a) If the fuses in the affected position(s) have not been unseated, unseat the indicator fuse first, and then unseat the load fuse. If the indicator fuse is blown, secure replacement fuses (load and indicator), and then continue.

   (b) At the PCFD control panel, pull outward on the **CHG PROBE**, and then insert and lock the probe into the **INDICATOR** fuse position.

   (c) Use one hand to push and hold inward on the **CAP CHG TEST** switch; the **CAP CHG** LED lights red and then goes off. Once the LED goes off, and while the **CAP CHG TEST** switch is still held inward, use the other hand to insert the **20 amp LOAD** fuse.

   (d) Release the switch, remove the probe, and insert a good **INDICATOR** fuse.
5. Once PCFD power has been restored to the application hardware unit(s), restore circuit power per applicable power-up procedure (Procedure 3.5).

Procedure 3.3.4: PCFD LOAD FUSE REPLACEMENT FOR LU3s WITH APR GRIDS

OVERVIEW

Use this procedure to replace blown (or reinsert good) PCFD load and indicator fuses that power a Model 3 LU that is equipped with all APR grid circuit packs (LU with all TN1058C grids). DO NOT reinsert a PCFD fuse (load or indicator) until the affected fuse position has been charged (Step 2).

CAUTION: If the affected LU3 IS NOT equipped with all APR grids, exit this procedure and refer to Procedure 3.3.5 .

PROCEDURE

1. Use the following substeps to charge the affected PCFD load fuse position(s), and then continue with the next step.

   (a) If the fuses in the affected position(s) have not been unseated, unseat the indicator fuse first, and then unseat the load fuse. If the indicator fuse is blown, secure replacement fuses (load and indicator), and then continue.

   (b) At the PCFD control panel, pull outward on the **CHG PROBE**, and then insert and lock the probe into the **INDICATOR** fuse position.

   (c) Use one hand to push and hold inward on the **CAP CHG TEST** switch; the **CAP CHG** LED lights red and then goes off. Once the LED goes off, and while the **CAP CHG TEST** switch is still held inward, use the other hand to insert a good **20 amp LOAD** fuse.

   (d) Release the switch, remove the probe, and insert a good **INDICATOR** fuse.

   NOTE: If the indicator fuse blows, either the fuses were defective, the **CAP CHG TEST** switch was released before the load fuse was inserted, or there is a problem at the LU cabinet level. When needed, **seek technical assistance**.

2. Was a 15-amp (ED-82950-30, G2) PCFD charge circuit used to charge the affected PCFD fuse positions?

   If **YES**, and if the LU APR capability is fully implemented (LU with all TN1058C grids and APR activation connectors), continue with Step 3. If the capability is not fully implemented, perform the task described in the **NO** case.

   If **NO**, power-up the affected LUs by pressing the **ST** (start) button on the LU power converters. If the converter alarm LED goes off, continue with Step 3. If the alarm LED does not go off, refer to Procedure 3.5 to power-up the LU.

3. Power has been restored to the affected LU. Restore the LU to the operational state. If operational problems occur, refer to the 235-105-220, *Corrective Maintenance*, document for assistance.

Procedure 3.3.5: PCFD LOAD FUSE REPLACEMENT FOR LUs WITH NON-APR GRIDS

OVERVIEW

Use this procedure to replace blown (or reinsert good) PCFD load and indicator fuses that power a Model 1 or Model 2 Line Unit (LU1/LU2), or any Model 3 LU (LU3) that is equipped with all TN1058C grid boards. DO NOT reinsert a PCFD fuse until after the affected LU has been conditioned for in-rush current (Step 1), and until the affected load fuse position has been charged (Step 2).

PROCEDURE

1. Proceed based on the applicable case.
   - For Model 2 and Model 3 LUs, proceed to Step 2.
   - For Model 1 LUs, proceed to Step 3.

2. Use the following substeps to prepare the affected Model 2 or Model 3 LU(s) for the return of power, and then continue with the next step.

   (a) In SG 0 and SG 1, unseat the TN831 pack first, and then the TN832.

   (b) Unseat all the grids in the LU.

3. Use the following substeps to prepare the affected Model 1 LUs for the return of power, and then continue with the next step.

   (a) In LU SG 0 and SG 1, unseat the TN331 pack first, and then the TN332.

   (b) Unseat the two TN338s, and then the TN340 pack for each equipped grid.

4. Use the following substeps to charge the affected PCFD load fuse position(s), and then continue with the next step.

   (a) If the fuses in the affected PCFD position have not been unseated, unseat the indicator fuse first, and then unseat the load fuse. If the indicator fuse is blown, secure replacement fuses (load and indicator), and then continue.

   (b) At the PCFD control panel, pull outward on the **CHG PROBE**, and then insert and lock the probe into the **INDICATOR** fuse position.

   (c) Use one hand to push and hold inward on the **CAP CHG TEST** switch; the **CAP CHG** LED lights red and then goes off. Once the LED goes off, and while the **CAP CHG TEST** switch is still held inward, use the other hand to insert the **20 amp LOAD** fuse.

   (d) Release the switch, remove the probe, and insert a good **INDICATOR** fuse.

   NOTE: If the indicator fuse blows, either the fuses were defective, the **CAP CHG TEST** switch was released before the load fuse was inserted, or there is a problem at the LU cabinet level. When needed, **seek technical assistance**.

5. Once PCFD power has been restored to the LU Cabinet, proceed to Procedure 3.5.2 — LU power-up procedure.

Procedure 3.3.6: PCFD LOAD FUSE REPLACEMENT FOR ISLUs/RISLUs

OVERVIEW

Use this procedure to replace blown (or reinsert good) PCFD load and indicator fuses that power a Model 1 or Model 2 Integrated Service Line Unit (ISLU) or a Remote Integrated Service Line Unit (RISLU).

PROCEDURE

1. Observe the PCFD charge circuit stamping on the PCFD control panel.

   If ED-82950-30, G1 (2-amp circuit), continue with Step 2.

   If ED-82950-30, G2 (15-amp circuit), proceed to Step 3.

2. Prepare the ISLU/RISLU for the return of -48 volt power by unseating the fuses in the ISLU cabinet fuse block without power.

3. Use the following substeps to charge the affected PCFD load fuse position(s), and then continue with the next step.

   (a) If the fuses in the affected PCFD position have not been unseated, unseat the indicator fuse first, and then unseat the load fuse. If the indicator fuse is blown, secure replacement fuses (load and indicator), and then continue.

   (b) At the PCFD control panel, pull outward on the **CHG PROBE**, and then insert and lock probe into the **INDICATOR** fuse position.

   (c) Use one hand to push and hold inward on the **CAP CHG TEST** switch; the **CAP CHG** LED lights red and then goes off. Once the LED goes off and while the **CAP CHG TEST** switch is still held inward, use the other hand to insert the **20 amp LOAD** fuse.

   (d) Release the switch, remove the probe, and insert a good **INDICATOR** fuse.

   NOTE: If the indicator fuse blows, either the fuses were defective, the **CAP CHG TEST** switch was released before the load fuse was inserted, or there is a problem at the ISLU/RISLU cabinet level. When needed, **seek technical assistance**.

4. Once PCFD power has been restored, proceed to Procedure 3.5.3 to power-up the ISLU/RISLU, and to insert any fuses that were removed in Step 2.

Procedure 3.3.7: PCFD LOAD FUSE REPLACEMENT FOR PSUs

OVERVIEW

Use this procedure to replace blown (or reinsert good) PCFD load and indicator fuses that power a Model 1 or Model 2 Packet Switch Unit (PSU). DO NOT reinsert PCFD fuses that powers a PSU until after the affected fuse position has been charged (Step 3).

CAUTION: If the affected PSU is equipped with TN1081 (MC5D115A1), TN1366 (MC5D100A10), or TN1367 (MC5D146A1) Protocol Handlers (PHs) circuit packs, the PHs must be unseated before PCFD fuses are inserted (Step 1 and, if applicable, Step 2).

PROCEDURE

1. Does the PCFD load fuse to be replaced power a **non-B or non-C suffixed PH** circuit pack?

   If **YES**, continue with Step 2.

   If **NO**, proceed to Step 3.

2. Prepare the affected PSU for the return of power by unseating the **non-B or non-C suffixed PHs** (such as, TN1081, TN1366, and TN1367), and then continue with the next step.

3. Use the following substeps to charge the affected PCFD load fuse position(s), and then continue with the next step.

   (a) If the fuses in the affected PCFD position(s) have not been unseated, unseat the indicator fuse first, and then unseat the load fuse. If the indicator fuse is blown, secure replacement fuses (load and indicator), and then continue.

   (b) At the PCFD control panel, pull outward on the **CHG PROBE**, and then insert and lock probe into the **INDICATOR** fuse position.

   (c) Use one hand to push and hold inward on the **CAP CHG TEST** switch; the **CAP CHG** LED lights red and then goes off. Once the LED goes off, and while the **CAP CHG TEST** switch is still held inward, use the other hand to insert a good **20 amp LOAD** fuse.

   (d) Release the switch, remove the probe, and insert a good **INDICATOR** fuse.

   NOTE: If the indicator fuse blows, either the load and/or indicator fuse was defective, the **CAP CHG TEST** switch was released before the load fuse was inserted, or there is a problem at the PSU cabinet level. When needed, **seek technical assistance**.

4. Once PCFD power has been restored, proceed to Procedure 3.5.3 to power-up the PSU.

Procedure 3.4: GPDF POWER RESTORATION

OVERVIEW

This procedure restores power to the *5ESS*®-2000 switch application units that are without power because of blown Global Power Distribution Frame (GPDF) fuses, or because one or more GPDF power plant Over-current Protection Devices (OPDs) are in the cleared state (are tripped/opened). This procedure is divided into two procedures that are based on a specific GPDF power restoration task. Procedure 3.4.1 restores power to a GPDF bus that does not have power because its power plant OPD has cleared. Procedure 3.4.2 conditions the application units level for the return of power when applicable, and reinserts GPDF fuses. When needed, **seek technical assistance**.

The GPDFs are equipped with a minimum of one, and a maximum of four fuse (bus) panels. Each GPDF bus panel has two sides, Bus A and Bus B. There are 24 load fuse positions and 2 filter fuse positions associated with each bus. Each GPDF fuse position is equipped with a fuse holder that has a light-emitting diode (LED) on its faceplate. The GPDF only uses a 25-amp fuse in both load and filter fuse positions. If a GPDF fuse clears (trip/blows), the LED on the fuse holder faceplate will light.

> **CAUTION 1:** There are steps in this procedure that require support personnel to unseat fuses and/or circuit packs prior to restoring power. When restoring GPDF power, always adhere to the applicable power restoration steps in Procedure 3.3 . Failure to do so may result in equipment damage.

CAUTION 2: The duration of a power-related service outage is dependent on the return of the source power, procedural awareness, and the number of support staff available to assist with any manual recovery tasks. Power-related service outages should always be escalated to the next level of support and to the appropriate technical support organization in Lucent Technologies.

PROCEDURE

1. Use the following list of procedures to restore GPDF power:

   (a) Procedure 3.4.1 — GPDF Power Plant OPD Is in the Cleared State

   (b) Procedure 3.4.2 — GPDF Fuse Replacement.

Procedure 3.4.1: GPDF POWER PLANT OPD IS IN THE CLEARED STATE

OVERVIEW

This section restores power to a GPDF power bus that does not have voltage because its power plant Over-current Protection Device (OPD) is in the cleared state (tripped/opened). The GPDF number and bus should be stamped next to the power plant OPD. If at least one side of an AM and/or CM panel has power, restore SM/SM-2000 power first, and then focus on restoring power to the other complexes. If power has been removed from both sides of a GPDF bus panel (such as, the A1-side and B1-side), and if the AM and/or CM is affected, restore power to the AM and/or CM first.

CAUTION: DO NOT repair a power/battery plant OPD that is in the cleared state until after the GPDF fuses (load and filter) that are associated with the affected power bus have been unseated (Step 2). Once a GPDF load fuse has been unseated, for whatever reason, refer to Procedure 3.4.2 to replace/reinsert GPDF fuses.

PROCEDURE

1. Associate the GPDF power bus(es) that is without voltage with its power plant OPD, and then continue with the next step.

2. Does the affected bus(es) **only** power hardware that is compatible with the APR feature?

   If **YES**, proceed to Step 4.

   If **NO**, continue with next step.

3. Use the applicable substep to condition the units for the return of power.

   (a) For each LU that is not equipped with **all TN1058C grids**, unseat the TN831 and TN832 packs, and then all grids according to the LU pack removal sequence.

   (b) Unseat all non-B or non-C suffixed PSU Protocol Handler circuit packs.

   (c) Unseat all of the circuit packs and power converters in the Ring Node (RN) cabinet.

   (d) Only for **340 MHDs:** Release the start button, and then **turn off** the **MHD** circuit breaker switch (beside the disk drive).

4. Unseat all GPDF fuses that are associated with power plant OPD that is in the cleared state.

5. Return the power plant OPD to the closed state (reset the circuit breaker to the **ON** position, or insert a good power plant fuse).

6. Reinsert the GPDF fuses.

7. Once power has been restored to the backplane of the affected unit, go to Procedure 3.5 to power-up the application units, and when warranted, to insert any unit circuit packs.

Procedure 3.4.2: GPDF FUSE REPLACEMENT

OVERVIEW

Use this procedure to replace a blown GPDF load or filter fuse. This procedure assumes that the affected GPDF bus has power.

CAUTION: Inserting a GPDF fuse into a live plant will cause arching and sparks. The support person inserting the fuse may also hear a popping noise. When replacing GPDF fuses, always adhere to the safety precautions (that is, wear safety glasses; make sure other personnel are clear from the front and back of the unit; do not stand directly in front of the holder when inserting; and try to quickly insert fuse holder into base to reduce the amount of arcing).

PROCEDURE

1. Does the affected GPDF power bus have power?

   If **YES**, continue with the next step.

   If **NOT SURE**, go to the power plant and determine if the OPD that power the affected GPDF bus is in the cleared state.

   If **NO**, exit this procedure and refer to Procedure 3.4.1 .

2. Does the GPDF fuse to be replaced (or inserted) power a unit that is compatible with the APR feature?

   If **YES**, proceed to Step 4.

   If **NO**, continue with the next step.

3. Use the applicable substep to prepare the units that are not compatible with the APR feature for the return of power, and then continue with the next step.

   (a) If applicable, prepare the CNI Ring Node circuits for the return of power. Unseat the affected RN circuit packs and power unit packs.

   (b) If applicable, prepare the affected Model 2 LU and any Model 3 LU which is not equipped with all TN1058C grids for the return of power. Unseat the TN831 and TN832 packs, and then unseat all grids.

4. If the fuse holder in the affected GPDF position(s) has not been unseated, unseat it, and then insert a good 25 amp fuse.

5. Reinsert the fuse holder. If the LED does not light, proceed to Step 6. If the LED lights, the fuse just inserted may be defective, or there is a problem at the application hardware cabinet level. Replace the fuse a second time. If the problem persists, **seek technical assistance**.

6. Once a good GPDF fuse is inserted, power has been restored to the backplane of the affected unit. At this point, the units that have the auto-start capability will power-up automatically. To power-up the units that do not have the automatic power-up capability or to reinsert unit circuit packs, refer to Procedure 3.5 .

Procedure 3.5: POWER-UP *5ESS*®-2000 SWITCH APPLICATION HARDWARE UNITS

OVERVIEW

The intent of this procedure is to provide the basic set of instructions for powering-up the *5ESS*®-2000 switch application hardware units in the Administrative Module (AM), Communication Module (CM), Switching Module and Switching Modules-2000 (SM/SM-2000), Remote SM/SM-2000, and Common Network Interface Ring Node (CNI-RN) complexes. This procedure assumes that the voltage at the unit level is above -42 volts, and that the unit only needs a start-up voltage to restore circuit power. If the entire office is shut down (no call processing), proceed (when needed) to Procedure 3.2 and establish a recovery execution plan.

NOTE 1: Most units are equipped with unit power Control and Display (C/D) packs and/or unit power converters. The unit power packs have a red **OFF** light-emitting diode (LED) that lights when the power pack (C/D pack or converter) shuts down. If the LED fails to go off when the **ON or ST** (start) button is pressed, the unit power pack(s) is more than likely defective. Another possibility is that the input voltage is too low, or a unit circuit pack is defective. If the unit does not power-up because source power is not present on the units backplane, exit this procedure and refer to the applicable procedure to check for a blown application cabinet fuse, or a blown fuse at the secondary power distribution bay [Power Control Fuse Distribution (PCFD) bay or the Global Power Distribution Frame (GPDF) bay].

NOTE 2: Although it is important to visually inspect the application hardware cabinets for power alarms, there may be a case where a power converter alarm or fuse alarm LED fails to illuminate because the fuse/converter has become defective. When warranted, use hardware diagnostics and voltage measurement to confirm whether the unit backplane is receiving its source voltage. When needed, **seek technical assistance**.

NOTE 3: This procedure is not intended to be used to troubleshoot unit power-up problems. If a unit does not power-up because there is a problem at the unit level, refer to the 235-105-220, *Corrective Maintenance*, document. If the source of the problem is not known, go to Procedure 3.1 . If an application cabinet fuse clears (trip/blows) while executing this procedure, exit this procedure and go to Procedure 3.6 .

PROCEDURE

1. Use the applicable procedures to power-up the application hardware units:

   (a) Procedure 3.5.1 — Power-Up All Units Except LUs, ISLUs/RISLUs, and PSUs

   (b) Procedure 3.5.2 — Power-Up LUs

   (c) Procedure 3.5.3 — Power-Up ISLU/RISLUs and PSUs.

Procedure 3.5.1: POWER-UP APPLICATION HARDWARE UNITS FOR ALL UNITS EXCEPT LUs, ISLUs/RISLUs, AND PSUs

OVERVIEW

This procedure restores circuit power to the *5ESS*®-2000 switch application units in the AM, CM, SM/SM-2000, Remote SM/SM-2000, and CNI-RN. When restoring SM/SM-2000 power, power-up the peripherals first, the DLIs/RLIs second, and MCTSIs last. If the affected unit does not power-up, observe ***Notes 1 and 2*** of Procedure 3.5 .

PROCEDURE

1. Depending on the affected unit, proceed as outlined in the following substeps:
   (a) For **AM** (*3B20D/3B21D*) units, perform Step 2.
   (b) For **340-SMD** MHDs, perform Step 3.
   (c) For **SCSI-DUP** MHDs, perform Step 4.
   (d) For **3B21D SCSIs** (UN375), perform Step 5.
   (e) For **3B21D DATs** (UN376B), perform Step 6.
   (f) For **CM** units, perform Step 7.
   (g) For **SM/SM-2000** units (except LUs and ISLUs/RISLUs, or PSUs), perform Step 8.
   (h) For **CNI Ring Node (RN)** circuits, perform Step 9.
2. After identifying the problem unit (CU, IOP, or DFC), observe the following note, and then proceed based on the applicable substep.

   NOTE: If the power controller has an alarm LED active, toggle the **ACO/T** switch to clear the alarm condition, and then make sure that the **ROS/RST** switch is in the **RST** position prior to pressing the **ON** button.

   (a) For *3B20D*, press the **ON** button on the power controller (CU=TN5B, IOP=TN6B, or DFC=TN6B) and verify that the **OFF** LED goes off.
   (b) For *3B21D*, press the **ON** button on the power controller and verify that the **OFF** LED goes off (CU=TN1821, IOP=TN1820, DFC=UN373B, or UN580).
3. After identifying the problem 340-SMD MHD, perform the following substeps:
   (a) Inspect the MHD's power supply (at side of disk drive). If the circuit breaker switch is not in the **ON** position, set it to **ON**.
   (b) On the MHD control/display panel (immediately below the disk drive), toggle the alarm cutoff and test (ACO/T) key, and then press the **ON** switch and verify that the **OFF** LED goes off.
   (c) On the MHD control/display panel, press the MHD **START SWITCH** and verify that the **START** LED starts flashing. Once the **START** LED stops flashing, MHD power has been restored.

4. After identifying the problem SCSI-DUP MHD, toggle the **ACO/T** key, and then press the **ON** button.

5. After identifying the problem 3B21D SCSI MHD (UN375), toggle the **ACO/T** key, and then rock the **ST** (start) button to the **ST** position.

6. The DAT power is controlled by unseating and reseating the UN376 pack. When reinserting the UN376 pack, make sure the **ACO/T** switch is in the **T** position.

7. After identifying the problem MSCU, MSPU, CMPU, or ONTCCOM, press the **ON** button on the affected unit power controller.

8. After identifying the problem SM/SM-2000 unit(s), perform the applicable substep (when possible, power-up peripheral first, DLI/RLI second, and then MCTSIs).

   CAUTION: When restoring power to an LU, ISLU, or PSU that is not APR compatible, power-up only per applicable unit power-up procedure. Failure to do so may cause equipment damage.

   (a) To power-up LUs, refer to Procedure 3.5.2 . To power-up **ISLUs/RISLUs and PSUs**, refer to Procedure 3.5.3 .

   (b) For DSUs, TUs, MMSUs, and GDSUs, press the **ST** button on the affected power converter.

   (c) For DLTUs and DCLUs, power is restored when the affected circuit pack is seated and locked into position, and the **ST** button on the DLTU/DCLU SN346 circuit pack is pressed.

   (d) For MCTSIs, DLIs, RLIs, and RCLKs, press the **ON** button on the affected power controller. NLI power is controlled by removing and inserting the NLI fuse in the SM-2000 cabinet, which means, power is restored to NLIs once backplane power is restored to the backplane of the NLI BKD boards.

   (e) Perform this step ***only*** if an SM/SM-2000 controller was powered-up before its peripherals.

   Repump the SM/SM-2000; on 1800,*x* page, enter the following: **923**

9. After identifying the problem CNI Ring Node (RN) cabinet, observe the following caution, and then perform the following substeps:

   CAUTION: If an RN power converter does not have power or if the alarm on an RN power converter is lighted, all packs that are powered by the affected converter should be unseated before the converter is replaced/reseated, or before powering-up the affected unit.

   (a) Before restoring power or replacing a power converter, unseat the circuit packs that are powered by the affected unit power pack.

   (b) Replace and/or power-up the power unit pack.

   (c) Reinsert the packs that were unseated in Substep (a).

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 3.5.2: POWER-UP LUs

OVERVIEW

Use this procedure to power-up one or more Line Units (LU) that do not have power because the LU power converter(s) has shut down.

CAUTION: Failure to perform the hardware conditioning step (Step 1), when required, may result in equipment damage.

PROCEDURE

1. Proceed base on the applicable case.
   - If a Model 2 LU or a Model 3 LU that is not equipped with all APR grids, proceed to Step 2.
   - If a Model 1 LU, proceed to Step 3.
   - If a Model 3 LU, and if the unit is equipped with all automatic power recovery grid (all TN1058C grids), proceed to Step 4.
2. For each affected Model 2 and/or Model 3 LU, use Substep (a) through (d) to restore circuit power, and then proceed to Step 5.
   (a) In LU SG 0 and SG 1, unseat the TN831 pack first, and then unseat the TN832. If LU packs are already unseated, disregard this substep.
   (b) Push the **ST** (start) button on the LU power converter. The converter alarm LED should go off. If the LED does not go off, observe ***Note 2*** of Procedure 3.5 .
   (c) If LU grids are unseated, reinsert them.
   (d) For LU SG 0 and SG 1, reinsert the TN832 pack, and then the TN831.
3. For each affected Model 1, use Substep (a) through (e) to restore circuit power, and then proceed to Step 5.
   (a) In LU SG 0 and SG 1, unseat the TN331 pack first, and then unseat the TN332. If the packs are already unseated, disregard this substep.
   (b) For each grid, unseat the two TN338 pack first, and then the 340 pack. If the packs are already unseated, disregard this substep.
   (c) Push the **ST** button on the LU power converter. The converter alarm LED should go off. If the LED does not go off, observe ***Note 2*** of Procedure 3.5 .
   (d) For each grid, insert the TN340 pack first, and then insert the two TN338 packs.
   (e) Reinsert the TN332 pack, and then the TN331.
4. Power-up the LUs equipped with APR grids by pressing the **ST** button on the LU power converter, and then proceed to Step 5. If the converter alarm LED does not go off, observe ***Notes 2*** of Procedure 3.5 .
5. Once LU circuit power has been restored, return the LUCOMC(s) to the active state. If any LU grids are

out-of-service, diagnose the grid ATP/CATP, and then unconditionally restore the grid to the active state (rst:gridbd=w-x-y-z,ucl).

6. Once the grids are active, execute the test grid (TST:GRID) audit on each grid in the affected LU, check for dial tone, and make test calls. If call processing has not been restored, refer to the applicable procedure to resolve the LU operational problem.

Procedure 3.5.3: POWER-UP ISLUs/RISLUs AND PSUs

OVERVIEW

Use this procedure to power-up Model 1 and Model 2 Integrated Services Line Unit (ISLU/ISLU2) or a Remote Integrated Service Line Unit (RISLU/RISLU2) that does not have power because the ISLU/RISLU power converter(s) has shut down. This section is also used to power-up Model 1 and Model 2 PSUs (PSU/PSU2).

CAUTION: If an application cabinet fuse blows during the power-up, refer to Procedure 3.6 to resolve the problem.

PROCEDURE

1. Proceed based on the applicable case.
   - To power-up an **ISLUs/RISLUs**, proceed to Step 2.
   - To power-up a **PSU/PSU2**, proceed to Step 7.

2. Use Substeps (a) through (c) to restore ISLU/RISLU circuit power.

   (a) If ISLU/RISLU cabinet fuses are unseated, reinsert them. If the cabinet fuses are already unseated, disregard this substep.

   (b) Verify that the red **OFF** LED on the power converter is lighted.

   (c) Push the **ST** (start) button on the power converter. The power converter red LED goes off. If the LED does not go off, see ***Note 2*** of Procedure 3.5 .

   (d) Once power has been restored, return the affected ISLU/RISLU to the operational state. If ISLU/RISLU services have not been restored, refer to the applicable procedure to resolve the ISLU/RISLU operational problem.

3. Use Substeps (a) and (b) to power-up the PSU.

   CAUTION: The PSUCOM is powered by Bus A or Bus B, but not both; the Protocol Handler (PH) circuit packs in a Model 1 PSU may be powered by both buses. All PSU2 PHs are only powered by one bus.

   (a) Restore circuit power by inserting and locking the affected PSU circuit pack(s) into its circuit pack position.

   (b) Once power has been restored, return the affected PSU circuit to the operational state. If PSU services have not been restored, refer to the applicable procedure to resolve PSU operational problems.

Procedure 3.6: REPLACE BLOWN FFU OR MFFU FUSES

OVERVIEW

The intent of this procedure is to provide the basic set of instructions for replacing blown *5ESS*®-2000 switch application hardware cabinet fuses. This procedure assumes that the secondary power distribution bay [a Power Control Fuse Distribution (PCFD) or a Global Power Distribution Frame (GPDF)] fuse is supplying power to the application cabinet fuse block which houses the blown fuse. Use the MCC/STLWS and ROP output data, visual inspections, and equipment identification information to identify the affected unit/circuit. If there is an upstream power fault (power plant or PCFD/GPDF), refer to the applicable procedure to respond to the problem.

Application cabinets that are equipped with a Fuse Filter Unit (FFU) or a Modular Fuse Filter Unit (MFFU) have a cabinet fuse alarm LED on the outside top of the cabinet. If the cabinet LED is lighted, determine if any cabinet fuses are blown. If a fuse is blown, it more than likely was caused by an excessive current drain, but it could have be caused by a power surge that originated at the office power plant, or because of a fault within the unit power pack and/or circuit pack. When replacing fuses, make sure that the replacement fuse is of the same physical appearance and power rating (same type and amperage) as the one removed.

> ***NOTE 1:*** The MFFUs (type J5D003FJ-1) can detect the loss of the incoming voltage from the PCFD/GPDF cabinet. If PCFD/GPDF power is lost to an MFFU fuse block, the cabinet fuse alarm LED and all of the LEDs on the affected MFFU fuse block(s) will light as long as one fuse block in the cabinet has power. If more than one LED on an MFFU fuse block is lighted, check the SPDB (PCFD/GPDF) and/or power plant for a power/fuse alarm. The FFUs (types J5D003AU-2, BJ-1, BT-1, FM-1) cannot detect when an incoming power feed is not supplying voltage to an FFU fuse block. If an FFU fuse block does not have power, the cabinet fuse alarm LED will not be lighted.

NOTE 2: Although it is important to visually inspect the application hardware cabinets for power alarms, there may be a case where a fuse alarm or power converter alarm light-emitting diode (LED) fails to illuminate because the fuse/converter has become defective. When warranted, use hardware diagnostics and voltage measurement to confirm whether the unit backplane is receiving its source voltage. When needed, **seek technical assistance**.

PROCEDURE

1. Use the applicable procedures to replace a blown MFFU or FFU fuse.

   (a) Procedure 3.6.1 — Replace FFU/MFFU Fuse for All Units Except LUs, ISLUs/RISLUs, MHDs, and DATs

   (b) Procedure 3.6.2 — Replace Blown FFU/MFFU Fuse That Provides LU Power

   (c) Procedure 3.6.3 — Replace Blown Cabinet Fuse for ISLUs/RISLUs

   (d) Procedure 3.6.4 — Replace Blown Cabinet Fuse for MHDs.

Procedure 3.6.1: REPLACE FFU/MFFU FUSE FOR ALL UNITS EXCEPT LUs, ISLUs/RISLUs, MHDs, AND DATs

OVERVIEW

Use this procedure to replace a blown FFU/MFFU fuse that supplies power for the units/circuits in the application hardware cabinets. Use the pictorial underneath the front bezel (outside top) of the cabinet to associate the blown fuse with the equipment it powers.

CAUTION 1: If the fuse powers an LU, ISLU/RISLU, MHD or DAT, exit this procedure and refer to the applicable fuse replacement procedure in Procedure 3.5 .

CAUTION 2: Do not replace a blown application cabinet fuse until the affected unit/circuit has been downgraded to the out-of-service (OOS) state and until the affected unit circuit packs have been unseated. Do not reinsert a unit circuit pack until unit backplane power has been restored (fuse replaced, and if applicable, power converter has been powered-up).

CAUTION 3: Some units are powered by a cabinet load fuse which is monitored by an indicator (pilot) fuse. When replacing a cabinet load fuse that has a pilot fuse (such as, MCTU2 or CM2 that is powered by an FFU), both the load and pilot fuses must be replaced. Always insert the load fuse before pilot fuse.

PROCEDURE

1. Identify the unit powered by the blown application cabinet fuse.

2. Downgrade the unit to the out-of-service (OOS) state, and then remove power from the unit.

3. Unseat the packs that are powered by the fuse that is blown.

4. Replace the blown fuse with a good fuse (same type as the one removed), and then restore power.

5. Did the good fuse clear (trip/blow)?

   If **YES**, observe the following note.

   If **NO**, continue with Step 6.

   NOTE: It appears that there is a backplane problem. The replacement fuse cleared while the unit circuit pack, and if applicable the unit power pack, was unseated. Inspect the unit backplane for bent pins; and when needed, **seek technical assistance**.

6. Does the affected unit have a power unit pack?

   If **YES**, continue with the next step.

   If **NO**, proceed to Step 9.

7. The fuse just inserted did not clear. Reinsert the power unit pack(s) and any pack that is part of the power interlock circuit. Once the packs are inserted, power-up the unit, and then continue with the next step.

   NOTE: If the affected unit is an SM-2000, the first TSI slice pack (KLU1) must be installed or the SM-2000 will not power-up. The KLU1 is part of the SM-2000 power interlock circuit.

8. Did the good fuse blow after the power unit pack(s) was reinserted?

If **YES**, observe the following note.

If **NO**, proceed to Step 10.

NOTE: It appears that one of the unit power packs is causing the fuse to clear. Remove the blown fuse, and unseat the unit power packs. Reinsert a good fuse, and then eliminate the unit power packs as being the cause of the problem (replace them one at a time until you can power-up the unit with them inserted). If the fuse does not clear with all of the unit power packs inserted, continue with the next step. If the fuse continues to clear, **seek technical assistance**.

9. The fuse did not blow with the power unit packs installed. Reinsert the unit circuit packs (one at a time) using the following substeps.

   (a) Remove power from the affected unit.

   (b) Reinsert a circuit pack, and then restore power.

   (c) If the fuse blows, remove the circuit pack that was just inserted. Replace the fuse, insert a replacement pack, and then restore power.

   (d) If the fuse continues to blow, there could be a unit backplane problem, **seek technical assistance**. If the fuse does not clear, repeat Substeps (a) through (c) until all of the unit circuit packs have been reinserted, and then continue with the next step.

10. If you have reached this point, circuit power has been restored. Return the unit/circuit to the operational state. If operational problems occur, **seek technical assistance**.

Procedure 3.6.2: REPLACE BLOWN FFU/MFFU FUSE THAT PROVIDES LU POWER

OVERVIEW

Use this procedure to replace a blown application hardware cabinet fuse that powers an LU. Use the pictorial underneath the front bezel (outside top) of the cabinet to associate the blown fuse with the equipment it powers. Before executing the steps in this procedure, always downgrade the affected LU service group (SG) and/or grid boards to the out-of-service (OOS) state.

CAUTION: The LUs that are not APR compliant must be conditioned for the return of power. When restoring power, alway follow the applicable step in the sequence specified. Failure to do so could result in equipment damage.

PROCEDURE

1. Determine what LU circuit packs are powered by the fuse to be replaced.
2. Depending on the affected circuits, proceed as outlined in Substeps (a) through (d).

   NOTE: Once the applicable substep has been completed, be sure to return the hardware and lines that are OOS back to the in-service state. If the replacement fuse clears while performing the applicable step, either the LU pack is bad or there is a backplane problem. Try repeating the step; eliminate the affected packs as being a probable cause by replacing them (one at a time).

   (a) For **Model 1 LU grids**, perform Step 3.

   (b) For **Model 1 LUCOMC SGs** (LUCOMC, GDXACC, GDXCON, HLSC, or LUCHAN), perform Step 4.

   (c) For **Model 2 or Model 3 LU grids**, perform Step 5.

   (d) For **Model 2 or Model 3 LUCOMC SGs** (LUCOMC, GDXACC, HLSC, or LUCHAN), perform Step 6.

3. **Only for Model 1 LU grids:** Perform Substeps (a) through (d).

   CAUTION: Always unseat the two TN338 grid boards before unseating their associated TN340 grid board. Always insert the TN340 grid board before inserting its two associated TN338 grid boards.

   (a) Downgrade the affected grid(s) to the OOS state.

   (b) Unseat the affected grid (the two TN338s first, then the TN340).

   (c) Remove the blown fuse and replace it with a good fuse (same type as the one removed).

   (d) Reinsert the grid (the TN340 first, then the two TN338).

4. **Only for Model 1 LU SGs:** Perform Substeps (a) through (d).

   CAUTION 1: When unseating GDXACC (gated diode crosspoints access code) packs, always unseat the TN331 pack in the affected LU SG before unseating the TN332. When reinserting gdxacc packs, make sure the converter alarm LED is off in the affected LU SG before reinserting the packs. And, always reinsert the TN332 pack before the TN331.

   CAUTION 2: When unseating LUCOMC packs, always unseat the TN341 pack in the affected LU SG before unseating the TN342. When reinserting LUCOMC packs, always reinsert the TN342 LUCOMC pack before the TN341.

(a) Downgrade the affected LU SG to the OOS state.

(b) Unseat the affected LU packs.

(c) Remove the blown fuse and replace it with a good fuse (same type as the one removed). Then if applicable, press the ***ST*** (start) button on the unit power converter.

(d) Reinsert the LU packs.

5. **For Model 2 and Model 3 LU grids:** Perform Substeps (a) through (d).

(a) Downgrade the affected grid boards to the OOS state.

(b) Unseat the affected grid boards.

(c) Remove the blown fuse and replace it with a good fuse (same type as the one removed).

(d) Reinsert the grid boards.

6. **For Model 2 and Model 3 LU SGs:** Perform Substeps (a) through (d).

CAUTION 1: When unseating Model 2 and 3 gdxacc packs, always unseat the affected TN831 pack before unseating the TN832. When reinserting gdxacc packs, make sure the LU converter alarm LED is off in the affected SG before reinserting the packs. And, always reinsert the TN832 pack before the TN831.

CAUTION 2: When unseating Model 2 LUCOMC packs, always unseat the TN842B in the affected LU service group before unseating the TN843. When reinserting LUCOMC packs, always reinsert the TN843 pack before reinserting the 842B. There is no specific order to unseat the LUCOMC pack (UN322) in a Model 3 LU.

(a) Downgrade the affected LU SG to the OOS state.

(b) Unseat the affected LU packs.

(c) Remove the blown fuse and replace it with a good fuse (same type as the one removed). Then if applicable, press the ***ST*** button on the unit power converter.

(d) Reinsert LU SG packs.

Procedure 3.6.3: REPLACE BLOWN CABINET FUSE FOR ISLUs/RISLUs

OVERVIEW

Use this procedure to replace a blown FFU/MFFU fuse that supplies power for a Model 1 and Model 2 ISLU\/RISLU. Use the pictorial underneath the front bezel (outside top) of the cabinet to associate the blown fuse with the equipment it powers.

PROCEDURE

1. Determine what ISLU/RISLU circuit boards are powered by the fuse to be replaced.

2. Does the blown fuse power a Model 2 ISLU LGC (ISLU2 LGC)?

   If **YES**, proceed to Step 4.

   If **NO**, continue with next step.

   CAUTION: If the fuse being replaced powers an LGC in an ISLU1, then the KCD3 board in the affected LGC must be unseated prior to replacing the fuse. Failure to do so could interfere with customer service.

3. Prepare the affected ISLU1-LCG for the return of power. Perform Substeps (a) and (b).

   (a) Identify and open the drawer that houses the affected LGC.

   (b) Locate and unseat the KCD3 board.

4. Remove the blown fuse and replace it with a good fuse (same type as the one removed).

5. Did the good fuse blow?

   If **YES**, continue with next step.

   If **NO**, and if an ISLU1-LGC, reinsert that KCD3 board. Otherwise, proceed to Step 7.

6. Use the following substeps to determine if an ISLU/RISLU circuit board (or backplane) is the cause of the problem.

   (a) Unseat the boards that are powered by the fuse to be replaced.

   (b) Replace the blown fuse. If the fuse blows, **seek technical assistance**.

   (c) Reseat the ISLU/RISLU boards one at a time. If the fuse blows, unseat the board just inserted, replace the fuse, and insert a replacement board. If the fuse continues to blow, **seek technical assistance**.

7. The fuse has been successfully replaced. Return the ISLU/RISLU to the operational state. If operational problems occur, **seek technical assistance**.

Procedure 3.6.4: REPLACE BLOWN CABINET FUSE FOR MHDs

OVERVIEW

Use this procedure to replace a blown FFU/MFFU fuse that supplies power for a moving head disk (MHD) or for the Digital Audio Tape (DAT) drive.

CAUTION: DO NOT replace a blown fuse that powers an MHD or DAT until after the MHD/DAT has been conditioned for the return of power.

PROCEDURE

1. Depending on the type of MHD affected, proceed as outlined in the applicable substeps.

   NOTE: Once the applicable substep has been completed, be sure to return the hardware and lines that are OOS back to the in-service state. If the replacement fuse clears while performing the applicable step, either the MHD or DAT drive is bad, or there is a backplane problem. Try repeating the step. This time eliminate the MHD or DAT drive as being a probable cause by replacing them.

   (a) For **340-MHDs**, proceed to Step 2.

   (b) For **SCSI-DUP**, proceed to Step 3.

   (c) For **3B21D SCSI MHD**, proceed to Step 4.

   (d) For **3B21D Digital Audio Tape (DAT)**, proceed to Step 5.

2. For 340-MHDs, perform the following substeps in the exact order specified.

   (a) Downgrade the affected MHD to the out-of-service state.

   (b) At the affected MHD, release the MHD **ST** (start) button.

   (c) At the affected MHD control panel (immediately below the disk drive), press the **OFF** switch.

   (d) At the MHD power supply (at side of MHD), set the circuit breaker to the **OFF** position.

   (e) Remove the blown fuse and replace it with a good fuse (same type as the one removed).

   (f) Set the MHD circuit breaker to the **ON** position.

   (g) At the control panel and with the **ROS\/RST** switch in the **RST** position, toggle the **ACO\/T** (alarm cutoff and test) switch; then press the **ON** switch and verify that the **OFF** LED goes off.

   (h) At the control panel, press **START** switch and verify that the **START** LED starts flashing. Once the **LED** stops flashing, power has been restored.

3. For SCSI-DUP, perform the following substeps in the exact order specified.

   (a) At the DUP, set the **RST/ROS** switch to the **RST** position.

   (b) At the DUP, press the **OFF** button.

   (c) Remove the blown fuses (load and indicator) and replace them with good fuses (same type as the ones removed).

(d) At the DUP, toggle the ACO/T switch, and then press the **ON** button.

4. For 3B21D SCSI-MHDs, perform the following substeps in the exact order specified.

   (a) On the SCSI-MHD face plate, set the **RST/ROS** switch to the **RST** position.

   (b) Unseat the SCSI-MHD from its circuit pack position.

   (c) Remove the blown fuse and replace it with a good fuse (same type as the one removed).

   (d) Reinsert the SCSI-MHD.

   (e) On the SCSI-MHD face plate, toggle the **ACO/T** switch.

   (f) Press the **ON\/ST** switch to the **ST** position.

   (g) Power has been restored.

5. For the 3B21D DAT Drive (UN376), perform the following substeps in the exact order specified.

   (a) Unseat the DAT (UN376) from its circuit pack position.

   (b) Remove the blown fuse and replace it with a good fuse (same type as the one removed).

   (c) Reinsert the DAT drive (make sure the **AC\/T** switch is in the **T** position when inserting).

Procedure 3.7: POWER DOWN *5ESS*®-2000 SWITCH

OVERVIEW

This procedure is for emergency situations when it is absolutely necessary to power down the *5ESS*®-2000 switch to slow the battery discharge rate or to remove the office load on the battery backup power source. This procedure **should not** be used to restore power or to perform routine maintenance. To establish a plan for power-related recoveries, go to Procedure 3.2 . For a *5ESS*®-2000 switch unit hardware condition, automatic power recovery, or power distribution information, refer to Procedure 3.9 .

CAUTION: This procedure should only be used in emergency situations that require the removal of power from secondary power distribution equipment (PCFD or GPDF buses) or to slow the battery discharge rate.

> ***NOTE 1:*** If there is commercial power failure and the battery backup power has not dropped below -40.5 volts, refer to Procedure 3.7.2 to slow battery discharge. If the battery voltage has dropped below -40.5 volts at the office power plant, refer to Procedure 3.2.3 .

NOTE 2: There are two sections in this procedure that are tailored for situations that require the immediate shutdown of the entire office. Procedure 3.7.3 is for rapid shutdown of the remote office, which means, power is removed from all of the *5ESS*®-2000 switch cabinets by opening the power plant circuits. Procedure 3.7.4 is for rapid shutdown of the host office. To systematically remove power from one or more PCFD/GPDF buses, refer to Procedure 3.7.2 .

PROCEDURE

1. Use the following list of procedures to resolve power problems:

   (a) Procedure 3.7.1 — Decrease the Rate of Battery Plant Discharge

   (b) Procedure 3.7.2 — Remove Power from One or More PCFD/GPDF Power Buses

   (c) Procedure 3.7.3 — Remove Battery Load at Remote Site - Shut Down RSM/ORM/EXM Sites

   (d) Procedure 3.7.4 — Remove -48 Volts Battery Load at Host Office - Shut Down Host Office.

Procedure 3.7.1: DECREASE THE RATE OF BATTERY PLANT DISCHARGE

OVERVIEW

This procedure slows the battery discharge rate by decreasing the load on the battery backup power source. During this procedure, one side of the AM, CM, and SM/SM-2000 control units will be powered down. This forces the remaining active side to perform all of the tasks essential to call processing. Configuring the AM, CM, or SM/SM-2000 to a side that has operational problems may result in service degradation.

This procedure downgrades one side of the AM, CM, and SM/SM-2000 unit controllers to the out-of-service (OOS) state. Once OOS, verify that the OOS LED on the unit controller pack or on the unit power converter is lighted before powering down the unit. Once the controllers are simplex, go to Procedure 3.2 — Power-Related System Recovery Decisions.

CAUTION: When possible, the accumulated Automatic Message Accounting (AMA) data should be polled before executing this procedure, and all other activities that are not essential to call processing should be discontinued until the power problem has been resolved (RC/DB, REX, ALIT, MLT, etc.).

PROCEDURE

1. When possible, use the SCC pattern search capability and the following input commands to determine what configuration is best suited for processing calls in the simplex mode.

   At the command prompt on the MCC display page **120**, enter the following:
   ```
   -op:sysstat,ucl             Status of AM, CMPs, and SMs
   -op:cfgstat,oos             AM out-of-service list
   -op:cfgstat,cm,oos,nofe     CM out-of-service list
   -op:cfgstat,sm=x&&y,oos,nofe SM out-of-service list
   ```

2. Output the contents of the AM error log and disk driver log files to the ROP. Use the log file data to determine which AM CU and DFC/MHD community is best suited to run error free in the simplex mode. Enter the following commands:

   - dump:file:all,fn="/log/log/ERLOG1",opl=99
   - dump:file:all,fn="/log/log/DKDRVLOG1",opl=99

3. Proceed base on the applicable case.

   - To Simplex the **AM**, see Steps 4 through 8.
   - To Simplex the **CM**, see Steps 9 through 11.
   - To Simplex the **SM/SM-2000s**, see Steps 12 through 15.

4. Downgrade the AM Control Unit (CU) that ***IS NOT*** best suited to run in the simplex mode to the OOS state.

   On the MCC **111** page, remove CU side 0 or CU side 1:
   ```
   -To remove CU 0,           enter poke 200
   -To remove CU 1,           enter poke 201
   -Or at the command prompt, enter rmv:cu=x  (where x = 0 or 1)
   ```

5. Downgrade the Disk Community that ***IS NOT*** best suited to run in the simplex mode to the OOS state. If both communities are stable, remove the Disk File Controller (DFC) that is on the same side as the OOS CU (that is, CU 0 and DFC 0).

NOTE: If DFC 2/3 is equipped, remove the DFC that is powered by the same PCFD power bus as the DFC 0, or DFC 1 (either remove DFC 0 and DFC 2, or DFC1 and DFC 3).

- On the MCC **123** page, remove DFC 0 or DFC 1:
```
-To remove DFC 0,          enter poke 200
-To remove DFC 1,          enter poke 201
-Or at the command prompt,enter rmv:dfc=x  (where x = 0 or 1)
```

- On the MCC **125** page, remove DFC 2 or DFC 3:
```
-To remove DFC 0,          enter poke 200
-To remove DFC 1,          enter poke 201-
Or at the command prompt,enter rmv:dfc=x  (where x = 0 or 1)
```

6. Power down the OOS DFC.

7. Power down the OOS CU.

8. Power down the OOS Disk Drives.

NOTE: Once this step is completed, the AM is in the simplex mode. Perform the following additional steps as necessary to put other units in simplex mode:

- CM, go to Step 9.
- SM/SM-2000s, go to Step 12.

Once all of the targeted complexes have been put into simplex mode, go to Procedure 3.2.3 — Low Battery Voltage at Host or Remote Office.

9. Downgrade the CM Message Switch (MSGS) that ***IS NOT*** best suited to run in the simplex mode to the OOS state.

- When warranted, use the MCC **1240** page to remove MSGS 0:
```
-To remove MSGS 0,          enter poke 220
-Or at the command prompt,  enter rmv:msgs=0
```

- When warranted, use the MCC **1250** page to remove MSGS 1:
```
-To remove MSGS 1,          enter poke 221
-Or at the command prompt,  enter rmv:msgs=1
```

10. Downgrade the Office Network Timing Controller (ONTCCOM) that ***IS NOT*** best suited to run in the simplex mode to the OOS state. If both ONTCs are stable, remove the ONTCCOM that is on the same side as the OOS MSGS (MSGS 0 and ONTCCOM 0).

On ONTC **1209** page, remove ONTCCOM 0 or

To remove ONTCCOM 0,	enter **poke 200.**
To remove ONTCCOM 1,	enter **poke 201.**
Or at the command prompt,	enter **rmv:ontccom=**x (where x=0 or 1).

11. Once the MSGS and ONTCCOM have been put into simplex mode, power down the OOS TMSUs and MSPUs, but ***do not*** power down the CMCU (or MICU).

    NOTE: Once this step is completed, the CM is in the simplex mode. Perform the following additional steps as necessary to put other units in simplex mode:

    - AM, go to Step 4.
    - SM/SM-2000s, go to Step 12.

    Once all of the targeted complexes have been put into simplex mode, go to Procedure 3.2.3 — Low Battery Voltage at Host or Remote Office.

12. Downgrade the MCTSI side that ***IS NOT*** best suited to run in the simplex mode to the OOS state. If both MCTSIs are stable, remove the MCTSI that is on the same side as the OOS DLI (that is, DLI *x*-*y* OOS and MCTSI *x*-*y* act, where *x* = SM/SM-2000 number and *y* = side).

    On **1190,***x* page (where *x* = SM/SM-2000 number):

    ```
    -To remove MCTSI 0,          enter poke 200
    -To remove MCTSI 1,          enter poke 201
    -Or at the command prompt,   enter rmv:mctsi=x-y
    ```

13. Power down the OOS MCTSI.

14. Power down the OOS DLI. (DO NOT power down SM-2000 NLIs.)

    NOTE: Once this step is completed, the SM/SM-2000 controller is in the simplex mode. Perform the following additional steps as necessary to put other units in simplex mode:

    - AM, go to Step 4.
    - CM, go to Step 9.

15. Once all of the targeted complexes have been put into simplex mode, go to Procedure 3.2.3 — Low Battery Voltage at Host or Remote Office. When possible, keep a record of which disk file controller was removed from service, and then gracefully powered down. This DFC/MHD community is deemed to be the most reliable for the recovery attempt.

Procedure 3.7.2: REMOVE POWER FROM ONE OR MORE PCFD/GPDF POWER BUSES

OVERVIEW

Use this procedure to remove power from one or more, but not all, PCFD or GPDF power buses (that is, bus A1, A2, B1, B2, etc.). This procedure is not intented to be used in emergency situations where power must be removed immediately. To perform a rapid shutdown of a remote office, refer to Procedure 3.7.3 To perform a rapid shutdown of the host office, refer to Procedure 3.7.4 .

CAUTION 1: Power can be removed from units/circuits without causing component damage, but damage may occur once a unit has shut down if the voltage increases before any required pre-power restoration steps have been performed. Once the power bus has been shut down, refer to Procedure 3.2 .

CAUTION 2: The removal of power from operating line/trunk units causes an interruption of service to those lines/trunks. The removal of power from both sides (side 0 and 1) of duplicated control units causes a complete Local/Remote Switching Module outage or a total system outage.

NOTE: When removing power from only one power bus side (A1 but not B1), the units/circuits that are powered by bus to be shut down must be downgraded to the OOS state, and then powered down. Failure to downgrade the unit/circuits to OOS may result in operational problems and processor initializations.

PROCEDURE

1. At the MCC/STLWS display terminal, downgrade the units/circuits on the power bus(es) to be shut down to the out-of-service (OOS) state.

2. Once the units have been removed from service, proceed to the following applicable step to power down the unit. Once the unit power down steps have been completed, proceed to Step 13 to shut down the targeted PCFD/GPDF bus.

   Go to Step 3 for LU Model 2 and 3.
   Go to Step 4 for LU Model 1.
   Go to Step 5 for ISLUs/RISLUs.
   Go to Step 6 for PSUs.
   Go to Step 7 for CNI RN cabinets.
   Go to Step 8 for 340-SMD MHDs.
   Go to Step 9 for SCSI-DUP.
   Go to Step 10 for 3B21D SCSI MHD, DFC.
   Go to Step 11 for Digital Audio Tape (DAT) Drives.
   Go to Step 12 for all other units (AM, CM, and SM/SM-2000).

3. **For Model 2 or 3 LUs:** If the LU **is not** equipped with all TN1058C APR grids, perform Substeps (a) and (b). If the LUs are equipped with all TN1058Cs, perform Substep (b) only:

   (a) Unseat the TN831 before the TN832 for each service group, and then unseat all of the non-APR grids (TN838, TN1048, TN1058, and TN1058B).

   (b) Power down the LU by unseating the LU power converters.

4. **For Model 1 LUs:** Unseat the TN331 before the TN332 for each service group, and then unseat the two TN338s packs before unseating their associated TN340 grid pack.

5. **For ISLUs/RISLUs:** If the power bus to be shut down is in a GPDF cabinet, or if the PCFD cabinet is equipped with an ED-82950-30, G2 (15-amp) charge circuit, perform Substep (a) only. If the PCFD is equipped with an ED-82950-30, G1 (2-amp) charge circuit, perform Substeps (a) and (b):

   (a) Power down the ISLU/RISLU by unseating the ISLU power converters.

   (b) Unseat the ISLU cabinet fuses.

6. **For PSUs:** If the PSU is equipped with non-B or non-C suffixed Protocol Handler circuit packs, unseat them [such as, TN1081 (MC5D115A1), TN1366 (MC5D100A1), or TN1367 (MC5D146A1)].

7. **For CNI RN Cabinets:** If the PCFD power bus to be shut down powers a CNI Ring Node (RN) cabinet, unseat all of the packs and the power converter(s) that are powered by the bus to be shut down.

8. **For SMD-340 Moving Head Disk (MHD):** If the power bus to be shut down powers SMD-340 MHDs, perform Substeps (a) through (c):

   (a) Release the MHDs **ST** (start) button.

   (b) Press the **OFF** switch on the MHDs control/display panel.

   (c) Turn off the **MAIN** circuit breaker switch on the MHD power supply (beside the disk drive).

9. **For SCSI-DUP MHDs:** For each SCSI-DUP MHD on the power bus to be shut down, press the **OFF** button on SCSI-DUP.

10. **For 3B21D SCSIs MHDs:** For each 3B21D SCSI DFC/MHD that is on the power bus to be shut down, press the **OFF** button on the face plate of the circuit pack (MHD = UN375; DFC = UN373 or UN580).

11. **For SCSI Digital Audio Tape (DAT) drive:** To power down the DAT drive, unseat the UN376B pack.

12. **For all other units (AM, CM, SM/SM-2000):** For each unit on the power bus to be shut down, press the **OFF** button on the unit power controller pack, or unseat the unit power converter pack. Once the unit has been shut down, continue with the next step.

    CAUTION: To power down an LU, ISLUs/RISLUs, PSUs, MHDs, DATs, or CNI RN, return to **Step 2.2**.

13. For each PCFD or GPDF power bus (designated as A1, A2, A3, B1, B2, etc.) to be shut down, perform the tasks described in Substeps (a) or (b), and in Substep (c):

    CAUTION 1: Once this point is reached, the units that are powered by the power bus that is being shut down should be OOS. If the units are not, then hardware interrupts are reported.

    CAUTION 2: The power plant circuit (circuit breaker or fuse) should have stamping that indicates the PCFD number and power bus it powers (that is, PCFD/GPDF 00 - A2). Do not open a power plant circuit that does not identify the PCFD or GPDF power bus it feeds.

   (a) If a PCFD power bus(es) is to be shut down, unseat the 24 indicator fuses (FA1-FA24) first, the 24 load fuses (F1-F24) second, and then the filter fuses.

   (b) If a GPDF power bus is to be shut down, unseated the load fuses first, and then the filter fuses.

   (c) At the office power plant (in power/battery room), identify the power plant Over-current Protection Device (circuit breaker of fuse) that supplies power to the PCFD power bus to be shut down. Then remove power from the targeted PCFD/GPDF power bus(es) by putting the OPD in the cleared state (reset circuit breaker to the off position, or unseat power plant fuse).

14. Is power to be removed from both sides of the PCFD/GPDF panel (such as A1 and B1)?

    If **YES**, the units on the other side of the panel should be removed before the bus is shut down. To accomplish this, unconditionally remove the unit from service. If the unit is not removed from service, simultaneously press the **MOR** and **OFF** button on the unit power controller pack, or unseat the power unit pack (power converter or circuit pack with surface mount converters). Once power is removed, continue with next step.

    If **NO**, continue with next step.

15. If you have reached this point, power has been removed from the targeted PCFD/GPDF power bus(es). Refer to Procedure 3.3 to prepare the PCFD bus for the return of power or Procedure 3.4 to prepare the affected GPDF bus(es) for the return of power. When needed, refer to Procedure 3.2 to establish a power-related recovery execution plan.

Procedure 3.7.3: REMOVE BATTERY LOAD AT REMOTE SITE - SHUT DOWN RSM/ORM/EXM SITES

OVERVIEW

This procedure is for emergency situations when it is absolutely necessary to perform a rapid shut down of a remote office. The steps in this section removes power from all RSM/ORM/EXM secondary power distribution bay (PCFD/GPDF) power buses by putting the remote power plant Primary Power Distribution Bay (PPDB) Over-current Protection Devices (OPDs) in the cleared state. To remove power from one or more PCFD/GPDF power buses, but not all, refer to Procedure 3.7.2 . To perform a rapid shut down of the *5ESS*®-2000 switch host office, refer to Procedure 3.7.4 .

PROCEDURE

1. At the remote location to be shut down, isolate the remote(s).

   - On MCC/STLWS **1800,x** (where x = RSM/ORM number):

To isolate remote,	enter **poke 403.**
Or at the command prompt,	enter **set:isol,sm=x** (where x=RSMORM number).

2. At the remote power plant, identify the primary power distribution bay OPDs (circuit breakers or fuses) that provide power to the remote secondary power distribution bay bus panels (that is, PCFD/GPDF buses A1, A2, A3, A4, B1, B2, B3, B4).

3. At the remote power plant, remove power by putting the OPDs that supply power to the targeted PCFD and/or GPDF in the cleared state (set circuit breakers to the off position, or unseat high-power fuses).

4. Once the remote power plant OPDs are in the cleared state, you have completed this procedure. To restore power, refer to Procedure 3.2 and establish a recovery execution plan for restoring power.

Procedure 3.7.4: REMOVE -48 VOLT BATTERY LOAD AT HOST OFFICE - SHUT DOWN HOST OFFICE

OVERVIEW

This procedure is for emergency situations when it is absolutely necessary to perform a rapid shut down of the host *5ESS*®-2000 switch host office. The steps in this section removes power from all host secondary power distribution bay (PCFD/GPDF) power buses by putting the host power plant Primary Power Distribution Bay (PPDB) Over-current Protection Devices (OPDs) in the cleared state. To remove power from one or more PCFD/GPDF power buses, but not all, refer to Procedure 3.7.2 . To perform a rapid shut down of the remote office, refer to Procedure 3.7.3 .

PROCEDURE

1. On the Emergency Action Interface (EAI) page, enter the poke command to inhibit the sanity timer, and then force the standby or out-of-service CU on-line:

   - To inhibit sanity timer, enter the following poke: **24**.
   - To force CU 0 on-line, enter the following poke: **10**.
   - To force CU 1 on-line, enter the following poke: **11**.

   NOTE: Once the sanity timer is inhibited, forcing an OOS or standby CU to the on-line state will halt both CUs.

2. To minimize the possibility of scribbling on the MHD (wild writes), power down both CUs, and then the MHDs. Perform the applicable substeps:

   (a) On the CU control and display pack, press the **MOR** and **OFF** buttons simultaneously (at same time).

   (b) For 340-SMD MHDs, release the MHD **ST** (start) button, and then press the **OFF** button on the MHD C/D panel. The OOS LED on the MHD C/D panel should light.

   (c) For SCSI-DUP MHDs, simultaneously (at the same time) press the **MOR** and **OFF** button.

   (d) For 3B21D SCSI MHDs, simultaneously (at the same time) press the **MOR** and **OFF** button, and then unseat the UN375 MHD packs.

3. At the host power plant, identify the primary power distribution bay OPDs (circuit breakers or fuses) that provide power to the host secondary power distribution bay bus panels (that is, PCFD/GPDF buses A1, A2, A3, A4, B1, B2, B3, B4).

4. At the host power plant, remove power by putting the OPDs that supply power to the targeted PCFD and/or GPDF in the cleared state (set circuit breakers to the off position, or unseat high-power fuses).

5. Once the host power plant OPDs are in the cleared state, you have completed this procedure. To restore power, refer to Procedure 3.2 and establish a recovery execution plan for restoring power.

Procedure 3.8: AUTOMATIC POWER RECOVERY (APR) FEATURE

OVERVIEW

This procedure is only intended for host or remote *5ESS*®-2000 switch offices that are fully compliant with the 5E11 Automatic Power Recovery (APR) Feature. This procedure is divided into several procedures that are based on different APR scenarios. Each scenario assumes that the *5ESS*®-2000 switch application units have shut down because of a low-power plant voltage or because there is a system-wide power outage. For information on the APR feature, refer to Procedure 3.9 . When needed, **seek technical assistance**.

In the context of this procedure, the office is at risk of shutting down due to a low-voltage condition when the power plant battery backup power source has discharged below -40.5 volts. The further the voltage drop, the greater the impact. A system-wide power outage occurs when power has been totally removed from the switch [which means, all Over-current Protection Devices (OPDs) in the power plants Primary Power Distribution Bay (PPDB) are in the cleared state (opened)].

CAUTION 1: This procedure was developed for APR feature package offices that were engineered to automatically recover from a power-related service outage with little or no manual intervention. Do not use this procedure if the office is not fully compliant with the APR feature.

CAUTION 2: The duration of a power-related service outage is dependent on the return of source power, procedural awareness, and the number of support staff available to assist with any manual recovery task. Power-related service outages should always be escalated to the next level of support and to the appropriate technical support organization in Lucent Technologies immediately.

PROCEDURE

1. Use the applicable procedure when the source voltage for the host office, or remote, is expected to activate the APR feature.

   (a) Procedure 3.8.1 — Low Voltage at Host *5ESS*®-2000 Switch Office

   (b) Procedure 3.8.2 — Low Voltage at Remote SM/SM-2000 Office

   (c) Procedure 3.8.3 — Power Outage at Host *5ESS*®-2000 Switch Office

   (d) Procedure 3.8.4 — Power Outage at Remote SM/SM-2000 Office

Procedure 3.8.1: LOW VOLTAGE AT HOST *5ESS*®-2000 SWITCH OFFICE

OVERVIEW

This procedure provides the steps needed to respond to a low-voltage condition at the 5ESS-2000 switch **Host Office**. The steps in this procedure assume (1) that the power plant at the host is equipped with a battery backup power source, (2) that the Over-current Protection Devices (OPDs) in the power plant's Primary Power Distribution Bay (PPDB) have not been opened, and (3) that the battery backup power source is discharging. When needed, **seek technical assistance**.

PROCEDURE

1. Is the voltage at the host office power plant below -40.5 volts?

   If **YES**, continue with the next step.

   If **NO**, and if the battery backup power source is discharging, exit this procedure and refer to Procedure 3.7 to slow the rate of battery discharge. If the batteries are not discharging, but are in the process of being charged, exit this procedure and refer to the applicable procedure to respond to any unit stability problem.

2. If the voltage discharge is below -40.5 volts, the hardware application units (AM, CM, SM/SM-2000, and CNI-RN) are at risk of shutting down. The further the voltage drops below -40.5 volts, one or more of the following may occur:

   (a) The shutdown of the SM/SM-2000 units/circuits causes excessive interrupts to be reported. If the SM/SM-2000 module controllers shut down, the affected SM/SM-2000 enters the communication lost or isolated state.

   (b) The shutdown of the CM units/circuits causes the CM duplex fail strategy to be invoked. This causes the AM to initialize and to roll in initializations until the CM is returned to the powered-up state.

   (c) The shutdown of the AM units/circuits affects the AM standard input/output (I/O) interfaces to the switch (all remote access to the switch is lost). Once the AM has shut down, communications to the SM/SM-2000 cannot be restored until after the AM has successfully completed its initialization cycle. The shut down of the CNI Ring units/circuits causes the AM to initialize.

3. Has the problem that caused the voltage to decrease been resolved?

   If **YES**, continue with the next step.

   If **NO**, a decision must be made by the operating company to let the batteries go into deep discharge, and risk the possibility of cell reversal, or to remove the load from the batteries. If the decision is to remove the battery load, go to Procedure 3.7.4 . If the decision is to let the batteries discharge, repair the problem, then return to Step 1.

4. If you have reached this step, the problem that caused the switch to shut down has been resolved. Did the AM start and complete its initialization cycle?

   If **YES**, continue with the next step.

   If **NO**, try forcing an AM boot configuration, and try setting hardware and software inhibits. Also check for a cleared OPD at the AM cabinet, the GPDF, or at the PPDB. When needed, refer to Procedure 4.2 to analyze the AM initialization failure.

5. On the **115 CM Summary page**, determine the state of the ONTC and MSGS on CM side zero and on CM side one.

6. Is there an ONTC side and an MSGS side shown as active or degraded?

   If **YES**, continue with the next step.

   If **NO**, enter the command to stop any CM diagnostics that might be running and/or queued. Check for a cleared OPD at the CM cabinet and/or the GPDF/PPDB. If applicable, diagnose the ONTC and MSGS controllers. When needed, refer to Procedure 5.1 to analyze and resolve any CM hardware problems.

7. Did at least one SM/SM-2000 start and complete its initialization cycle?

   If **YES**, continue with the next step.

   If **NO**, emphasis should be placed on recovering the SM/SM-2000 that provide emergency services. Focus on verifying that the hardware essential to establishing communication to the SM/SM-2000 is active (DLI/NLI and CLNK). When needed, refer to Procedure 6.1 to analyze an SM/SM-2000 initialization fault.

8. As the SM/SM-2000 completes its initialization sequence, use the following substeps to monitor the progress of the recovery and to return any out-of-service units to the operational state.

   (a) Check for dial tone and verify that the remainder of the SM/SM-2000 started and completed their initialization cycle. For each SM/SM-2000 that fails to start its initialization cycle, try unconditionally restoring the DLIs/NLIs and CLNKs. For each SM/SM-2000 that repeatedly fails to complete its initialization cycle, try inhibiting hardware and software checks. If an SM/SM-2000 continues to experience problems, manually isolate the SM/SM-2000 and revisit it once the remainder of the SM/SM-2000s have completed their initialization cycle.

   (b) For each unit that is out-of-service, starting with the units/circuits that are essential to supporting call processing (such as, CCS7 Ring, LUs, ISLUs, and PSUs), restore the unit to the in-service operational state.

   (c) Once the units that are essential to call processing are operational, go to Procedure 8.2 to verify that call processing has been restored. When needed, **seek technical assistance**.

Procedure 3.8.2: LOW VOLTAGE AT REMOTE SM/SM-2000 OFFICE

OVERVIEW

This procedure provides the steps needed to respond to a low-voltage condition at the *5ESS*®-2000 switch **Remote Office**. The steps in this procedure assumes (1) that the power plant at the remote is equipped with a battery backup power source, (2) that the Over-current Protection Devices (OPDs) in the power plant's Primary Power Distribution Bay (PPDB) have not been opened, and (3) that the battery backup voltage is discharging. When needed, **seek technical assistance**.

PROCEDURE

1. Is the voltage at the remote office power plant below -40.5 volts?

   If **YES**, continue with the next step.

   If **NO**, and if the battery backup power source is discharging, exit this procedure and refer to Procedure 3.7.1 to slow the rate of battery discharge. If the batteries are not discharging, but are in the process of being charged, exit this procedure and refer to the applicable procedure to respond to any unit stability problem.

2. If the voltage discharge is below -40.5 volts, the hardware application units are at risk of shutting down. The further the voltage drops, one or more of the following may occur:

   (a) If the carrier interface equipment experiences a problem before the remote application units, communications to the remote is lost and the remote enters the stand-alone state.

   (b) If the units in the remote shut down before the module controller, the remote initializes due to excessive interrupts. Once both sides of the controller shut down, the remote becomes isolated from the host.

3. Has the problem that caused the voltage to decrease been resolved?

   If **YES**, continue with the next step.

   If **NO**, a decision must be made by the customer to let the batteries go into deep discharge, and risk possible cell reversal, or to remove the load from the batteries. If the decision is made to let the batteries discharge, do not continue until the power plant problem has been resolved. If the decision is to remove the battery load, proceed to Procedure 3.7.3 to remove the battery load at the remote office.

4. If you have reached this step, the problem that caused the remote to shut down has been resolved. Did the remote start and complete its initialization cycle?

   If **YES**, continue with the next step.

   If **NO**, check for a problem with the carrier and for an opened OPD in the remote cabinet. For each remote SM/SM-2000 that fails to start its initialization cycle, try reconfiguring the communication path (ONTCs/MCTSIs/RDFIs) to the remote. For each remote that repeatedly fails to complete its initialization cycle, try inhibiting hardware and software checks. When needed, refer to Procedure 6.3 to analyze a remote SM/SM-2000 initialization fault.

5. Once the remote SM/SM-2000 completes its initialization sequence, use the following substeps to monitor the progress of the recovery and to restore any out-of-service units to the operational state.

(a) Check for dial tone, and then verify the units/circuits that are essential to supporting the call processing (such as LUs, ISLUs, and PSUs) are operational. For each unit that is out-of-service, enter the command to restore the unit to the active state.

(b) Once the units that are essential for call processing are operational, go to Procedure 8.2 to verify that call processing has been restored. When needed, **seek technical assistance**.

Procedure 3.8.3: POWER OUTAGE AT HOST *5ESS*®-2000 SWITCH OFFICE

OVERVIEW

This procedure provides the steps needed to respond to a system-wide power outage at the *5ESS*®-2000 switch **Host Office**. This procedure assumes that the battery load has already been removed from the switch, which means that all of Over-current Protection Devices (OPDs) in the host office Primary Power Distribution Bay (PPDB) are in the cleared state (are opened).

CAUTION: DO NOT return a PPDB OPD that powers a Secondary Power Distribution bay (GPDF) to the closed state until after the GPDF has been conditioned for in-rush current. When needed, **seek technical assistance**.

PROCEDURE

1. At the GPDFs, unseat the bus panel fuses, and then continue with the next step.

2. Has the problem that caused the system wide power outage been resolved?

   If **YES**, continue with the next step.

   If **NO**, do not continue unit the problem has been resolved.

3. At the host office power plant, restore power to the GPDFs by resetting the PPDB circuit breakers to the on position or by reinserting the PPDB fuses.

   CAUTION: The next step is to reinsert the GPDF fuses that were unseated in Step 1. The support person that reinserts GPDF fuses may hear a popping noise. When replacing GPDF fuses, always adhere to the safety precautions (that is, wear safety glasses; make sure other personnel are clear from the front and back of the unit; do not stand directly in front of the holder when inserting; and try to quickly insert fuse holder into base to reduce the amount of arcing).

4. Reinsert the GPDF fuses.

   NOTE: In order to facilitate a smooth recovery, it is recommended that the GPDF fuses that supply power to the CM and CCS7 ring be reinserted first, the SM/SM-2000 fuses second, and then the AM fuses. When possible, insert the fuses that powers the AM Control Unit last.

5. If you have reached this point, power has been restored to the host office. Did the AM start and complete its initialization cycle?

   If **YES**, continue with the next step.

   If **NO**, observe the following notes.

   NOTE 1: Check the AM and GPDFs for blown fuses. If the AM has started but fails to complete its initialization sequence, check the CM and/or CNI Ring Node for blown fuses. If the AM repeatedly fails to recover, inhibit hardware and software check. When needed, refer to Procedure 4.2 to analyze AM initialization failures.

   NOTE 2: Although it is important to visually inspect the application hardware cabinets for power alarms, there may be a case where a fuse alarm or power converter alarm light-emitting diode (LED) fails to illuminate because the fuse/converter has become defective. When warranted, use voltage measurement to confirm whether the AM and/or CM backplane is receiving its source voltage.

6. Display the CM summary page (enter poke 115). If any of the CM units are duplex failed, refer to Procedure 5.2 to analyze CM duplex hardware faults.

7. Display the SM/SM-2000 summary page (141 through 144). Verify that at least one SM/SM-2000 has started its initialization cycle and that the remaining SM/SM-2000s are not isolated. For each local or optical remote SM/SM-2000s that is isolated, refer to Procedure 6.2 . For each non-optical remote SM/SM-2000, refer to Procedure 6.3 .

8. As the SM/SM-2000s recover, monitor the progress of the recovery. This includes verifying that all modules in the host have returned to the in-service active state, that communications have been re-established with any remote modules, and that call processing has been restored (CCS and non-CCS). If call processing has not been restored, refer to the applicable procedure to resolve unit operational problems.

Procedure 3.8.4: POWER OUTAGE AT REMOTE SM/SM-2000 OFFICE

OVERVIEW

This procedure provides the steps needed to respond to a system-wide power outage at the *5ESS*®-2000 switch **Remote Office**. This procedure assumes that the battery load has already been removed from the switch, which means that all of the Over-current Protection Devices (OPDs) in the remote office Primary Power Distribution Bay (PPDB) are in the cleared state (are opened).

CAUTION: DO NOT return a PPDB OPD that powers a Secondary Power Distribution bay (GPDF) to the closed state until after the GPDF has been conditioned for in-rush current. When needed, **seek technical assistance**.

PROCEDURE

1. At the GPDFs, unseat the bus panel fuses, then continue with the next step.
2. Has the problem that caused the system-wide power outage at the remote been resolved?

   If **YES**, continue with the next step.

   If **NO**, do not continue unit the problem has been resolved.
3. At the remote office power plant, restore power to the GPDFs by resetting the PPDB circuit breakers to the on position or by reinserting the PPDB fuses.

   CAUTION: The next step is to reinsert the GPDF fuses that were unseated in Step 1. The support person that reinserts GPDF fuses may hear a popping noise. When replacing GPDF fuses, always adhere to the safety precautions (that is, wear safety glasses; make sure other personnel are clear from the front and back of the unit; do not stand directly in front of the holder when inserting; and try to quickly insert fuse holder into base to reduce the amount of arcing).
4. Reinsert the GPDF fuses.

   NOTE: In order to facilitate a smooth recovery, it is recommended that the GPDF fuses that supply power to the peripherals at the remote be reinserted first and the link interface hardware (DLI/NLI) second. Whenever possible, insert the fuses that powers MCTSIs last.
5. If you have reached this point, power has been restored to the remote office. Did the remote(s) start and complete its initialization cycle?

   If **YES**, continue with the next step.

   If **NO**, observe the following notes.

   NOTE 1: Check the remote and GPDF for blown fuses. If the remote has started but repeatedly fails to complete its initialization sequence, try inhibiting hardware and software checks. When needed, for each optical or extended remote, refer to Procedure 6.2 to analyze the initialization failures. For each non-optical remote, refer to Procedure 6.3 .

   NOTE 2: Although it is important to visually inspect the application hardware cabinets for power alarms, there may be a case where a fuse alarm or power converter alarm light-emitting diode (LED) fails to illuminate because the fuse/converter has become defective. When warranted, use a voltage measurement to confirm whether the AM and/or CM backplane is receiving its source voltage.

6. As the remotes recover, monitor the progress of the recovery. This includes verifying that the affected remotes have returned to the in-service active state, and that call processing has been restored. If call processing has not been restored, refer to the applicable procedure to resolve unit operational problems.

Procedure 3.9: HARDWARE CONDITIONING, APR COMPLIANT UNITS, AND POWER DISTRIBUTION

OVERVIEW

This procedure provides the information needed to assist support personnel with responding to a *5ESS*®-2000 switch power-related service outage. The steps in this procedure describes the required hardware condition steps (if any), the Automatic Power Recovery Feature, and the power distribution scheme used by the *5ESS*®-2000 switch hardware architecture.

NOTE: In the context of the power chapter, hardware conditioning is the term used to describe the manual action taken to prepare a unit/circuit for the removal of power or the return of power. Pre-power restoration hardware conditioning is required to prevent the in-rush current surge that occurs when -48 volt power is restored to a unit from blowing fuses and/or damaging hardware components. Use the following tables and figures as support information for responding to power-related service interruptions:

- Figure 3.9-1 — PCFD Bus Panel and Control Panel Components
- Figure 3.9-2 — GPDF Bus Panel and Alarm Status Panel Components
- Figure 3.9-3 — LU Cabinet Fuse Assignments
- Figure 3.9-4 — ISLU Cabinet Fuse Assignments
- Table 3.9-1 — Bus A1 Fuse Assignment Label
- Table 3.9-2 — Bus A2 Fuse Assignment Label
- Figure 3.9-5 — Modular Fuse Filter Unit (MFFU).

PROCEDURE

1. Use the following bullet list to determine how to proceed:
   - For unit hardware conditioning information, proceed to Step 2.
   - For Automatic Power Recovery information, proceed to Step 3.
   - For power distribution information, proceed to Step 6.

2. The pre-power restoration step generally requires unit circuit packs to be unseated, or fuses to be unseated or re-inserted, in a specific sequence before power is restored to the backplane of the unit. Use the following substeps to determine which units must be conditions for in-rush current before power is restored:
   (a) **SM/SM-2000 Controller** does not have to be conditioned, but some of the SM/SM-2000 peripherals must be conditioned before power is restored to the SM/SM-2000 controller unit backplane.
      - **LUs** must be conditioned if they are not equipped with all TN1058C grid packs and TN831C/TN832C GDXACC packs. This means the LUs gdxacc packs, and when applicable the LU grid packs, must be unseated before power is restored to the LU backplane.
      - **ISLUs/RISLUs** must be conditioned if they are powered by a PCFD bus and if the PCFD cabinet

is equipped with a 2-amp charge circuit (ED-82950-30, G1). ISLUs do not require conditioning if the PCFD is equipped with a 15 amp charge circuit (ED-82950-30, G2).

- **PSU protocol handler (PSUPH)** circuit packs must be conditioned if they do not have a "B or C" suffix (TN1081, TN1366, or TN1367).
- NI Ring Node (RN) circuits,

(b) **AM** units do not require conditioning, except with the lone exception of the manufactured discontinued 340-megabyte MHD. This means that AM circuit packs or AM cabinet fuses do not have to be unseated when charging a PCFD load fuse position or when reinserting a GPDF load fuse.

(c) **CM** units do not require conditioning. This means that CM circuit packs or CM cabinet fuses do not have to be unseated when restoring PCFD or GPDF power to the CM backplane.

(d) **PCFD cabinet power buses** must always be condition for the return of power to the backplane of the PCFD power bus. This means, once power has been removed from a PCFD power bus [by the opening of a power plant Primary Power Distribution Bay (PPDB) over-current protection device (circuit breakers or high-powered fuse), all PCFD fuses in the affected PCFD power bus must be unseated before power is restored to the PCFD bus. Once a PCFD fuse has been removed, the fuse must not be re-inserted until after power has been restored to the PCFD bus and until after the PCFD charge circuit has been used to condition the fuse position.

(e) **GPDF power buses** are compatible with the APR feature; but once the power plants PPDB have been opened, all of the GPDF fuses in the bus without power must be unseated. Once a GPDF fuse has been unseated, the fuse cannot be re-inserted until after power has been restored to the affected GPDF bus. GPDFs are not equipped with a charge circuit; therefore, the fuse positions do not require charging. When inserting GPDF fuses, the technician may seek arching and hear a poping noise.

3. Use the following substeps to obtain APR specific information:

NOTE: The APR feature is a new capability that allows for a rapid recovery of a host or remote office from a major power failure. A major power failure is defined as a state where commercial AC power is not present, backup (diesel) power is not available, and office battery backup power source has discharged below the minimum operating voltage needed to sustain the switch call processing function.

(a) Do not use Procedure 3.8 if the office is not fully compliant with the APR feature. To be fully complaint with the APR feature, the office must be on the 5E11 or later software release, and the units must have the following hardware equipage:

- **SPDB:** To be fully compliant, the office must only use GPDFs as there Secondary Power Distribution Bay (SPDB) equipment.
- **AM (CU/IOP/DFC):** To be fully compliant, a 3B21D processor must be equipped with the auto-start backplane option and have "B suffixed" controller packs equipped (UN373B, UN375B, UN376B, TN1820B, or TN1821B).
- **CM (MSGS/ONTC):** To be fully compliant, a CM2 (or CM2C) must be equipped with the auto-start backplane option and have all "B suffixed" SN516 Control and Display packs (SN516C is APR, SN516 is not).
- **SM-2000 Core (MCTSI/NLI/LDSF):** To be fully compliant, the SM-2000 core must have the auto-start backplane option.

- **SMP Core (MCTSI/DLI/LDSU):** To be fully compliant, the SM core must be an SMPU3 or SMPU4 with SN516B C/D packs, TN1077E DLI/RLI packs, TN833C LDSU DSC packs, and the auto-start backplane option.
- **LU3 (Model 3):** To be fully compliant, the LUs must be a Model 3 LU (LU3) with the auto-start backplane option and the following equipage: all TN1058C GRIDBDs, all TN355Es LUCHBDs, and TN832C and TN831C GDXACC packs. A line unit with some but not all of the aforementioned circuit are not APR compliant.
- **DLTU/DLTU2:** To be fully compliant, the DLTU/DLTU2 must be equipped with a SN730 circuit pack.

(b) Circuit power is restored to a unit that is APR compliant once -48 volts is restored to the backplane of the unit. Circuit power is removed by unseating the applicable unit power pack [unit Control and Display (C/D) pack, unit power converter module, and/or unit circuit pack that is equipped with surface mounted power converter (such as PSU packs)].

4. Do you want information on power distribution at office power plant?

   If **YES**, observe the following note.

   If **NO**, continue with the next step.

   NOTE: **Power Distribution at Office Power Plant:** The power source for the *5ESS*®-2000 switch originates at the office power/battery plant located in the office power room. The power plant has primary power distribution circuits (circuit breakers or high-power fuses) that partitions the voltage into smaller isolated branches called primary power buses (such as, A1, B1, A2, B2, A3, B3, A4, and B4). The primary power buses supply power to Secondary Power Distribution (SPD) circuits located in the *5ESS*®-2000 switch cabinet lineup.

5. Do want power distribution information at the *5ESS*®-2000 switch SPDB?

   If **YES**, observe the following note.

   If **NO**, continue with the next step.

   NOTE: The Secondary Power Distribution Bay [Power Control Fuse Distribution (PCFD) and Global Power Distribution Frame (GPDF)] is equipped with fuse panels that have two independent sides (Bus-A circuit and a Bus-B circuit). Each primary power bus in the office power room has a stamping next to it that identifies the SPD circuit it powers (such as, PCFD 00 - Bus A1, and GPDF 03 - Bus B4). Each SPD bus distributes -48 volt power downstream by way of isolated power feeds (load fuse positions) to application hardware cabinets. Fuse assignment tables are used to associate a load fuse with a specific fuse block in the application cabinet (that is, for PCFD/GPDF Bus A1, fuse F4 supplies power to SM5 LTP2 fuse block A0 or block position 032).

6. Do you need information on the GPDF?

   If **YES**, observe the following note.

   If **NO**, continue with the next step.

   NOTE: The GPDF is the latest design used for *5ESS*®-2000 switch secondary power distribution. Unlike the PCFD, each GPDF fuse position has a light-emitting diode (LED) that lights when the fuse in the position it monitors is blown. The PCFD bus panels use one LED to monitor all of the fuses on a bus and indicator (pilot) fuses to monitor the bus load fuse positions.

7. Do you need information on power distribution at the application hardware cabinet level?

   If **YES**, observe the following note.

   If **NO**, continue with the next step.

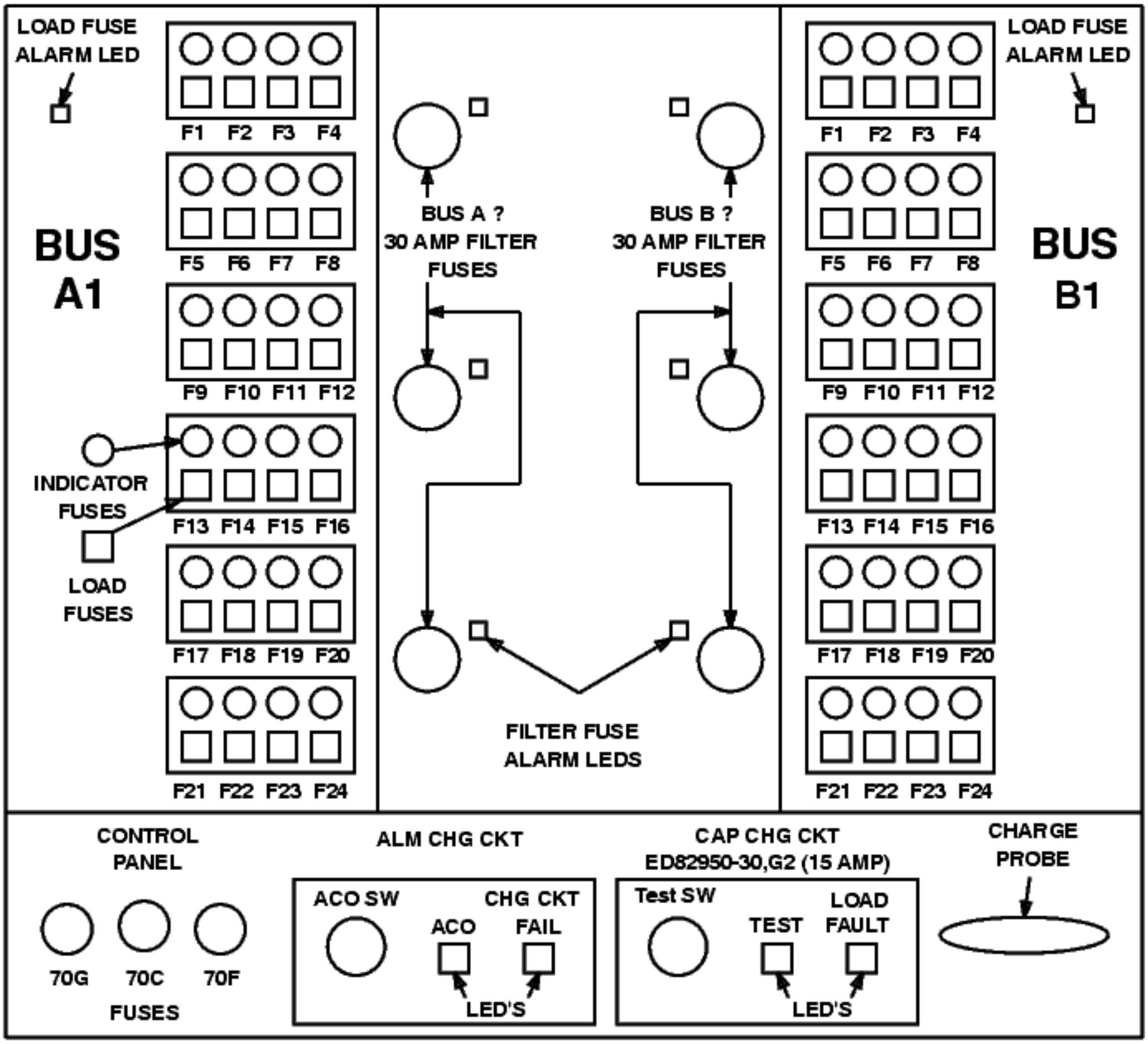
   NOTE: The application hardware cabinets (AM, CM, SM/SM-2000, and CNI-RN) with the exception of the Lucent Technologies 3B20D computer are equipped with Fuse Filter Units (FFUs) or a Modular Fuse Filter Unit (MFFU). The -48 volt power source for the units equipped in application cabinets is distributed to the application circuits via MFFU or FFU fuses. Each application cabinet has a pictorial of the fuse block layout that is used to associate the cabinet fuse with the circuits the fuse powers. The FFU fuse blocks have power feed stampings that allow support personnel to associate a PCFD/GPDF load fuse with the fuse block (A0 and A1 - Figures 3.9-3 and 3.9-4). The MFFU fuse blocks are identified by block position (such as, position 014, 023, or 032). Cabinets equipped with an MFFU or FFUs also have cabinet fuse alarm LEDs on the outside top of the cabinet.

8. Do you need information on the Intercabinet Power Distribution Scheme?

   If **YES**, observe the following note.

   If **NO**, continue with the next step.

   NOTE: Intercabinet Power Distribution Scheme: The AM and CM complexes are powered by PCFD or GPDF power Bus A and Bus B. The **A** buses are engineered to power AM/CM side 0 (CU 0, DFC 0, IOP 0, MSGS 0, and ONTC 0), and the **B** buses are engineered to power side 1. In the switching module/switching module-2000 (SM/SM-2000) complex, most of the units follow the same powering scheme. The MCTSI, DLI, and LDSU are engineered so that Bus A supplies power to side 0 and Bus B supplies power to side 1. The LUs, ISLUs/RISLUs, and several other peripheral circuits do not receive power from both buses. These units are supplied with power from one bus, either the A or B, but not both.



Notes:

1. The pictorial shows one (out of a possible four) PCFD bus panel and a PCFD control panel. A bus panel has two isolated sides (primary power buses) that receive power from two different power plant load lines (A-load and B-load). Each PCFD primary power bus (for example, A1 and B1) is equipped with 16 or 24 fuse positions (for example, F1 through F24) that distributes voltage downstream to the 5ESS®-2000 switch application hardware cabinets. Each fuse position has a load and an indicator pilot fuse.
2. The control panel is shown equipped with a 15-amp (G2 - ED-82950-30) charge circuit. The control panel can also be equipped with a 2-amp (G1 - ED-82950-30) charge circuit.

Figure 3.9-1 PCFD Bus Panel and Control Panel Components

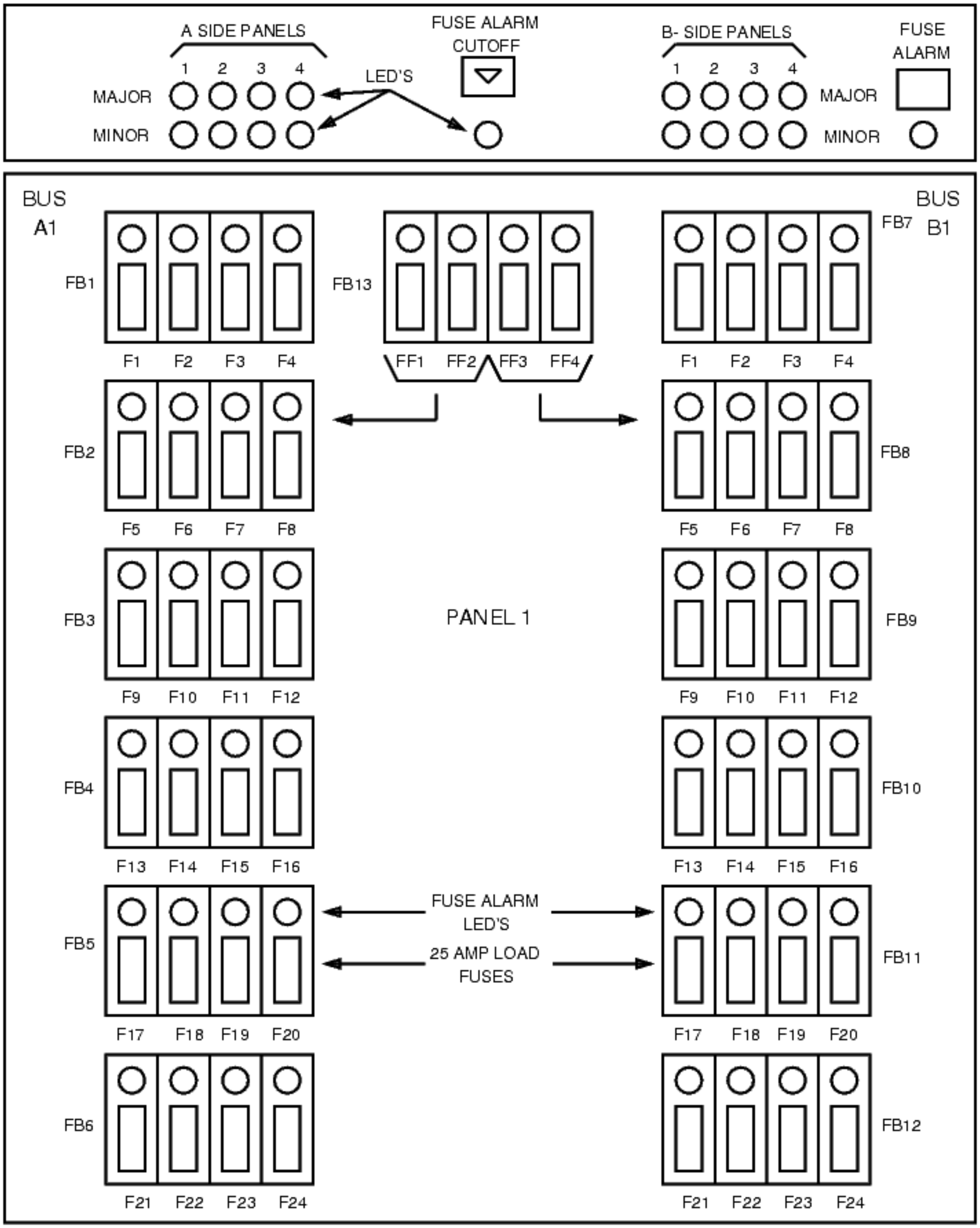
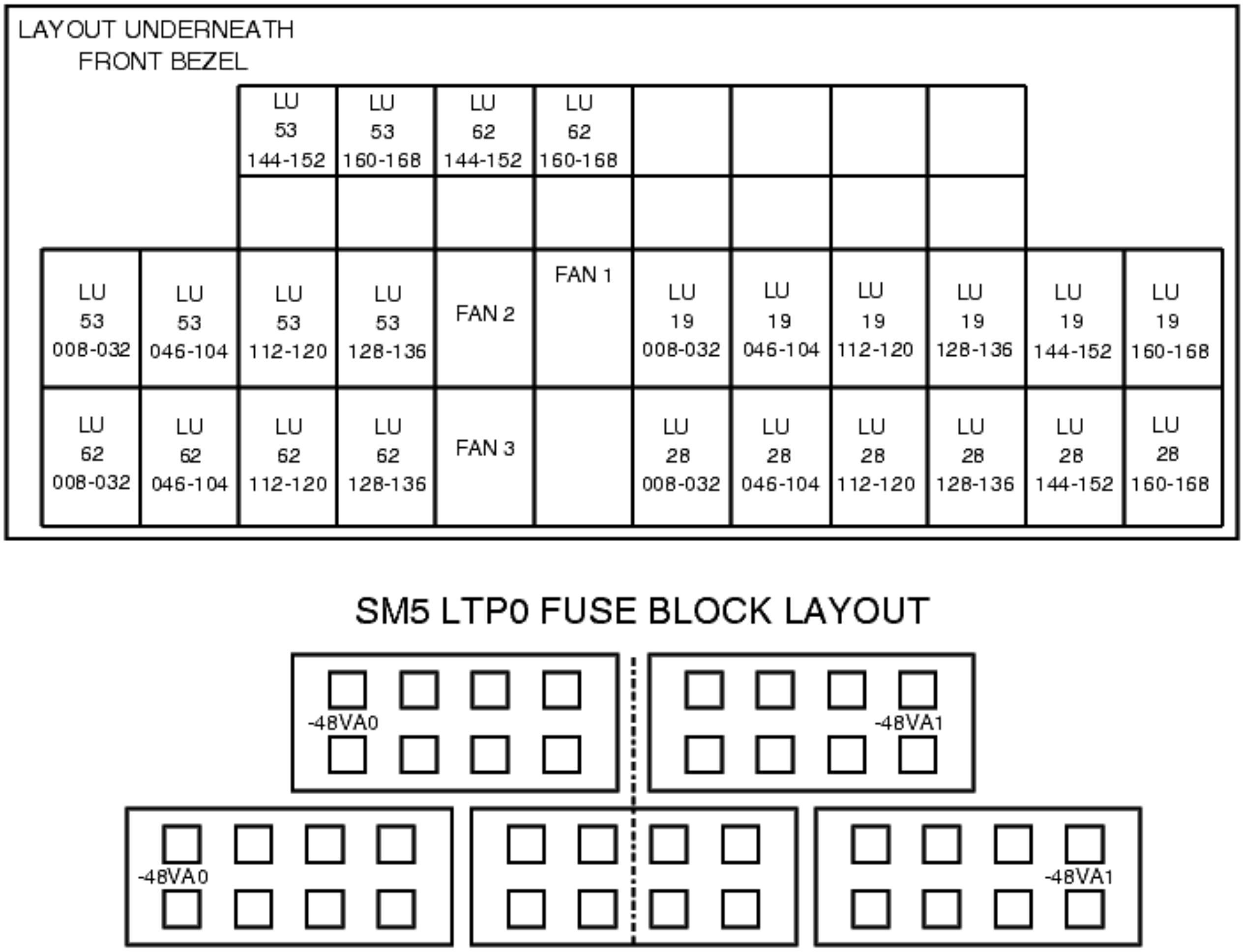


Figure 3.9-2 GPDF Bus Panel and Alarm Status Panel Components

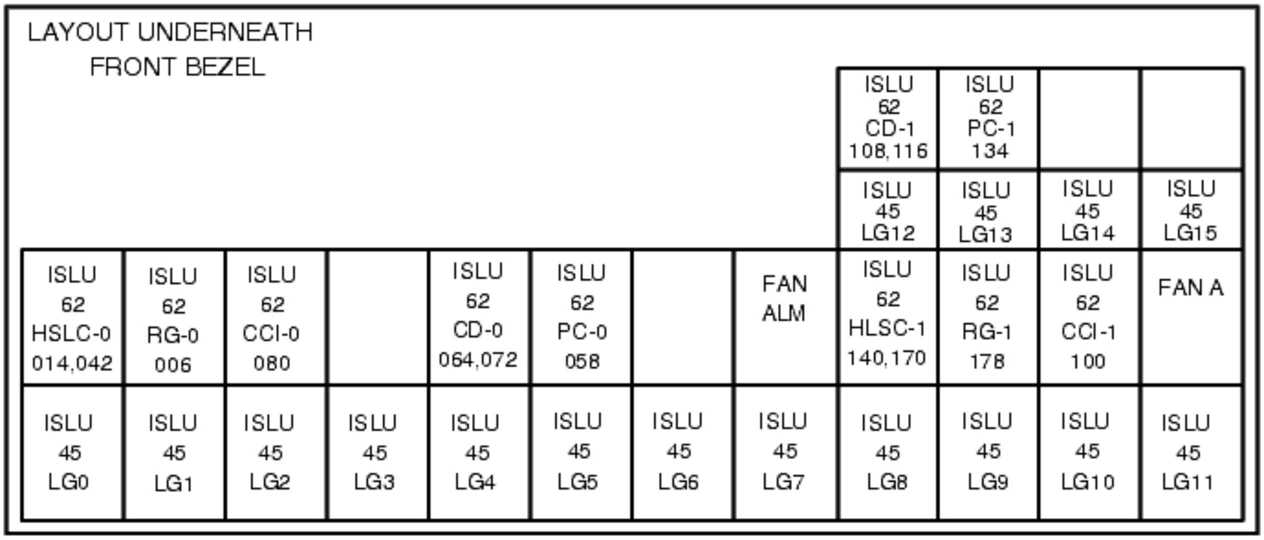


Notes:

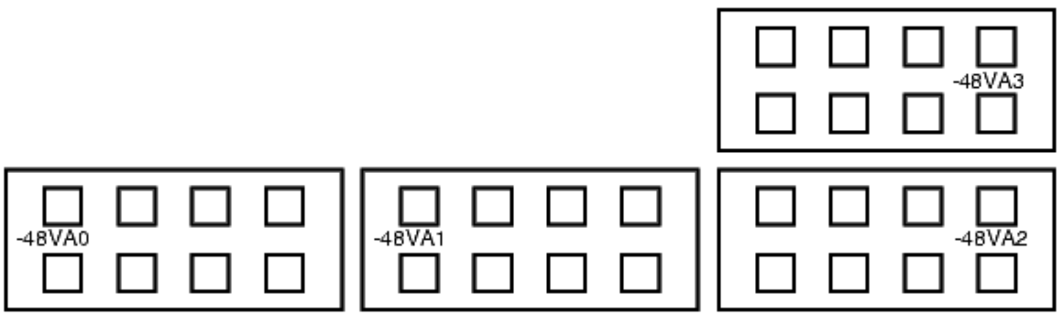
1. The -48 V stamping, on an application cabinet fuse block, associates a PCFD load fuse with the fuse block it powers.

2. An LU is powered by one PCFD power feed from the "A or B" PCFD primary power bus. The hardware assigned to the fuse positions is reflected in the fuse assignment pictorial. In the example, the LU at cabinet level 19 and 28 is powered by the -48VA1 feed, and the LU at cabinet levels 53 and 62 is powered by the -48VA0 feed.

Figure 3.9-3 LU Cabinet Fuse Assignments



SM LTP FUSE BLOCK LAYOUT



Notes:

1. The -48 V stamping, on an application cabinet fuse block, associates a PCFD load fuse with the fuse block it powers.
2. An ISLU is powered by four PCFD power feeds from the "A or B" (not both) PCFD primary power bus. Each power feeds supplies power to 4 line group (LG) controllers (for example, -48VA0 supplies power to line group controllers 0 through 3) and to ISLU controller hardware (for example, -48V0 supplies power to CCI-0, RG-0, and HLSC-0).

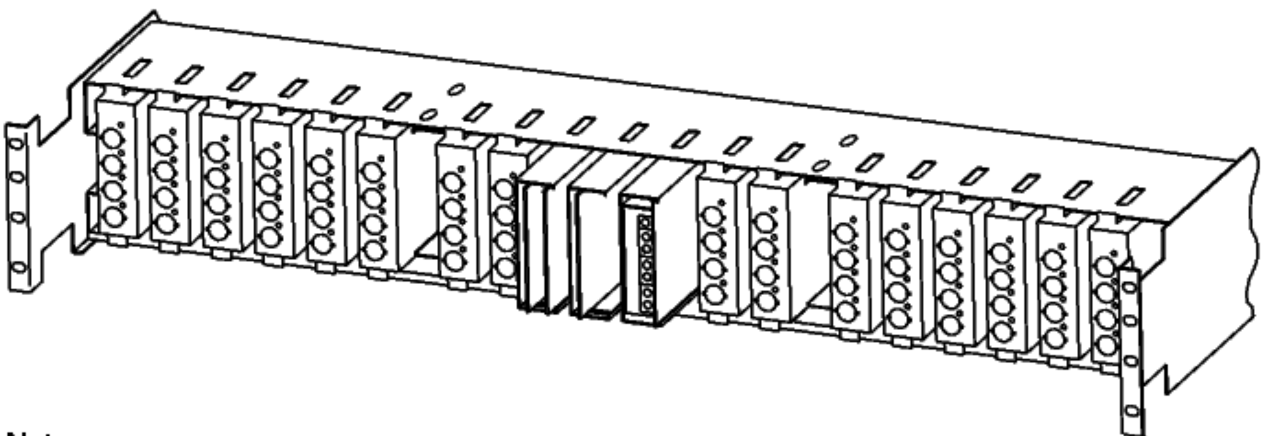
Figure 3.9-4 ISLU Cabinet Fuse Assignments

Table 3.9-1 Bus A1 Fuse Assignment Label

NO.	AMP	EQUIPMENT
F1	20	SM005 LTP0 -48VA0
F2	20	SM005 LTP0 -48VA1
F3	20	SM005 LTP0 -48VA2
F4	20	SM005 SMC1 -48VA0
F5	20	SM005 SMC1 -48VA1
F6	20	SM005 LTP2 -48VA0
F7	20	SM005 LTP2 -48VA1
F8	20	T/DC 00 -48A
F9	20	T/DC 00 -48B

Table 3.9-2 Bus A2 Fuse Assignment Label

NO.	AMP	EQUIPMENT
F1	74F	SM005 LTP0 017
F2	74F	SM005 LTP0 063
F3	74F	CM2 05 017
F4	74F	—
F5	74F	CSPC 017
F6	74F	CSPS 032
F7	74F	CSPS 047
F8	74F	CSPS 063
F9	74F	CSPS 078



Notes:

1. Modular Fuse Filter Units (MFFUs) are used to distribute the incoming -48 volts from the secondary power distribution equipment (PCFD or GPDF) to the units equipped in 5ESS®-2000 switch application hardware cabinets.

2. An MFFU has the ability to terminate up to 12 isolated power feeds and to provide output voltage for up to 19 output positions. The 19 output positions can be configured as fuse blocks, card holders that house alarm cards, or alarm opto-isolator cards, or tel-jack cards.

3. Each MFFU fuse block has 4 fuse positions. Each fuse position has a light-emitting diode next to it that monitors the fuse position. Once a load has been assigned to a fuse position, the LED will light if it detects an open circuit (blown fuse or fuse unseated from its position), or if -48 volts are not present on an MFFU fuse block.

4. The MFFU fuse blocks have bus designation in between each fuse block to inform the viewer which bus (a or b) powers the block. There are four types of designations: "A:A", "B:B", "A:B," and "B:A".

5. This arranging of buses allows for daisy chaining of buses, or bus splits as, "A:B:A" or "B:A", but bus splits must comply with the 5ESS®-2000 switch power consultant's recommendations.

Figure 3.9-5 Modular Fuse Filter Unit (MFFU)

4. ADMINISTRATIVE MODULE

GENERAL

This group of procedures (4.x) is used to determine which unit, the administrative module (AM) or the switching module/switching module-2000 (SM/SM-2000), is experiencing a fault and to recover the AM when the fault is causing repeated AM initializations.

Procedure 4.1: DETERMINING THE FAULT

OVERVIEW

This procedure is to be used to determine which unit, administrative module (AM) or switching module/switching module-2000 (SM/SM-2000), is experiencing a fault (initializing). The procedure will direct maintenance personnel to the correct trouble analysis procedure for analyzing the initialization.

PROCEDURE

1. At the master control center (MCC) video terminal, what is the indication of trouble?

   If emergency action interface (EAI) page is the only page which can be displayed, proceed to Step 2.

   If **CRITICAL SM** alarm is indicated on MCC, proceed to Step 3.

2. Are processor recovery messages (PRMs) present on EAI page and receive-only printer (ROP)?

   If **YES**, analyze AM initialization failure, using Procedure 4.2 .

   If **NO**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3. Access MCC Display Pages **141 through 144**.

4. Are initialization progress phrases present for one or more SM/SM-2000s?

   If **YES**, analyze the SM/SM-2000 initialization failure for each affected SM/SM-2000 using Procedure 6.1 .

   If **NO**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 4.2: ANALYZE ADMINISTRATIVE MODULE (AM) INITIALIZATION FAILURE

OVERVIEW

This procedure is used to determine whether manual intervention is required to recover the system and, if so, to direct the craft person to the proper recovery procedures. If manual action is found to be necessary, the craft person should contact the Electronic Switching Action Center (ESAC), Regional Technical Assistance Center (RTAC) (1-800-225-RTAC), or Customer Technical Support (CTS) (1-800-225-4672). The craft person should follow this procedure until support can be obtained. Once support is obtained, the craft person should assist in clearing the problem.

An administrative module (AM) initialization can be caused by failures in the AM, the communication module (CM), or the common network interface (CNI) hardware, or by *UNIX*® real-time reliable (RTR) system or application software. If manual intervention is necessary, analysis of the failure is performed in order to select procedures that recovers the system while minimizing call processing downtime.

The key to this analysis is the information provided by processor recovery messages (PRMs). A failure PRM printed at the beginning of every initialization attempt identifies the failure source. The "40" PRM, printed by the application integrity monitor (AIM) process, contains the AM initialization levels and the escalation counter.

When looking for specific PRMs on the receive-only printer (ROP), fields shown in **bold** print in this procedure should exactly match the corresponding PRM on the ROP. Other fields may contain different values.

PROCEDURE

1. ***NOTE:*** This procedure is associated with a service outage, therefore, the craft person should seek technical assistance per local procedures and/or contact the Electronic Switching Action Center (ESAC). If the problem persists or if manual action is necessary for recovery then the craft person or the technical support center should contact Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC), (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], while continuing to follow this procedure. Lucent Technologies support (RTAC or CTS) can provide additional support, if necessary, to resolve the problem. Lucent Technologies support should be contacted no later than 10 minutes after the start of a service outage triggered by an AM initialization failure.

   Record the approximate time at which the first automatic AM initialization occurred.

2. At the master control center (MCC) receive-only printer (ROP), mark the occurrence of the first initialization on the ROP output.

3. At the MCC ROP, look for the most recent failure PRM (first hexadecimal digit = **F**) which has the format:

   PRM_a **F**bcd xxxx xxxx xxxx xx xx xx.

4. Was a failure PRM found in the previous step with field `b' equal to **E**?

   If **YES**, application hardware or software is implicated. Continue with Step 11.

   If **NO**, AM hardware or *UNIX*® RTR system software is implicated. Continue with Step 5.

5. Check power and fuses to the moving head disks (**MHDs**), disk file controllers (**DFCs**), and control units (**CUs**).

6. If any of the units listed in Step 5 are powered down, restore power to the units in accordance with local procedure.

7. If any of the units listed in Step 5 have blown fuses, replace the blown fuses.

   Reference: **Procedure 3.1**

8. If any configurations of **CU**, **MHD**, or **DFC** are forced, clear the forces in accordance with local procedure (unless the units are known to be unusable).

9. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

   If **YES**, continue with Step 10.

   If **NO**, continue with Step 28.

10. The AM hardware and *UNIX*® RTR system software are the primary suspects. Automatic escalation may also have occurred due to CNI hardware.

    Follow Procedure 4.3 to further analyze and recover from a *UNIX*® RTR system fault. If this fails to resolve the problem, follow Procedure 7.1 to attempt to recover from a CNI-related fault. If the problem persists, **seek technical assistance** in accordance with local procedures.

    References: **Procedures 4.3** and **7.1**

11. At the MCC ROP, look for the most recent printout of the "40" PRM, which has the format:

    PRM_a **EE**cd **40**ef ghii jjjj xx xx xx

    Where: "ii" = the AM initialization escalation counter.

    NOTE: This PRM may not be printed if automatic escalation occurs very early in the initialization.

12. Was the "40" PRM indicated in the previous step printed out?

    If **YES**, continue with Step 13.

    If **NO**, continue with Step 14.

13. Is the escalation counter ("ii") equal to or greater than **09**?

    If **YES**, continue with Step 16.

    If **NO**, continue with Step 15.

14. In **PRM_**a **F**bcd xxxx xxxx xxxx xx xx xx found in Step 3, are fields 'c' and 'd' (the *UNIX*® RTR system and application initialization levels) both equal to **3**?

    If **YES**, continue with Step 16.

    If **NO**, continue with Step 15.

15. The automatic recovery sequence has not yet been completed. Continue to observe the "40" and failure PRMs that print on the ROP.

NOTE: The software error checks inhibit must be cleared for automatic recovery escalation to occur. (The inhibit status can be checked from the EAI page or from EE50 PRM.) If software error checks are inhibited, allow them using Procedure 4.6 before continuing with this procedure.

If the "40" PRM is printing, wait until the escalation counter (field "ii" shown in Step 11) in this PRM equals **09**. Then proceed to Step 16.

If the "40" PRM is not printing, wait until the *UNIX*® RTR system and application initialization levels (fields "cd" shown in Step 14) in the failure PRM equal **33**. Then proceed to Step 16.

If automatic recovery is successful (the AM initialization completes and the previous PRMs never print), proceed to Step 28.

16. Automatic recovery actions have been unable to restore essential functionality. Manual intervention is required to recover the system.

    At the MCC ROP, find the initial failure PRM which has the format:
    PRM_a **FE**cd eeff gggg hhhh xx xx xx.

    This PRM should appear on the ROP at the beginning of the first automatic initialization (located in Step 2).

    NOTE: The initial failure PRM provides the best information about the cause of the AM initializations. If this PRM cannot be located, find the most recent failure PRM having the previous format instead.

17. What is the value of field "ee"?

    If **7F** or **8F**, CNI hardware and related software are implicated. Analyze the CNI-related problem using Procedure 7.1 .

    If **F0**, analyze the AM software fault using Procedure 4.4 .

    If **FF**, proceed to Step 18.

    If any other value, or if the previous procedures fail to recover the system, **seek technical assistance** in accordance with local procedure.

18. What is the value of field "ff"?

    If **05**, proceed to Step 19.

    If **88**, proceed to Step 20.

    If **0E**, **80**, **82**, **83**, **84**, or **87**, then CM hardware is implicated. Go to Step 22.

    If **2D**, then CNI hardware and related software are implicated. Analyze the CNI-related problem using Procedure 7.1 . If this procedure fails to recover the system, **seek technical assistance** in accordance with local procedure.

    If any other value, then AM application software is implicated. Analyze the AM software fault using Procedure 4.4 . If this procedure fails to recover the system, **seek technical assistance** in accordance with local procedure.

19. What are the values of "gggg" and "hhhh"?

    If "gggg" is **0410** and "hhhh" is **0201** or **0301**, then proceed to Step 20.

If "gggg" is **047A** or **04E4**, then CNI hardware and related software are implicated. Analyze the CNI-related problem using Procedure 7.1 . If this procedure fails to recover the system, **seek technical assistance** in accordance with local procedure.

If any other value, then AM application software is implicated. Analyze the AM software fault using Procedure 4.4 . If this procedure fails to recover the system, **seek technical assistance** in accordance with local procedure.

20. At the MCC ROP, look for the most recent printout of the "40" PRM (format **PRM_**a **EE**cd **40**ef ghii jjjj xx xx xx).

21. Was the "40" PRM printed with field `f' having a value of **3** or higher?

    If **YES**, CM hardware is implicated. Go to Step 22.

    If **NO**, AM software is the primary suspect. Analyze the possible AM software fault using Procedure 4.4 . If this fails to resolve the problem, proceed to Step 22.

22. Check the power and fuses to the office network and timing complex (**ONTC**) and message switch (**MSGS**).

23. If any of the units listed in Step 22 are powered down, restore power to the units in accordance with local procedures.

24. If any of the units listed in Step 22 have blown fuses, replace the blown fuses.

    Reference: **Procedure 3.1**

25. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

    If **YES**, continue with Step 26.

    If **NO**, continue with Step 28.

26. Does the failure PRM found in Step 16 match any of the following formats?

```
PRM_aFEcd FF05 0410 0301 xx xx xx
PRM_aFEcd FF0E eeee ffff xx xx xx
PRM_a FEcd FF88 03fg hijk xx xx xx
```

    If **YES**, the AM has lost communication with all switching modules. The CM hardware is the primary suspect. Automatic escalation may also have occurred due to AM software. Follow Procedure 5.2 to recover from a possible CM duplex hardware failure. If this fails to resolve the problem, follow Procedure 4.4 to attempt to recover from an AM software fault. If the problem persists, **seek technical assistance** in accordance with local procedures.

    If **NO**, continue with Step 27.

27. Recover from CM hardware duplex failure using Procedure 5.2 .

28. Determine whether call processing has been restored.

    Reference: **Procedure 8.1**

29. Has call processing been restored?

If **YES**, continue with Step 30.

If **NO**, **seek technical assistance** in accordance with local procedures.

30. Monitor call processing and do not proceed any further than this step of this procedure unless call processing has been lost again or unless directed by the Regional Technical Assistance Center (RTAC) or Customer Technical Support (CTS).

    Reference: **Procedure 8.2**

Procedure 4.3: ANALYZE *UNIX*® RTR OPERATING SYSTEM FAULT

OVERVIEW

This procedure is used to correct a *UNIX*® real-time reliable (RTR) operating system software fault which has prevented the system from initializing automatically. It is assumed that the craft person has already contacted the Electronic Switching Assistance Center (ESAC), the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC), or Customer Technical Support Customer Technical Support (CTS) (1-800-225-4672). The craft person should follow this procedure until support can be obtained. Once support is obtained, the craft person should assist in clearing the problem.

This procedure utilizes administrative module (AM) full initializations to attempt to reboot the corrupted software area. These initializations may result in an interruption of call processing and the loss of stable calls. If the office communication module (CM) vintage is "CM2", call processing that does not require the AM can be preserved during any AM initialization. This is done by isolating the AM from the CM and switching module/switching module-2000 (SM/SM-2000). Common channel signaling (CCS) call processing, which requires the AM, cannot be preserved.

Once AM stability has been restored, the AM and CM are resynchronized to restore the system to normal operation, resynchronization has no adverse affect on call processing.

PROCEDURE

1. At the master control center (MCC) receive-only printer (ROP), find the most recent printout of the failure processor recovery message (PRM) of the format:

   PRM_a **F**cde ffgg gggg gggg hi jk lm

2. Is field "de" equal to **33**?

   If **YES**, continue with Step 5.

   If **NO**, continue with Step 3.

3. Allow automatic recovery actions to continue until field "de" is equal to **33** or until automatic recovery is successful. If initialization failures continue to occur but field "de" is not changing, proceed to Step 5.

4. Are AM initialization failures still occurring (repeated new initializations and/or failing PRMs)?

   If **YES**, continue with Step 5.

   If **NO**, continue with Step 22.

5. Is the communication module (CM) vintage "CM2"?

   If **YES**, use Procedure 4.7 to perform an AM initialization (D4, S7, H0, C4) with AM/CM isolation (application parameter **O**).

   If **NO**, use Procedure 4.7 to perform an AM full initialization (D4, S7, H4, C4).

6. Are AM initialization failures still occurring (repeated new initializations and/or failing PRMs)?

   If **YES**, continue with Step 7.

If **NO**, continue with Step 19.

7. Inhibit AM hardware error checks (application command **34** on the emergency action [**EA**] page of the MCC).

   Reference: **Procedure 4.6**

8. Inhibit AM software error checks (application command **36** on the **EA** page of the MCC).

   Reference: **Procedure 4.6**

9. Is the communication module (CM) vintage "CM2"?

   If **YES**, use Procedure 4.7 to perform an AM initialization (D4, S7, H0, C4) with AM/CM isolation (application parameter **O**).

   If **NO**, use Procedure 4.7 to perform an AM full initialization (D4, S7, H4, C4).

   Reference: **Procedures 4.7**

10. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

    If **YES**, continue with Step 11.

    If **NO**, continue with Step 19.

11. Select a working control unit/moving head disk (CU/MHD) configuration from Table 4.3-1

12. Enter emergency action interface (EAI) commands on the command input line of the **EA** page to force the selected working **CU/MHD** configuration from Table 4.3-1 .

13. Is the communication module (CM) vintage "CM2"?

    If **YES**, use Procedure 4.7 to perform an AM initialization (D4, S7, H0, C4) with AM/CM isolation (application parameter **O**).

    If **NO**, use Procedure 4.7 to perform an AM full initialization (D4, S7, H4, C4).

    Reference: **Procedure 4.7**

14. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

    If **YES**, continue with Step 15.

    If **NO**, continue with Step 19.

15. Have all possible working **CU/MHD** configurations been tried?

    If **YES**, continue with Step 17.

    If **NO**, continue with Step 16.

16. Select a working **CU/MHD** configuration from Table 4.3-1 that has not yet been tried, and then return to Step 12.

17. Perform office dead-start procedure.

    Reference: **Procedure 2.4**

18. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

    If **YES**, contact your next higher level of support immediately. Also refer to the previous procedure for possible additional recovery actions.

    If **NO**, continue with Step 19.

19. Was AM/CM isolation invoked during previous steps?

    If **YES**, continue with Step 20.

    If **NO**, continue with Step 22.

20. Clear AM/CM isolation to resynchronize the AM and CM.

    Reference: **Procedure 5.1**

21. Are AM initialization failures occurring (repeated new initializations and/or failure PRMs)?

    If **YES**, contact your next higher level of support immediately. Also refer to the previous procedure for possible additional recovery actions.

    If **NO**, continue with Step 22.

22. Determine whether call processing has been restored.

    Reference: **Procedure 8.1**

23. Has call processing been restored?

    If **YES**, continue with Step 24.

    If **NO**, contact your next higher level of support immediately.

24. Monitor call processing and do not proceed any further than this step of this procedure unless call processing has been lost again or unless directed by your next higher level of support.

    Reference: **Procedure 8.2**

Table 4.3-1 Configuration Options for 3B20D/3B21D

CONFIGURATION	ENTER THE FOLLOWING EAI COMMANDS
CU 0/PRI-DISK (MHD 0) [a]	10 and 20
CU 0/SEC-DISK (MHD 1)	10 and 22
CU 1/PRI-DISK (MHD 1)	11 and 20
CU 1/SEC-DISK (MHD 0)	11 and 22
CU 1/BACKUP ROOT	11 and 30
CU 0/BACKUP ROOT [b]	10 and 30

Notes:

a. The first four combinations should have been attempted through *UNIX* ® RTR initialization level

b. Other configuration options include the above six options with inhibits or minimum configurations mode set.

25. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 4.4: ANALYZE ADMINISTRATIVE MODULE (AM) SOFTWARE FAULT

OVERVIEW

This procedure is used to correct an AM software fault which has prevented the system from initializing automatically. It is assumed that the craft person has already contacted the Electronic Switching Action Center (ESAC), the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC), or Customer Technical Support (CTS) (1-800-225-4672). The craft person should follow this procedure until support can be obtained. Once support is obtained, the craft person should assist in clearing the problem.

This procedure utilizes administrative module (AM) full initializations to attempt to reboot the corrupted software area. These initializations may result in an interruption of call processing and the loss of stable calls. If the office communication module (CM) vintage is "CM2", call processing that does not require the AM can be preserved during any AM initialization. This is done by isolating the AM from the CM and switching module/switching module-2000 (SM/SM-2000). Common channel signaling (CCS) call processing, which requires the AM, cannot be preserved.

Once AM stability has been restored, the AM and CM are resynchronized to restore the system to normal operation, resynchronization has no adverse affect on call processing.

PROCEDURE

1. Is the communication module (CM) vintage "CM2"?

   If **YES**, use Procedure 4.7 to perform an AM initialization (D4, S7, H0, C4) with AM/CM isolation (application parameter **O**).

   If **NO**, use Procedure 4.7 to perform an AM full initialization (D4, S7, H4, C4).

2. Are AM initialization failures still occurring [repeated new initializations and/or failure processor recovery messages (PRMs)]?

   If **YES**, continue with Step 3.

   If **NO**, continue with Step 15.

3. Inhibit AM software error checks [application command **36** on the emergency action (**EA**) page of the master control center (MCC) video terminal].

   Reference: **Procedure 4.6**

4. Use Procedure 4.7.2 to perform an AM *selective* initialization (D3) with recent changes backed out (application parameter **H**). Note that this initialization preserves AM/CM isolation, if isolation was invoked in Step 1.

   Reference: **Procedure 4.7.2**

5. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

   If **YES**, continue with Step 6.

   If **NO**, continue with Step 15.

6. Allow AM software error checks (application command **37** on the **EA** page of the MCC).

   Reference: **Procedure 4.6**

7. Set backup root on the booting disk by entering application command **30** on the command input line of the EA page of the MCC.

   Response: **30** next to **Backup Root** is backlighted.

8. Is the communication module (CM) vintage "CM2"?

   If **YES**, use Procedure 4.7 to perform an AM initialization (D4, S7, H0, C4) with AM/CM isolation (application parameter **O**).

   If **NO**, use Procedure 4.7 to perform an AM full initialization (D4, S7, H4, C4).

   NOTE: This AM full initialization automatically clears the recent change backout request made in Step 4.

   Reference: **Procedure 4.7**

9. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

   If **YES**, continue with Step 10.

   If **NO**, continue with Step 15.

10. Inhibit AM software error checks (application command **36** on the **EA** page of the MCC).

    Reference: **Procedure 4.6**

11. Is the communication module (CM) vintage "CM2"?

    If **YES**, use Procedure 4.7 to perform an AM initialization (D4, S7, H0, C4) with AM/CM isolation (application parameter **O**).

    If **NO**, use Procedure 4.7 to perform an AM full initialization (D4, S7, H4, C4).

    Reference: **Procedure 4.7**

12. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

    If **YES**, continue with Step 13.

    If **NO**, continue with Step 15.

13. Perform office dead-start procedure.

    Reference: **Procedure 2.4**

14. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

If **YES**, contact your next higher level of support immediately. Also refer to the previous procedure for possible additional recovery actions.

If **NO**, continue with Step 15.

15. Was AM/CM isolation invoked during previous steps?

    If **YES**, continue with Step 16.

    If **NO**, continue with Step 18.

16. Cear AM/CM isolation to resynchronize the AM and CM.

    Reference: **Procedure 5.1**

17. Are AM initialization failures still occurring (repeated new initializations and/or failure PRMs)?

    If **YES**, contact your next higher level of support immediately. Also refer to the previous procedure for possible additional recovery actions.

    If **NO**, continue with Step 18.

18. Determine whether call processing has been restored.

    Reference: **Procedure 8.1**

19. Has call processing been restored?

    If **YES**, continue with Step 20.

    If **NO**, contact your next higher level of support immediately.

20. Monitor call processing, and do not proceed any further than this step of this procedure unless call processing has been lost again or unless directed by CTS.

    Reference: **Procedure 8.2**

21. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 4.5: PLANNED AM INITIALIZATION

OVERVIEW

When circumstances allow, support personnel need to perform an integrity check on the disk data and the disk drive hardware prior to issuing a manual request to initialize the administrative module (AM). Although there are various methods of performing integrity checks, the preferred method is to perform an Off-Line Boot of the AM/CNI/CM as specified in Procedure 4.10 — AM Off-Line Boot Verification Procedure. If circumstances prevent execution of Procedure 4.10 , then, this procedure (4.5) can be used as a less extensive verification of AM hardware and file system integrity.

PROCEDURE

1. **AM HARDWARE VERIFICATION CHECKS**

   Before committing to an AM hardware configuration, review the AM critical event log files and perform a Moving Head Disk (MHD) verify test on the primary disk pair. The verify MHD test performs an integrity check on each data block on disk.

   VERIFY MHD HARDWARE TEST

   (a) Enter the command to output the AM critical event log files to the printer.

   dump:file:all,fn="/log/log/PMLOG1"

   dump:file:all,fn="/log/log/ERLOG1"

   dump:file:all,fn="/log/log/MEMLOG1"

   dump:file:all,fn="/log/log/DKDRVLOG1"

   NOTE: Observe the time stamp and hardware unit associated with each log entry. Use this information to assess AM hardware reliability.

   (b) Enter the following command to start the MHD verify test on MHD=0. After the test completes, repeat MHD=1.

   vfy:MHD=0

   vfy:MHD=1

   NOTE: The verify test can be executed on an in-service or out-of-service disk.

2. **AM SOFTWARE VERIFICATION CHECKS**

   The GENBKUP program provides an interface to verify system files. The verify option of the GENBKUP program performs disk file system audits, compares the disk files with the files in AM memory, and performs Cyclic Redundancy Checks (CRC) to verify if stored files on disks have been altered. The verify option takes approximately 30 minutes to complete.

   Another method of performing file system integrity checks, but not as extensive, is to manually execute the "FSLINK" and "FSBLK" audits. The audits perform linkage and connectivity checks on the disk file partitions. This manual procedure outputs the mounted file systems to the printer and executes the audits in the

"NON-CORRECTING" mode. Although it is strongly recommended that the software integrity check be performed using GENBKUP program, the manual audits may be used when there are software inconsistencies between the disk data and AM memory. If an error is detected using either method, support personnel must refrain from performing a manual initialization.

AUTOMATIC DISK DATA INTEGRITY CHECKS

(a) Enter the command to start the GENBKUP program:

From STLWS, enter the following: **195 poke**

or from the recent change/verify (RC/V) terminal, enter the following: **RCV:MENU:GENBKUP**

NOTE: Several tests are performed before the GENBKUP program menu screen is displayed.

(b) Enter the letter **v** to activate the verify program.

NOTE 1: After the **v** has been entered, "GENBKUP PROCEDURE" is displayed at the top of the screen along with the test that is being performed.

NOTE 2: If the verify program detects an error during any phase of the program, the test that was being performed is backlighted on the screen, and the program aborts.

(c) Enter the letter **q** to exit the GENBKUP program.

3. MANUAL DISK DATA INTEGRITY CHECKS

List the mounted file systems and execute the fslink and fsblk audits.

(a) Enter the command to output a list of the mounted file systems:

op:status:filesys

Response: **/ on /dev/root read/write**
/etc on /dev/etc read/write
/no5odd/cpdata on /dev/no5aodd1 read/write

NOTE: The previous response is only a sample of the output expected. Other file systems are on the list.

(b) Enter the command to audit the mounted file systems.

aud:fslink=a,ins="/dev/b"

aud:fsblk=a,ins="/dev/b"

NOTE: The **a** variable represents the value in the Equipment Configuration Data base (ECD) for the respective file system. The **b** variable represents the system to be audited.

aud:fslink=1,ins="/dev/root"

aud:fsblk=1,ins="/dev/root"

aud:fslink=2,ins="/dev/no5text"

aud:fsblk=2,ins="/dev/no5text"

(c) Review the results of each file system test. If an error has been detected, do not initialize the AM; escalate to the next technical support level.

4. Poll AMA data if there is time to do so or if there is a large amount of AMA on the disk. This is only a precaution; normally AMA data that is stored on disk will not be affected during an initialization.

5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 4.6: EMERGENCY ACTION INTERFACE COMMAND POKES

OVERVIEW

This procedure provides the basic set of instructions for using the Emergency Action Interface (EAI) display page. This procedure should only be used in recovery situations which require an Administrative Module (AM) initialization or that require the system disk (disk drive 0 or 1) to be loaded from office backup tapes.

CAUTION: Some EAI pokes act like a toggle switch (such as, Backup Root and Min-Config). The "Min-Config" field SHOULD NEVER be set. The EAI Backup Root field is used to configure a file system for the initialization. If "Backup Root" is set, the backup file system will be used. If cleared, Backup Root will not be used (that is, the primary file system Root will be used instead of Backup Root). When needed, seek technical assistance.

PROCEDURE

1. At master control center (MCC) video display terminal, is the **EAI PAGE** displayed (Figure 4.6-1)?

   If **YES**, proceed to Step 4.

   If **NO**, continue with next step.

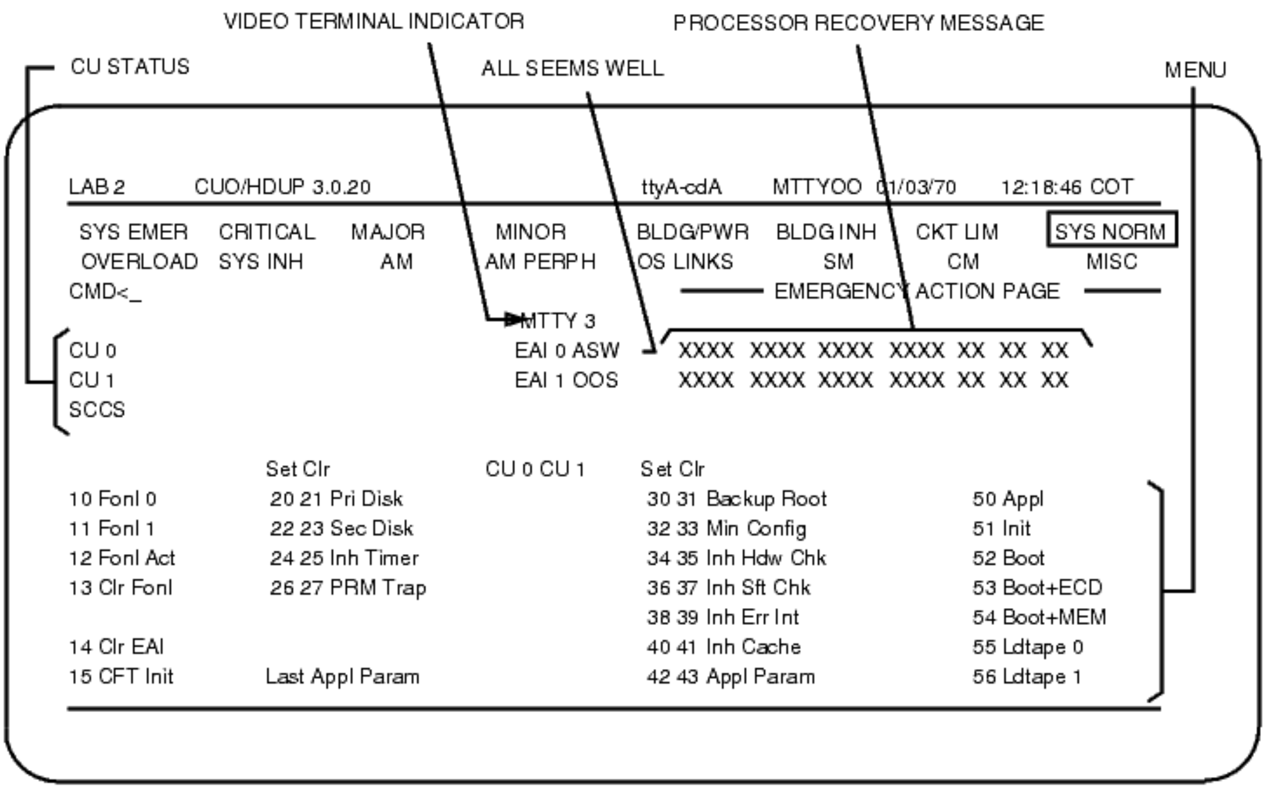


Figure 4.6-1 EAI Display (TN983 Circuit Pack)

2. At MCC or at Switching Control Center (SCC), press the **EA DISP** key.

3. Is the EAI page displayed?

If **YES**, continue with next step.

If **NO**, observe note.

NOTE: The TN983 circuit pack in the AM Input/Output Processor (IOP) provides the EAI capability. The IOP port switch allows the MCC to be configured to the TN983 packs in IOP #0 or IOP #1. If there is a problem displaying the EAI page, manually force the switch on the port switch circuit pack (UN377 in 3B21D or TN10 in 3B20D) onto IOP #0, then try IOP #1. When needed, seek technical assistance.

4. Table 4.6-1 provides a brief description of the EAI display pokes. Use the information as reference material when preparing for an AM initialization, then refer to the appropriate procedure in Section 4 (Administrative Module), of this document to initialize the AM, or to Section 2 (DIOP, Dead Start and Tape Load), to execute one of the following Load Disk From Tape (LDFT) procedures:

   - AM Initialization Procedure and Application Parameters - Procedure 4.7
   - Use EAI Application Commands 4-9 to Raise the Level of Initialization - Procedure 4.8
   - Perform Craft Terminal Software Initialization - Procedure 4.9
   - Start of Recovery from Disk Independent Operation (DIOP) - Procedure 2.1
   - Perform Office Dead Start Recovery - Procedure 2.4 .
   - Recover ODD Disk Image from Tape - Procedure 2.5

NOTE: There are two types of pokes on the EAI display page, pokes that configure the AM for an initialization, and pokes which call the *UNIX*® real-time reliable (RTR) system level programs that are used to take control of the switch [such as the Load Disk From Tape (LDFT) program]. When needed, refer to the footnotes at the end of Table 4.6-1 .

Table 4.6-1 Emergency Action Interface (EAI) Maintenance Commands and Poke Commands

COMMAND	DESCRIPTION	*UNIX*® RTR SYSTEM LEVEL
10	Forces CU-0 to be the on-line processor and CU-1 off-line. Will cause an AM initialization if CU-0 was not on-line at time of force. If CU are forced, automatic fault recovery will not attempt to recover on the CU that is configured off-line.	N/A
11	Same as 10 except, forces CU-1 on-line and CU-0 off-line.	N/A
12	Forces the CU that is currently active on-line, the other CU off-line. Once the on-line CU is forced, automatic fault recovery will not attempt to recover on the CU that is configured off-line.	N/A
13	Removes on-line and off-line forces and allows automatic fault recovery programs to determine the on-line and off-line CUs.	N/A
14	Clears all of the following which may be in effect: forces, disk selection and EAI buffer.	N/A
15	Is used together with the application parameter poke to produce three levels of craft initializations (Procedure 4.9).	N/A
20	Forces both processors to access their primary disk unit on a boot (MHD0 is the primary disk for CU 0; MHD1 is the primary disk for CU 1). If the primary disk field **is set**, automatic fault recovery will not attempt to use the secondary disk during the boot.	52 thru 54
21	Removes force on primary disk unit select.	52 thru 54
22	Same as 20 except forces the processors to access their secondary disk units (the secondary disk for CU 0 is MHD1; the secondary disk for CU 1 is MHD0).	52 thru 54
23	Removes force on secondary disk unit select.	52 thru 54

24	Prevents the sanity timer from expiring and initiating automatic recovery action.	N/A
25	Allows the sanity timer, when it expires, to initiate an automatic recovery.	N/A
26	Will cause the next RTR failure processor recovery messages (PRM) to be trapped and displayed in reverse video. The failure PRM will remain displayed until EAI poke 27 is entered to release the trapped PRM.	N/A
27	Releases any trapped failure PRMs and allows further PRMs to be displayed.	N/A
28 **a**	Allows an Alternate Boot Disk (ABD) to be specified. **a**	N/A
29 **a**	Restores the system default boot disks. **a**	N/A
30 **b**	Forces the processor to initialize from the backup root file system. **b**	53 and up
31 **b**	Forces the processor to initialize from the primary root file system. **b**	53 and up
32 **b**	Forces the processor to initialize only the *UNIX*® RTR operating system (minimum configuration). The SM/SM-2000, CM, and CNI **will not** be populated in the database. This field should **never** be backlighted. **b**	53 and up
33 **b**	Forces the processor to initialize both the *UNIX*® RTR operating system and application software needed to support call processing. This field should **always** be backlighted.	53 and up
34 **b**	Prevents certain AM hardware interrupts from initiating automatic recovery action. Does not have an impact on CM hardware interrupts. **b**	51 and up
35 **b**	Allows AM hardware checks to initiate an automatic recovery action. Does not allow CM hardware checks. **b**	51 and up
36 **b**	Prevents certain AM software interrupts from initiating an automatic recovery action. Does not have an impact on CM hardware interrupts. **b**	51 and up
37 **b**	Allows AM software checks to initiate automatic recovery action. Does not allow CM software checks. **b**	51 and up
38 **b**	Inhibits error interrupts (AM only). **b**	51 and up
39 **b**	Allows error interrupts (AM only). **b**	51 and up
40 **b**	Inhibits use of AM cache memory. **b**	51 and up
41 **b**	Allows use of AM cache memory. **b**	51 and up
42 **b**	Allows the setting of a parameter which is made available to application software. **b**	50 and up
43 **b**	Clears the application parameter. **b**	N/A
50 **c**	Passes application parameter to AIM. **c**	N/A
51 **c**	Forces initialization of the *UNIX*® RTR operating system (level 1 initialization). **c**	N/A
52 **c**	Forces bootstrap and reloads the *UNIX*® RTR operating system from disk (level 2 initialization). **c**	N/A
53 **c**	Same as 52 plus reloads equipment configuration data (level 3 initialization) and ODD. **c**	N/A
54 **c**	Same as 53 plus clears the memory (level 4 initialization). **c**	N/A
55 **c d**	Loads selected disk from tape unit 0. **c d**	N/A
56 **c d**	Loads selected disk from tape unit 1. **c d**	N/A

Notes:

a. Commands 28 and 29 are only available on the UN597 circuit pack when the ABD feature is active.

b. Commands 30 through 43 are sent to the 3B20/3B21 computer the next time commands 50 through 56 are executed.

c. Commands 50 through 56, in addition to the description given, cause the current next state information to be sent to the processor.

d. Commands 55 and 56, require a CU to be forced on-line (command 10, 11, or 12) and a disk unit to be selected (command 20 or 22).

Procedure 4.7: AM INITIALIZATION PROCEDURE AND APPLICATION PARAMETERS

OVERVIEW

This procedure provides the basic set of instructions for performing an Administrative Module (AM) initialization. The person who executes this procedure should be familiar with the menu level poke commands on the Master Control Center (MCC) Emergency Action Interface (EAI) display page. The user should also be prepared to look for and decode any failure Processor Recovery Messages [PRMs (see 235-600-601 document)]. This procedure should only be used for system recovery purposes where manual intervention is required.

> ***NOTE 1:*** This procedure is divided into two procedures. Procedure 4.7.1 conditions the AM for a manually invoked *UNIX*® real-time reliable (RTR) initialization, provides a brief description of the RTR system levels (D0 through D4), and provides the essential data needed to initiate a manual recovery. Procedure 4.7.2 provides a description of the EAI application parameters as well as the step-by-step instructions needed to activate/deactivate the desired parameter.

NOTE 2: Section 9.1.2 — System Recovery Description, provides a more comprehensive list of parameters, initialization levels, and some data on automatic escalation strategies. Procedure 4.8.1 provides instructions for using EAI application commands to raise the level of initialization within a *UNIX*® RTR bootstrap level. When needed, refer to Procedure 4.6 for a description of the EAI command pokes.

PROCEDURE

1. Use the following list of procedures to perform an AM initialization:
    - Procedure 4.7.1 — Perform a Manual AM Initialization
    - Procedure 4.7.2 — Initialize System with EAI Application Parameters

Procedure 4.7.1: PERFORM A MANUAL AM INITIALIZATION

OVERVIEW

This procedure should only be used for system recovery purposes when it is absolutely necessary to perform a manual AM initialization.

PROCEDURE

1. At the MCC, access the EAI display page (press the **EA DISP** key).

2. At prompt on EAI display page, enter the following poke: **14** (Clear EAI).

   CAUTION: The EAI poke 14 should reset ("Clr") the following indicators; Backup Root, Pri/Sec Disk, and Min-Config. If the "Clr" field is not backlighted, enter the EAI poke in the "Clr" column that is adjacent to the indicator.

3. Use Substeps (a) through (d) to configure the AM, then continue with Step 4.

   (a) Configure a CU.

   - To force the active CU on-line, enter the following EAI poke: **12**.
   - To force CU 0 on-line, enter the following EAI poke: **10**.
   - To force CU 1 on-line, enter the following EAI poke: **11**.

   NOTE: When possible, use EAI poke 12 when configuring the CUs. Poke 12 will force the active CU on-line and the other CU off-line. Forcing a CU on-line that is not active will result in an AM initialization.

   (b) Configure a disk to the CU that is ***FONL*** (primary disk or secondary).

   - To configure primary disk, enter the following EAI poke: **20**.
   - To configure secondary disk, enter the following EAI poke: **22**.

CU FONL	DISK TO BE USED	EAI COMMANDS
CU 0	Pri Disk (MHD0)	20
CU 0	Sec Disk (MHD1)	22
CU 1	Pri Disk (MHD1)	20
CU 1	Sec Disk (MHD0)	22

   (c) Select a file system (Root **or** Backup Root).

   - To set Root, enter the following EAI poke: **31**.
   - To set Backup Root, enter the following EAI poke: **30**.

   NOTE: When selecting a file system, always select the primary file system (Root) by entering EAI poke *31* unless Root is known to be unusable. If it become necessary to initialize the AM onto the backup file system (Backup Root), enter EAI poke *30*.

(d) **Disable** AM "Min Config". Enter the following EAI poke: **33**.

4. Do the status indicators on the EAI display reflect the configuration you selected?

   - **FONL** backlighted next to the CU forced.
   - **SET** backlighted next to disk you selected.
   - **CLR** backlighted next to Backup Root (only applicable if Root was selected).
   - **CLR** backlighted next to Min-Config.

   If **YES**, continue with next step.

   If **NO**, return to Step 2, or **seek technical assistance**.

5. Do you know what EAI pokes are needed to obtain the desired result?

   If **YES**, proceed to Step 7.

   If **NO** or **NOT SURE**, continue with next step.

6. The EAI display pokes 50 through 54 are used to call a specific *UNIX*® RTR system initialization level. Use Substeps (a) through (e) to determine the impact of each RTR level, then continue with next step.

   (a) **EAI poke 50 (level D0 or AM level 0):** Is not a true RTR initialization. An AM level 0 will only pass the contents of the EAI APPL buffer to the Application Integrity Monitor (AIM) for processing.

   (b) **EAI poke 51 (level D1 or AM level 1):** Will perform a **D1/S2/H0/C1** initialization. An AM level 1 initializes the *UNIX*® RTR operating system level processes and performs a low-level initialization of the CNI Ring. A level 1 does not affect the application kernel processes (such as, OKP, SMKP, and MSKP).

   (c) **EAI poke 52 (level D2 or AM level 2):** Will perform a full processor initialization of operating kernel processes by triggering a **D2/S6/H2/C2** initialization. An AM level 2 will not reload the ODD or ECD and will not clear the Protected Application Segment (PAS) area of memory. The status of CM hardware will not be affected nor will stable calls unless an error is detected that automatically raises the level of initialization.

   (d) **EAI poke 53 (level D3 or AM level 3):** Will invoke a **D3/S6/H2/C3** initialization if the office is equipped with a CM2 or CM2C. A 53 will invoke an **S6/H3/C3** initialization if the office is equipped with a CM1. An AM level 3 will always reload the Office Dependent Data (ODD) and Equipment Configuration Database (ECD) that was backed up to disk (data for AM, CM, and CNI). A level 3 will not clear the AM PAS.

   (e) **EAI poke 54 (level D4 or AM level 4):** Will invoke a **D4/S7/H2/C3** initialization which will perform the same functions described by an AM level 3, but a level 4 will also clear out most of the AM PAS in memory.

7. Can you achieve the desired results *without* using the EAI APPL Poke (field 42)?

   If **YES**, continue with next step.

   If **NO** or **NOT SURE**, observe note.

NOTE: The EAI **APPL Param** field (poke 42) is used to pass an EAI application parameter, or application command, to the application integrity monitor for processing. **When needed**, refer to Section 4.7.2 for information on application parameters, or to Procedure 4.8.1 for application commands. If you have determined that the APPL Param field is not needed, continue with next step.

8. Use one of the following EAI pokes to call the desired RTR system level.

   - For RTR ***Level 1***, enter the following poke: **51**.
   - For RTR ***Level 2***, enter the following poke: **52**.
   - For RTR ***Level 3***, enter the following poke: **53**.
   - For RTR ***Level 4***, enter the following poke: **54**.

9. Did the AM recover (MCC Page 111 is displayed)?

   If **YES**, determine if call processing has been restored. Go to Procedure 8.1 .

   If **NO**, use the PRMs to identify the source of the problem. When applicable, return to Step 3 and try another configuration and/or **seek technical assistance**. If the AM still does not recover, exhaust all the available CU to Disk configurations on Root, then Backup Root.

Procedure 4.7.2: INITIALIZE SYSTEM WITH EAI APPLICATION PARAMETERS

OVERVIEW

This procedure provides the basic set of instructions for using EAI Application Parameters (APPL Param).

PROCEDURE

1. Review the parameters listed in Table 4.7.2-1 , then continue with next step.

Table 4.7.2-1 Enter Application Parameters

DESIRED OPERATION	APPLICATION PARAMETER	NEEDED *UNIX*® RTR SYSTEM INITIALIZATION LEVEL
Isolate all SM/SM-2000s	b	50 and up
Unisolate all SM/SM-2000s	c	50 and up
Back out AM recent changes	h	50 and up
Inhibit CM hardware checks	f	50 and up
Enter CNI minimum mode	l	50 and up
Exit CNI minimum mode	n	50 and up
Full Pump of CNI Ring	p	52 and up
Enter AM/CM min mode (C4)	m	53 and up
Exit AM/CM min mode (C4)	n	53 and up
Activate AM/CM Isolation	o	50 and up
Unisolate AM from CM	t	50 and up
Force MSCU 0 to active and MSCU 1 to unavailable	u	50 and up
Force MSCU 1 to active and MSCU 0 to unavailable	v	50 and up
Clear MSCU forces	w	50 and up
Force ONTCCOM 0 active and ONTCCOM 1 unavailable	x	50 and up
Force ONTCCOM 1 active and ONTCCOM 0 unavailable	y	50 and up
Clear ONTCCOM forces	z	50 and up

2. Is there a parameter listed that when called would allow you to obtain the desired results?

   If **YES**, continue with next step.

   If **NO**, return to the procedure/section that sent you here.

3. Do you know how the parameter that you selected will affect the system?

   If **YES**, proceed to Step 4.

   If **NO** or **NOT SURE**, review Substeps (a) through (h), then continue with next step.

   (a) **Isolate all SM/SM-2000s from the CM**: The EAI APPL Param **b** should only be used if the recovery requires that all SM/SM-2000 be isolated from the CM. The use of this parameter will disable call processing in the host office. The SM/SM-2000 isolation can be cleared with a manual input command, or EAI APPL Param **c**.

   (b) **Backout all AM recent changes**: The EAI APPL Param **h** is used during recovery situations where there is a need to back out all AM database entries that have not been incorporated into the official AM ODD file on disk. This parameter is used in recovery situations to back out changes made to the AM database file that could be contributing to office stability problems.

(c) **Inhibit CM hardware checks**: The EAI APPL Param **f** is used in recovery situations where a CM hardware problem is causing the AM to roll in initializations. The CM hardware checks can be cleared with a manual input command, or EAI APPL Param **g**.

(d) **Set CNI minimum mode**: The EAI APPL Param **l** provides the means to disable the CNI Ring call processing function during a manual AM initialization request. This parameter should only be used when the AM is rolling in initializations due to a CNI hardware or software problem. The CNI minimum mode can be cleared with a manual input command or with EAI APPL Param **n**.

(e) **Set AM/CM Minimum Mode**: The EAI APPL Param **m** provides the means to initialize the system into AM/CM minimum mode. This parameter will disable call processing in the host office and, therefore, should only be used if a CM hardware problem is causing the AM to roll in initializations. The AM/CM minimum mode parameter should only be used after all other conventional recovery methods have been exhausted. The AM/CM minimum mode can be cleared using EAI APPL Param **n**.

(f) **Activate AM/CM isolation feature**: The EAI APPL Param **o** is used to activate the AM/CM isolation feature. When called, the system will be initialized into a state where the CM and SM/SM-2000s are the only complexes available to perform the call processing function. The AM/CM isolation feature is most useful when recovering from AM software or hardware problems. The AM/CM isolation can be cleared using EAI APPL Param **t**.

(g) The EAI APPL Param **u** and **v** are used to configure a specific CM Message Switch (MSGS) side to the force active state and the other MSGS side to the unavailable state. These parameters are primarily used during a manual AM initialization to prevent the system from initializing units with known bad hardware. The MSGS forces can be cleared by using EAI APPL Param **w**.

(h) The EAI APPL Param **x** and **y** are used to configure a specific CM Office Network Timing Complex (ONTC) side to the force active state and the other MSGS side to the unavailable state. These parameters are primarily used during a manual AM initialization to prevent the system from initializing units with known bad hardware. The ONTC forces can be cleared by using EAI APPL Param **z**.

4. Do you really want to enter an EAI application parameter?

   If **YES**, continue with next step.

   If **NO**, observe note.

   NOTE: If you have reached this point, you have determine that an application parameter will not be used. Return to Section 4.7.1 of this procedure, or go to Procedure 4.8.1 and review EAI application commands 4-9. When needed, **seek technical assistance**.

5. Do you know what RTR level is needed to achieve the desired results?

   If **YES**, continue with next step.

   If **NO**, **seek technical assistance**.

6. Use Substeps (a) through (d) to configure the AM, then continue with next step.

   (a) Configure a CU.

   - To force the active CU on-line, enter the following EAI poke: **12**.
   - To force CU 0 on-line, enter the following EAI poke: **10**.
   - To force CU 1 on-line, enter the following EAI poke: **11**.

NOTE: When possible, use EAI poke 12 when configuring the CUs. Poke 12 will force the active CU on-line and the other CU off-line. Forcing a CU on-line that is not active will result in an AM initialization.

(b) Configure a disk to the CU that is ***FONL*** (primary disk or secondary).

- To configure primary disk, enter the following EAI poke: **20**.
- To configure secondary disk, enter the following EAI poke: **22**.

CU FONL	DISK TO BE USED	EAI COMMANDS
CU 0	Pri Disk (MHD0)	20
CU 0	Sec Disk (MHD1)	22
CU 1	Pri Disk (MHD1)	20
CU 1	Sec Disk (MHD0)	22

(c) Select a file system (Root **or** Backup Root).

- To set Root, enter the following EAI poke: **31**.
- To set Backup Root, enter the following EAI poke: **30**.

NOTE: When selecting a file system, always select the primary file system (Root) by entering EAI poke *31* unless Root is known to be unusable. If it become necessary to initialize the AM onto the backup file system (Backup Root), enter EAI poke *30*.

(d) **Disable** AM "Min Config". Enter the following EAI poke: **33**.

7. Use Substep (a) and (b) to load the EAI APPL buffer, then continue with next step.

   (a) Set APPL Param field, enter the following poke: **42**.

   (b) Enter parameter type, poke: **xx** (**xx** = value from Table 4.7.2-1)

   NOTE: The contents of the buffer will not get processed until the EAI maintenance command is entered to initialize the AM. To clear APPL buffer, for any reason, enter EAI poke **43**.

8. Use one of the following EAI pokes to call the desired RTR system level.

   - For RTR ***Level 0***, enter the following poke: **50**.
   - For RTR ***Level 1***, enter the following poke: **51**.
   - For RTR ***Level 2***, enter the following poke: **52**.
   - For RTR ***Level 3***, enter the following poke: **53**.
   - For RTR ***Level 4***, enter the following poke: **54**.

9. Did the AM recover (MCC Page 111 is displayed)?

   If **YES**, determine if call processing has been restored. Go to Procedure 8.1 .

   If **NO**, use the PRMs to identify the source of the problem. If an MSCU or ONTC side was forced active, try clearing the force (Appl Param **w** clears MSCU force, **z** clears ONTCCOM force). In any case, **seek technical assistance**.

Procedure 4.8: USE EAI APPLICATION COMMANDS 4-9 TO RAISE THE LEVEL OF INITIALIZATION

OVERVIEW

This procedure provides the basic set of instructions for raising the level of initialization within a *UNIX*® real-time reliable (RTR) bootstrap level. The person who executes this procedure should be familiar with the menu level poke commands on the Master Control Center (MCC) Emergency Action Interface (EAI) display page. The user should also be prepared to decode any failure Processor Recovery Messages [PRMs (see 235-600-601 document)]. This procedure should only be used for system recovery purposes where manual intervention is required.

The *UNIX*® RTR level D2, D3, and D4 are the only RTR levels that perform a bootstrap of the Administrative Module (AM). Each bootstrap level calls for a specific level of initialization [that is, hardware (H); software (S); Common Network Interface (C)]. The initialization levels called are only raised if an error is detected during the initialization sequence, or if an EAI application command is manually entered before the AM bootstrap request. The highest level of initialization that can be manually called from the EAI display without using an EAI APPL command is dependent on the hardware vintage of the Communication Module (CM). A manual D4 in an office equipped with a CM Model 2 (CM2) invokes a **D4/H2/S7/C3** initialization. A D4 in an office equipped with a CM Model 1 (CM1) invokes a **D4/H4/S7/C3** initialization.

NOTE: This procedure is divided into five procedures. Procedure 4.8.1 configures the AM for a manual initialization and lists the EAI application commands needed to raise the initialization level. Procedure 4.8.1 also provides an impact statement for the system initialization levels that can be called with an AM bootstrap level (H2 - H4, S6 and S7, C2 - C4, M7 and M8). Procedures 4.8.2 , 4.8.3 , 4.8.4 , and 4.8.5 provide the step-by-step instructions needed to call a specific level of initialization.

PROCEDURE

1. Use the following list of procedures to perform initializations:

   (a) Procedure 4.8.1 — Determine What EAI Poke(s) Is Needed to Achieve the Desired Level of Initialization

   (b) Procedure 4.8.2 — Perform AM and CM Selective Initialization (H3,S6 or H3,S7)

   (c) Procedure 4.8.3 — Perform AM and CM Full Initialization (H4,S6 or H4,S7)

   (d) Procedure 4.8.4 — Perform a Stable Clear of System (D3/D4,H4,S7,C3) With or Without an Initialization (M7) of the SM/SM-2000

   (e) Procedure 4.8.5 — Perform a Stable Clear of System (D3/D4,H4,S7,C4) With or Without an Unconditional Full Pump (M8) of the SM/SM-2000.

Procedure 4.8.1: DETERMINE WHAT EAI POKE(S) IS NEEDED TO ACHIEVE THE DESIRED LEVEL OF INITIALIZATION

OVERVIEW

The intent of this sub-procedure is to provide information that helps the user determine what EAI pokes are needed to achieve the desired AM initialization results. The EAI pokes **52 through 54** call for a specific initialization level (**D, H, S, and C**). The EAI application commands **4 through 9** are used in conjunction with an AM bootstrap level to raise the level of initialization within a specific bootstrap level.

PROCEDURE

1. Do you know the impact of *UNIX*® real-time reliable (RTR) system levels D2 through D4?

   If **YES**, continue with next step.

   If **NO**, refer to Procedure 4.7.1 . You must know the impact of the *UNIX*® RTR system levels before continuing.

2. Do you want to invoke a higher level of initialization within a specific RTR bootstrap level (such as a hardware level 4)?

   If **YES**, continue with next step.

   If **NO**, return to the procedure that sent you here, or **seek technical assistance**. If you are not sure, continue with next step.

3. Associate an EAI APPL command poke with the desired initialization level (Table 4.8.1-1), then continue with the next step.

Table 4.8.1-1 Application Commands (4-9) Used to Set Specific Levels of Initializations

DESIRED INITIALIZATION LEVEL	EAI POKE COMMAND	NEEDED *UNIX*® RTR SYSTEM INITIALIZATION LEVEL
AM Selective Initialization Level **(S6,H3)**	4	52 or 53
AM Selective Initialization Level **(S7,H3)**	5	53 only
AM Full Initialization Level **(S6,H4)**	6	52 or 53
AM Full Initialization Level **(S7,H4)**	7	53 or greater
System Stable Clear Level **(S7,H4)** with a power pump of CMPs, plus if needed, an AM/SM-2000's level **M7** is performed if poke 42;8;50 is entered within 30 minutes of the stable clear.	8	53 (or greater)
System Stable Clear Level **(S7,H4)** with a power pump of CMPs, plus if needed, an SM/SM-2000's level **M8** is performed if poke 42;9;50 is entered within 30 minutes of the stable clear.	9	53 (or greater)

4. Do you know the impact of raising the initialization level (H, S, C, or M)?

   If **YES**, proceed to Step 5.

   If **NO**, the following list, provides an impact statement for the system initialization levels. Review this list, then continue with next step.

   (a) **H0** performs a Full Processor Initialization (FPI) on Switch Maintenance Kernel Process (SMKP).

NOTE: **H1** single-circuit level is not used.

(b) **H2** is the hardware initialization level used to re-establish communication between the AM and CM without initializing the CM hardware. An H2 can not be performed in a CM1 office. In a CM2 office, an H2 is called any time a manual request is entered to perform an AM level 2 or higher *UNIX*® RTR system initialization. To request a manual H3 or higher initialization, the EAI poke must be proceeded by an EAI application command.

(c) **H3** is a partial hardware initialization that does not affect stable calls. An **H3** does initialize some of the CM hardware, but it ***does not*** initialize TMS hardware since doing so would cause stable calls to be dropped. A hardware level 3 can be called with EAI APPL commands 4 or 5.

(d) **H4** is a full hardware initialization that performs a complete initialization of the hardware [that is, H3 plus the full initialization of all Time Multiplexed Switch (TMS) hardware]. This level fully initializes the TMS fabric, opening up all connections (stable calls are dropped). An H4 is only run by manual command ***except*** in extreme situations such as an ONTC duplex failure. A hardware level 4 can be called with APPL commands 6 through 9.

(e) **S6** reloads the program text and the compiled data for the *UNIX*® RTR operating system processes and the application processes. This includes OKP and SMKP. An **S6** ***does not*** clear the Protected Application Segment (PAS) in memory; depending on the D level requested, may or may not reload the database; and depending on the H level requested, may or may not initialize the hardware in the CM. All hardware that was out-of-service (OOS) or forced at the time of the initialization remains OOS or forced unless a fault is detected that escalated the recovery to a higher level. An **S6** can be called without an APPL command.

(f) **S7** performs all of the actions described in level S6, and it also clears out most phase-protected information in PAS that is used for making decisions regarding maintenance actions. Phase-protected information such as, AMA, plant measurements, and post mortem information is retained. An **S7** can be called without an APPL command (a D4 without a parameter always calls an S7).

(g) **C2** causes all CNI processes to abort and be recreated, and attempts to resynchronized the CNI Ring. A **C2** is performed as part of a *UNIX*® RTR system level 2 (D2) initialization. A **C2** can be called without an APPL command.

(h) **C3** performs a full processor initialization of the Common Network Interface (CNI) software. This means the critical CNI processes are rolled back to a known safe point and all noncritical processes are killed and restarted. A C3 also zeros the CNI PAS area and restores the information from disk, then downloads the routing information to the CNI Nodes. A C3 is performed as part of a *UNIX*® RTR system level 3 (D3) or level 4 (D4) initialization. A CNI level 3 can be called without an APPL command.

(i) **C4** is the most severe action which can be performed on the CNI ring. The C4 aborts all CNI processes, recreates the processes, reinitializes the CNI's PAS, and downloads all text and data to the CNI nodes. The CCS call processing is lost during this level of initialization. A C4 is performed as part of a *UNIX*® RTR system level 4 (D4) initialization if EAI APPL parameters **p** or **9** are used.

(j) **M7** provides the means to trigger an SM/SM-2000 full initialization without pump. A system wide M7 is only performed if EAI APPL poke 42;8;50 is issued within 30 minutes of issuing EAI APPL poke 42;8;53 (or 42;8;54). An **M7** initializes all SM/SM-2000 memory and peripherals to a known state (idle), synchronizes interprocessor data with the AM and CMP, outputs failure and post-mortems information, and performs a hashsum check. An **M7** does not perform a full pump, but pumps the portion of SM/SM-2000 memory which has failed the hashsum check. An M7 can be called without initializing the AM (broadcast input message).

(k) **M8** provides the means to trigger an SM/SM-2000 full initialization with full pump. A system wide M8 is only performed if EAI APPL poke 42;9;50 is issued with 30 minutes of issuing EAI APPL poke 42;9;53 (or 42;9;54). An **M8** performs all of the actions included in an M7, but also performs an unconditional full pump of the SM/SM-2000 memory and peripherals in a nonbroadcast mode. An M8 can be called without initializing the AM.

The nonbroadcast mode only transitions an SM/SM-2000 to the pump state after the system has determined that the resources are available to pump the targeted SM/SM-2000. This allows some SMs/SM-2000s to process calls while others pump and initialize. A broadcast pump is only performed if the SM/SM-2000 has been powered cycled before, or if the manual command string is entered to perform a broadcast pump once the AM has recovered.

5. Do you want to raise the initialization level within a specific RTR bootstrap level?

   If **YES**, continue with next step.

   If **NO**, return to the procedure that sent you here.

6. If you have reached this step, you have reviewed EAI application commands 4 through 9 and have determined that an application command is needed to achieve the desired results. Are you ready to initialize the AM?

   If **YES**, continue with next step.

   If **NO**, exit this procedure and **seek technical assistance**.

7. At the MCC, access the EAI display page (press the **EA DISP key**).

8. At prompt on EAI display page, enter the following poke: **14** (Clear EAI).

   CAUTION: EAI poke 14 should **reset** the Backup Root, Pri/Sec Disk, and Min-Config EAI display indicators. If the "Clr" field is not backlighted, enter the EAI poke in the "Clr" column that is adjacent to the indicator.

9. Use Substeps (a) through (d) to configure a CU, a disk and a file system, then proceed to Step 10.

   (a) Configure a CU.

   - To force the active CU on-line, enter the following EAI poke: **12**.
   - To force CU 0 on-line, enter the following EAI poke: **10**.
   - To force CU 1 on-line, enter the following EAI poke: **11**.

   NOTE: When possible, use EAI poke 12 when configuring the CUs. Poke 12 forces the active CU on-line and the other CU off-line. Forcing a CU on-line that is not active results in an AM initialization.

   (b) Configure a disk to the CU that is ***FONL*** (primary disk or secondary).

   - To configure primary disk, enter the following EAI poke: **20**.
   - To configure secondary disk, enter the following EAI poke: **22**.

CU FONL	DISK TO BE USED	EAI COMMANDS
CU 0	Pri Disk (MHD0)	20
CU 0	Sec Disk (MHD1)	22
CU 1	Pri Disk (MHD1)	20
CU 1	Sec Disk (MHD0)	22

(c) Select a file system (Root **or** Backup Root).

- To set Root, enter the following EAI poke: **31**.
- To set Backup Root, enter the following EAI poke: **30**.

NOTE: When selecting a file system, always select the primary file system (Root) by entering EAI poke *31* unless Root is known to be unusable. If it become necessary to initialize the AM onto the backup file system (Backup Root), enter EAI poke *30*.

(d) **Disable** AM "Min Config". Enter the following EAI poke: **33**.

10. Do the status indicators on the EAI display reflect the configuration you selected?

- **FONL** backlighted next to the CU forced.
- **SET** backlighted next to disk you selected.
- **CLR** backlighted next to Backup Root (only applicable if Root was selected).
- **CLR** backlighted next to Min-Config.

If **YES**, continue with next step.

If **NO**, repeat from Step 8 or **seek technical assistance**.

11. If you have reached this step, then the AM has been configured for the bootstrap. Go to one of the following sections based on the desired initialization type:

- To perform AM and CM Selective Initialization (H3,S6 or H3,S7), go to Procedure 4.8.2 .
- To perform AM and CM Full Initialization (H4,S6 or H4,S7), go to Procedure 4.8.3 .
- To perform a Stable Clear of System (D3/D4,H4,S7,C3) With or Without an Initialization of the SM/SM-2000 (M7), go to Procedure 4.8.4 .
- To perform a Stable Clear of System (D3/D4,H4,S7,C4) With or Without an Unconditional Full Pump of the SM/SM-2000 (M8), go to Procedure 4.8.5 .

Procedure 4.8.2: PERFORM AM AND CM SELECTIVE INITIALIZATION (H3,S6 OR H3,S7)

OVERVIEW

Use this sub-procedure to request an AM and CM selective initialization [hardware level 3 (H3) and software level 6 or 7 (S6 or S7)]. Stable calls are preserved as long as a fault is not detected during the initialization sequence.

NOTE: To clear the EAI APPL buffer, for any reason, enter EAI poke **43**.

PROCEDURE

1. What type of selective initialization do you want to perform?

   If **S6/H3**, continue with next step.

   If **S7/H3**, proceed to Step 3.

2. To invoke an **S6/H3** initialization, perform Substeps (a) through (c), then proceed to Step 4.

   (a) Set APPL Param field, enter the following poke: **42**.

   (b) Enter APPL type, poke: **4**.

   (c) What real-time reliable (RTR) level (D2 or D3) is needed to obtain the desired results?

   If **D2**, enter the following EAI poke: **52**.

   If **D3**, enter the following EAI poke: **53**.

3. To invoke an **S7/H3** initialization, perform Substeps (a) through (c), then proceed to Step 4.

   (a) Set APPL Param field, enter the following poke: **42**.

   (b) Enter APPL type, poke: **5**.

   (c) Request a system level 3 (D3). Enter the following EAI poke: **53**.

4. Do you really want to perform a selective initialization?

   If **YES**, enter the following: **y**.

   If **NO**, enter the following: **n**.

   NOTE: If you answered **yes**, the ***RCVRY*** indicator on the EAI display starts flashing. At this point, monitor the progress of the recovery. If the AM fails to recover, **seek technical assistance**. If you decided not to perform the initialization, enter EAI poke 14 to clear the EAI, then exit this procedure.

Procedure 4.8.3: PERFORM AM AND CM FULL INITIALIZATION (H4,S6 OR H4,S7)

OVERVIEW

Use this procedure to request an AM and CM full initialization [hardware level 4 (H4) and software level 6 or 7 (S6 or S7)]. Stable calls are not preserved!

NOTE: To clear the EAI APPL buffer, for any reason, enter EAI poke **43**.

PROCEDURE

1. What type of AM/CM full initialization do you want to perform?

   If **S6/H4**, continue with next step.

   If **S7/H4**, proceed to Step 3.

2. To request an **S6/H4** initialization, perform Substeps (a) through (c), then continue with Step 4.

   (a) Set APPL Param field, enter the following poke: **42**.

   (b) Enter APPL type, poke: **6**.

   (c) What real-time reliable (RTR) level (D2 or D3) is needed to achieve the desired results?

   If **D2**, enter the following EAI poke: **52**.

   If **D3**, enter the following EAI poke: **53**.

3. To request an **S7/H4** initialization, perform Substeps (a) through (c), then continue with Step 4.

   (a) Set APPL Param field, enter the following poke: **42**.

   (b) Enter APPL type, poke: **7**.

   (c) What RTR level (D3 or D4) is needed to achieve the desired results?

   If **D3**, enter the following EAI poke: **53**.

   If **D4**, enter the following EAI poke: **54**.

4. Do you really want to perform an AM full initialization?

   If **YES**, enter the following: **y**.

   If **NO**, enter the following: **n**.

   NOTE: If you answered **yes**, the ***RCVRY*** indicator on the EAI display starts flashing. At this point, monitor the progress of the recovery. If the AM fails to recover, **seek technical assistance**. If you decided not to perform the initialization, enter EAI poke 14 to clear the EAI, then exit this procedure.

Procedure 4.8.4: PERFORM A STABLE CLEAR OF SYSTEM WITH OR WITHOUT AN INITIALIZATION OF THE SM/SM-2000

OVERVIEW

Use this procedure to request a stable clear of the system [*UNIX*® real-time reliable (RTR) D3 (or D4), H4, S7, C3)] with or without a full initialization of the SMs/SM-2000s (M7). The CMPs are power pumped immediately following the AM Initialization. Stable calls are not preserved!

NOTE: To clear the EAI APPL buffer, for any reason, enter EAI poke **43**.

PROCEDURE

1. What type of system initialization do you want to perform?

   If RTR level 3 (D3,H4,S7,C3), continue with next step.

   If RTR level 4 (D4,H4,S7,C3), proceed to Step 3.

2. To invoke a **D3,H4,S7,C3** initialization, perform Substeps (a) through (c), then proceed to Step 4.

   (a) Set EAI APPL Param field, enter the following poke: **42**.

   (b) Enter APPL type, poke: **8**.

   (c) Select AM bootstrap level 3, enter the following poke: **53**.

3. To invoke a **D4,H4,S7,C3** initialization, perform Substeps (a) through (c), then proceed to Step 4.

   (a) Set EAI APPL Param field, enter the following poke: **42**.

   (b) Enter APPL type, poke: **8**.

   (c) Select AM bootstrap level 4, enter the following poke: **54**.

4. Do you really want to perform a system stable clear?

   If **YES**, enter the following: **y**.

   If **NO**, enter the following: **n**.

   NOTE: If you answered **yes**, the ***RCVRY*** indicator on the EAI display starts flashing. If the AM fails to recover, decode any failure PRMs and **seek technical assistance**. If the AM completes its initialization sequence (MCC Page 111/112 is displayed), continue with next step. If you decided not to perform the initialization by answering **n**, enter EAI poke 14 to clear the EAI, then exit this procedure.

5. Do you want to perform the SM/SM-2000 full initialization without pump (M7) portion of this procedure?

   If **YES**, proceed to Step 6.

   If **NO**, exit this procedure and monitor the progress of the recovery. Refer to Procedure 8.3 .

6. To invoke a full initialization of the SMs/SM-2000s (level M7), perform Substeps (a) through (c), then continue

with next step.

(a) Set EAI APPL Param field, enter the following poke: **42**.

(b) Enter APPL type, poke: **8**.

(c) Pass the EAI command to AIM, enter the following poke: **50**.

7. Do you really want to initialize the SMs/SM-2000s?

CAUTION: If you choose yes, all of the SM/SM-2000s that are equipped undergo a full initialization without pump.

If **YES**, enter the following: **y**.

If **NO**, enter the following: **n**.

NOTE: If you answered **yes**, observe MCC Pages 141-144 to verify that one of the SM/SM-2000s has started its initialization sequence. If at least one of the SM/SM-2000s starts its initialization sequence, monitor the progress of the recovery. If the SM/SM-2000 sequence does not start, **seek technical assistance**. If you decided not to perform the initialization, enter EAI poke 14 to clear the EAI, then exit this procedure.

Procedure 4.8.5: PERFORM A STABLE CLEAR OF SYSTEM WITH OR WITHOUT AN UNCONDITIONAL FULL PUMP OF THE SM/SM-2000

OVERVIEW

Use this procedure to request a stable clear of the system [*UNIX*® real-time reliable (RTR) D3 (or D4), H4, S7, C4)] with or without an unconditional full pump of the SMs/SM-2000s (M8). The CMPs are power pumped immediately following the AM initialization. Stable calls are not preserved!

NOTE: To clear the EAI APPL buffer, for any reason, enter EAI poke **43**.

PROCEDURE

1. What type of system initialization do you want to perform?

   If RTR level 3 (D3,H4,S7,C4), continue with next step.

   If RTR level 4 (D4,H4,S7,C4), proceed to Step 4.

2. To invoke a **D3,H4,S7,C4** initialization, perform Substeps (a) through (c), then proceed to Step 4.

   (a) Set EAI APPL Param field, enter the following poke: **42**.

   (b) Enter APPL type, poke: **9**.

   (c) Select AM bootstrap level 3, enter the following poke: **53**.

3. To invoke a **D4,H4,S7,C4** initialization, perform Substeps (a) through (c), then proceed to Step 4.

   (a) Set EAI APPL Param field, enter the following poke: **42**.

   (b) Enter APPL type, poke: **9**.

   (c) Select AM bootstrap level 4, enter the following poke: **54**.

4. Do you really want to perform a system initialization?

   If **YES**, enter the following: **y**.

   If **NO**, enter the following: **n**.

   NOTE: If you answered **yes**, the ***RCVRY*** indicator on the EAI display starts flashing. If the AM fails to recover, decode any failure PRMs and **seek technical assistance**. If the AM completes its initialization sequence (MCC Page 111/112 is displayed), continue with next step. If you decided not to perform the initialization by answering **n**, enter EAI poke 14 to clear the EAI, then exit this procedure.

5. Do you want to perform an unconditional pump of the SMs/SM-2000s?

   If **YES**, continue with next step.

   If **NO**, exit this procedure and monitor the progress of the recovery. Refer to Procedure 8.2 .

6. Use Substeps (a) through (c) to set up the EAI display for the unconditional pump of the SMs/SM-2000s

(level M8).

(a) Set EAI APPL Param field, enter the following poke: **42**.

(b) Enter APPL type, poke: **9**.

(c) Pass the EAI command to AIM, enter the following poke: **50**.

7. Do you really want to pump the SMs/SM-2000s?

CAUTION: If you choose yes, all of the SM/SM-2000s that are equipped are pumped.

If **YES**, enter the following: **y**.

If **NO**, enter the following: **n**.

NOTE: If you answered **yes**, observe MCC Pages 141-144 to verify that one of the SM/SM-2000s has started its initialization sequence. If at least one of the SM/SM-2000s starts its initialization sequence, monitor the progress of the recovery. If the SM/SM-2000 sequence does not start, **seek technical assistance**. If you decided not to perform the initialization, enter EAI poke 14 to clear the EAI, then exit this procedure.

Procedure 4.9: PERFORM CRAFT TERMINAL SOFTWARE INITIALIZATION

OVERVIEW

The intent of this procedure is assist support personnel with the recovery from the loss of all craft interface terminals. This procedure restarts the essential processes needed to provide craft terminal interface to the *5ESS*®-2000 switch.

> ***NOTE 1:*** This procedure uses three craft terminal initialization levels to restart the essential processes, beginning at level 1, and increasing the level by one until all three levels have been exhausted. Level 1 terminates and restarts all craft processes. Level 2 terminates and restarts all the killable nonessential users, and supervisor processes. Level 3 terminates and restarts all killable nonessential and essential users, and supervisor processes, in addition to initializing the input/output (I/O) drivers.

NOTE 2: To effectively investigate the loss of craft interface, a snapshot of the AM incore memory must be taken while the problem exists (Step 2). The snapshot preserves a copy of the memory until the data can be written to tape (Step 7).

PROCEDURE

1. At the MCC (or SCC) terminal, display the Emergency Action Interface (EAI) page by pressing the EA key.

2. To preserve a copy of the incore memory, enter the EAI poke command to force the active CU online. If no investigation is required, proceed to Step 3.

   To force the active CU online, enter the following poke: **12**.

3. Enter the following EAI poke commands in the exact order specified to set up the craft initialization request.

   NOTE: When selecting the parameter type, the value of **n** represents the craft initialization level (Level 1, 2, or 3).

   (a) Set application parameter, enter the following poke: **42**.

   (b) Select type of parameter, enter the following poke: **n (where n = 1, 2, or 3)**.

   (c) Request craft initialization, enter the following poke: **15**.

4. Do you really want the **craft initialized? (y/n)**.

   If **YES**, enter the following: **y**.

   If **NO**, enter the following: **n**.

5. If **y** is entered, the system should respond with the following craft initialization PRM. If **n** is entered, the craft initialization is not performed.

   PRM vBda 7400 xxyy zzzz hh hh hh

```
Where:  v     =  E or F.
        xx    =  craft initialization level (01 to 03).
        yy    =  craft initialization phase (01 to 04).
        zzzz  =  0000 - current phase proceeds normally.
```

```
0001 - phase timed out.
0002 - craft initialization aborted.
0003 - craft initialization failed.
0004 - craft initialization completed successfully.
```

NOTE: **PRM EBda 7500 0000 0000 hh hh hh** indicates that craft initialization was denied because another craft initialization is already in progress.

6. If the craft terminal initialization was successful, continue with Step 7. If the craft initialization was not successful, return to Step 3 and increase the craft initialization level by 1. If a level 3 has already been performed, escalate to the next support level.

7. If a copy of the AM incore memory was preserved (Step 2), and if the cause of the craft lockout needs investigating, use the following commands to create an off-line dump tape. The off-line dump tape and a tape of the critical log files (Procedure 8.4) are to be sent to *5ESS*®-2000 switch Customer Technical Support (CTS) for analysis. If no investigation is required, continue with Step 8.

   (a) To create an off-line dump tape, mount tape and place the tape drive online, then enter the following command string:

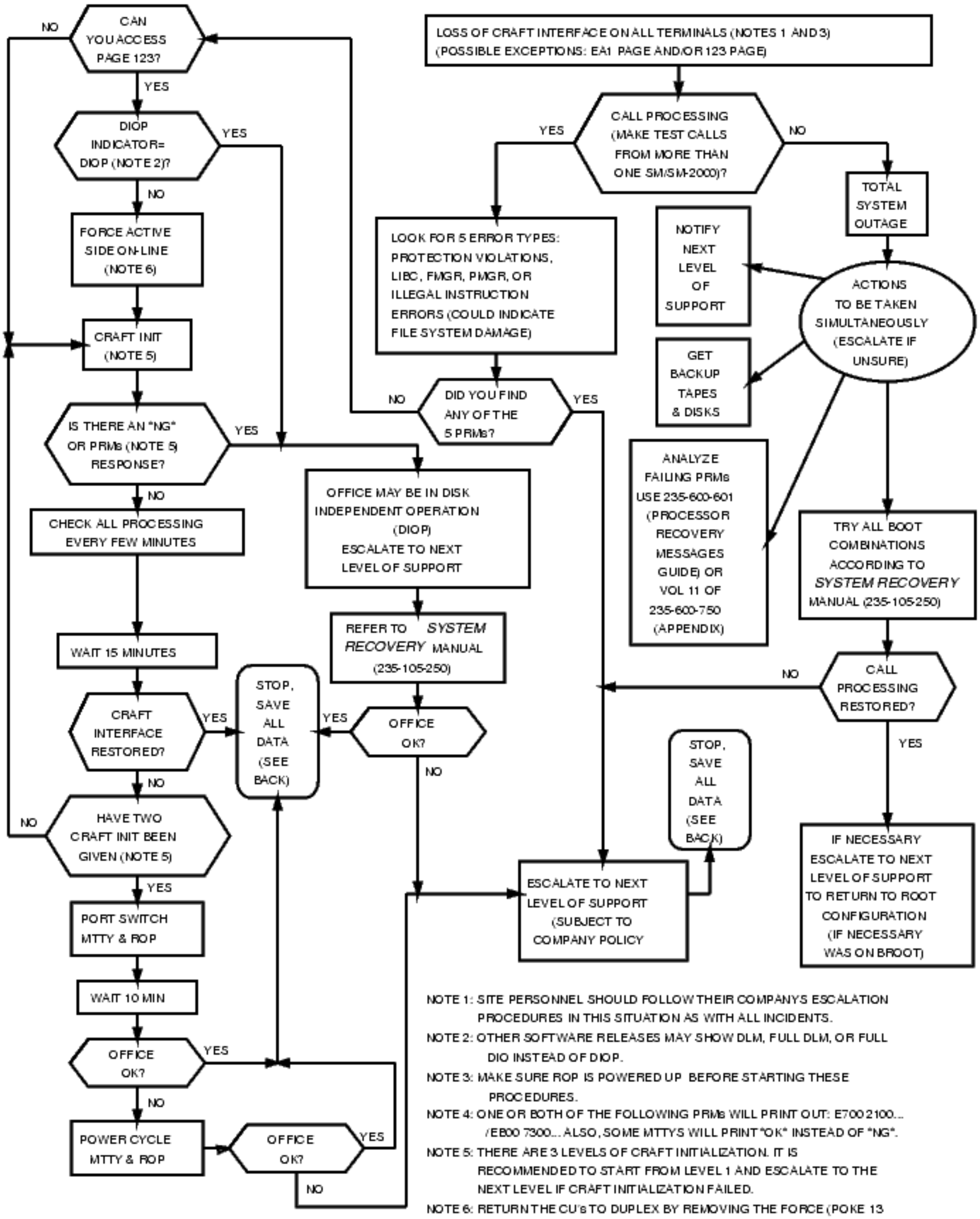
   exc:envir:uproc,fn="/bin/sh",args="-c"-"pio dd if=/dev/ofln of=/dev/mt00 bs=6144" (takes approximately 40 minutes to create tape)

8. The craft terminal interface capability has been restored. Go to the EAI display page and enter the poke command to clear all EAI parameters.

   To clear all EAI parameters, enter the following poke: **14**.

9. Once the EAI page has been cleared (no parameters set), press the MCC (or SCC) normal display key, then proceed to the applicable procedure to restore the out-of-service units to the operational state.

   Refer to Figure 4.9-1 for a flowchart on the loss of craft interface on all terminals.



NOTE 1: SITE PERSONNEL SHOULD FOLLOW THEIR COMPANYS ESCALATION PROCEDURES IN THIS SITUATION AS WITH ALL INCIDENTS.

NOTE 2: OTHER SOFTWARE RELEASES MAY SHOW DLM, FULL DLM, OR FULL DIO INSTEAD OF DIOP.

NOTE 3: MAKE SURE ROP IS POWERED UP BEFORE STARTING THESE PROCEDURES.

NOTE 4: ONE OR BOTH OF THE FOLLOWING PRMs WILL PRINT OUT: E700 2100... /EB00 7300... ALSO, SOME MTTYS WILL PRINT "OK" INSTEAD OF "NG".

NOTE 5: THERE ARE 3 LEVELS OF CRAFT INITIALIZATION. IT IS RECOMMENDED TO START FROM LEVEL 1 AND ESCALATE TO THE NEXT LEVEL IF CRAFT INITIALIZATION FAILED.

NOTE 6: RETURN THE CU's TO DUPLEX BY REMOVING THE FORCE (POKE 13 ON EAI PAGE) AFTER RECOVERY OF THE SYSTEM.

Figure 4.9-1 Loss of Craft Interface on All Terminals

Procedure 4.10: AM OFF-LINE BOOT VERIFICATION PROCEDURE

OVERVIEW

The administrative module (AM) off-line boot (OFLBOOT) verification procedure is a maintenance activity used to verify the integrity of the AM, communications module (CM), and common network interface (CNI) initialization (bootstrap) and idle system text, equipment-configuration data (ECD), and office-dependent data (ODD) while maintaining call-processing functionality. The inability of the off-line units to successfully complete a bootstrap is an indication of a potential system outage in the event of a future recovery. It is recommended that this OFLBOOT procedure be used in conjunction with GENBKUP to verify that the text and data is being backed up and then allow the AM to boot successfully.

During this procedure, the AM, CM, and CNI are split into two simplex configurations as follows: one side is *on-line*, the other side is *off-line*. The on-line side continues to handle call processing and other operational-related activities.

NOTE: If the switch is configured with an ASM (Administrative Services Module), then the AM boot procedures are different. See 235-105-220, *Corrective Maintenance Procedures* for the AM procedures using the ASM.

The off-line side is then initialized with parameters provided by the on-line side. An option to monitor the processor recovery messages (PRM), generated by the off-line side, is provided to allow printing them on the on-line receive-only printer (ROP).

Another option allows a teletypewriter (TTY) to be used as a pseudo ROP on the off-line side. If the TTY option is specified, PRMs and ROP messages generated by the off-line side that are directed to the ROP appear on the designated TTY. However, this option should be used cautiously, because the input/output processor (IOP) and the IOP subunits associated with this TTY are not available for use by the on-line side.

After the OFLBOOT procedure has successfully completed the initialization, the off-line side continues to run. The OFLBOOT procedure stops under the following circumstances:

- The technician requests to stop the procedure from the on-line side (via the STOP:OFLBOOT command).
- It is automatically stopped due to an on-line failure (hardware or software) that jeopardizes normal call processing operations (unless the UCL command line option is specified). Required off-line hardware is restored automatically and is made available to the active on-line side.
- It is automatically stopped if the off-line side experiences a fault. The off-line side is left out of service for analysis and requires the system to be manually restored to normal duplex operation. A failed off-line boot is an indication of a problem such as a disk-file corruption or bad hardware.

A logfile is generated to store the ROP output produced by the off-line side during this procedure.

Software release transition procedures may use the SW:OFLBOOT switch to the AM, CM, and CNI sides that were initialized. This side switch operation makes the *off-line side*, the new *on-line side*, and the original *on-line side*, the new *off-line side*. Call processing and operational activities are switched to the new on-line side. This side switch operation MUST only be performed as described in the software release transition procedures. The OFLBOOT procedure is useful in software release transitions, since it greatly reduces downtime by eliminating an (on-line) AM boot.

CAUTIONS WHEN USING OFLBOOT

The OFLBOOT feature is a powerful tool that must be used cautiously. It is important that the entire procedure be closely monitored by the technician. During the OFLBOOT procedure, the AM and its disks, CM, and CNI ring are simplex. During this procedure, there is an increased risk of system outage from a hardware failure associated with the on-line side. It is recommended that OFLBOOT be used during low-traffic hours.

Before initiating the procedure, the technician must ensure that the system is healthy, with no known hardware faults associated with the AM, CM, and CNI.

If the IOP or TTY command option is specified, note that all IOP subunits and operational support system (OSS) links, provided by the associated IOP, are not available to the system during the OFLBOOT procedure (for example, tape drives, TTYs, SDLs, AMA teleprocessing, data links, etc.).

Root ECD (that is, disk) recent changes are allowed only on the off-line side. Although office-dependent data recent changes are not inhibited, it is recommended that technicians NOT apply software updates, grow hardware, or perform ODD recent changes during this procedure.

The OFLBOOT command can be denied due to units not in service. The out-of-service (OOS) option overrides these defensive checks for units associated with the off-line side. On-line side defensive checks may be overridden with the UCL option. The UCL option allows the procedure even when call processing may be degraded or interrupted, and this prevents the automatic stop of the OFLBOOT procedure. Therefore, use of the UCL override is ***not*** normally recommended and must be used with extreme caution.

The RETROFIT option and the SW:OFLBOOT command must only be used as described during the software release transition procedures.

PROCEDURE

1. ***NOTE:*** Before starting the OFLBOOT procedure, the AM, CM, and CNI hardware should be free of any known hardware problems. This increases the chance of OFLBOOT executing successfully and decreases the chance of endangering the system operation of the on-line side.

   To verify that no AM or CNI units are OOS or unavailable, at the master control center (MCC), enter the following message:

   OP:OOS;

   Response: **PF** is printed, followed by a printout of all AM units that are OOS.

2. Are any units OOS?

   If **YES**, follow appropriate procedure to restore the units listed.

   If **NO**, continue with the next step.

3. To verify that no CM units are OOS, at MCC, enter the following message:

   OP:CFGSTAT,CM,OOS,NOFE;

   Response: **PF** is printed, followed by a printout of all CM units that are OOS.

4. Are any units OOS?

   If **YES**, follow appropriate procedure to restore the units listed.

   If **NO**, continue with the next step.

5. To verify that no CM units are unavailable, at MCC, enter the following message:

   OP:CFGSTAT,CM,UNAV;

   Response: **PF** is printed, followed by a printout of all CM units that are UNAV.

6. Are any units UNAV?

   If **YES**, follow appropriate procedure to restore the units listed.

   If **NO**, continue with the next step.

7. To verify that no CM units are off-normal, at MCC, enter the following message:

   OP:OFFNORM,CM;

   Response: **PF** is printed, followed by a printout of all CM units that are off-normal.

8. Are any units off-normal?

   If **YES**, follow appropriate procedure to correct the off-normal units.

   If **NO**, continue with the next step.

9. To verify that no AM or CNI requests are on the deferred maintenance queue, at MCC, enter the following message:

   OP:DMQ;

   Response: **PF** is printed, followed by a printout of AM or CNI units on the queue.

10. Are any requests on the queue?

    If **YES**, wait for requests to complete. After requests complete, go to Step 1.

    If **NO**, continue with the next step.

11. To verify that no CM requests are on the deferred maintenance queue, at MCC, enter the following message:

    OP:DMQ,CM;

    Response: **PF** is printed, followed by a printout of CM units on the queue.

12. Are any requests on the queue?

    If **YES**, wait for requests to complete. After requests complete, go to Step 1.

    If **NO**, continue with the next step.

13. To verify that the system is normal, at MCC, enter the following message:

    OP:SYSSTAT,AM,CM;

    Response: **PF**, followed by the status of the system.

14. Are any units not normal?

    If **YES**, follow appropriate procedure to restore the system to normal.

    If **NO**, go to the next step.

15. To verify that both CU=0 and CU=1 are in service, at MCC, enter the following messages:

    OP:CFGSTAT,CU=1;

    OP:CFGSTAT,CU=0;

    Response: **PF**, followed by a printout of the status of CU.

16. To trigger a normalization of the CLNKs, at MCC, enter the following message:

    ALW:CLNORM;

    Response: **OK**

NOTE: The CLNK normalization restores a duplex CLNK configuration to all non-RSM SM/SM-2000s. This process can take up to 10 minutes to complete and can be observed on the 1260 page.

17. To clear any AUTIS condition in the ONTC, at MCC, enter the following command to switch the ONTC:

    SW:ONTC;

    Response: **PF**, followed by the completion message:

    SW ONTC COMPLETED

18. To inhibit AMA sessions, at MCC, enter the following message:

    INH:AMA:SESSION,ST1;

    Response: **IP**, followed by the output of the AMA control file when completed:

    REPT AMA CONTROLFILE

19. If AMA stream 2 is equipped, then at MCC, enter the following message:

    INH:AMA:SESSION,ST2;

    Response: **IP**, followed by the output of the AMA control file when completed:

    REPT AMA CONTROLFILE

20. Is one CU **ACT** and the other CU **STBY**?

    If **YES**, continue with the next step.

If **NO**, follow appropriate procedure to restore both CUs to service.

NOTE: The CU that is currently ACT is later automatically selected to remain on the on-line side. The CU that is STBY is later automatically selected to be used for the off-line side.

21. On the Emergency Action Interface (EAI) page, select and force the desired disk configuration to remain on the on-line side using the appropriate EAI poke. Type and enter the appropriate Poke using Table 4.10-1 .

Table 4.10-1 Emergency Action Interface Pokes

DFC CHOSEN FOR ON-LINE SIDE	DFC CHOSEN FOR OFF-LINE SIDE	CURRENT ACTIVE CU	ACTIVE DISK	POKE
0	1	0	Primary	20
0	1	1	Secondary	22
1	0	0	Secondary	22
1	0	1	Primary	20

NOTE: If DFC 0 is selected for the on-line side, then DFC 1 is used by the off-line side. Similarly, if DFC 1 is selected for the on-line side, then DFC 0 is used by the off-line side.

If DFC 0 is selected for the on-line side and DFC 2 is equipped, then DFC 2 remains on the on-line side. DFC 1 and DFC 3 are accessed by the off-line side. Similarly, if DFC 1 is selected for the on-line side and DFC 3 is equipped, then DFC 3 remains on the on-line side. DFC 0 and DFC 2 are accessed by the off-line side.

22. To request the OFLBOOT procedure, at the MCC, enter the following message:

EXC:OFLBOOT;

Response: **PF** is printed.

Wait for completion or failure indication.

NOTE 1: Other options are available for the EXC:OFLBOOT command. Refer to 235-600-700, *Input Messages Manual*, for a description of the options. Also, refer to the cautions noted in earlier in the OVERVIEW of this procedure.

NOTE 2: When the system is preparing for the off-line boot, the following messages print:

EXC OFLBOOT STARTED
EXC OFLBOOT IN PROGRESS

The units selected as *off-line* are removed from service. At this time, many ROP messages are printed indicating units reconfigured and removed from service. The AM, CM, and CNI MCC display pages reflect the units removed.

The EAI page indicates the off-line CU in recovery. The EAI page also has the RUN indicators for both CUs on. The message "START of CU-x RECOVERY" prints on the ROP where CU=x is the off-line CU.

Also, MCC Display Page 111 shows OFLBOOT IP - ONLINE.

While the boot of the off-line side is in progress, the following message is periodically printed:

EXC OFLBOOT INFO
BOOT IN PROGRESS

If the MONITOR option was specified, then PRMs generated from the off-line side will be printed on the ROP. (PRMs generated by the off-line side are identified by the prefix PRM_x where x is the CU number of the off-line side.)

When the boot of the off-line side completes, the following completion message prints:

EXC OFLBOOT COMPLETED
OFFLINE SIDE BOOT COMPLETED

Failures are indicated by failure PRMs or by one or more of the following messages:

REPT OFLBOOT TERMINATED
REPT OFLBOOT ABORTED
EXC OFLBOOT TERMINATED
EXC OFLBOOT ABORTED

NOTE: In the event that you want to stop, the stop OFLBOOT, go to Step 30.

23. Did the following message print?

EXC OFLBOOT COMPLETED
OFFLINE SIDE BOOT COMPLETED

If **YES**, the boot of the off-line side is completed, go to Step 29.

NOTE: At the end of the initialization, a status check obtained from the off-line side will be printed on the on-line side if errors during the initialization occurred. Refer to the *Output Messages Manual* to interpret the results.

If **NO**, the boot of the off-line side is still in progress or failed. Wait for the boot of the off-line side to complete (see messages in Step 23, this step) or fail (see messages in Step 24).

24. Did any failure PRMs print or any of the following failure strings print?

REPT OFLBOOT TERMINATED
REPT OFLBOOT ABORTED
EXC OFLBOOT TERMINATED
EXC OFLBOOT ABORTED

If **YES**, the OFLBOOT procedure failed, go to the next step.

If **NO**, go to Step 26.

25. Did the message **START of CU-x RECOVERY** print on the ROP, where CU=x is the off-line CU?

If **YES**, the boot of the off-line side failed, go to Step 28.

If **NO**, the system failed to prepare for the off-line boot. Take appropriate corrective action. After correcting, go to Step 5.

26. Did any of the following failure strings print?

REPT OFFLINE BOOT ABORTED or
REPT OFFLINE BOOT TERMINATED

If **YES**, failures occurred after the boot of the off-line side, go to Step 28.

If **NO**, go to the next step.

27. Did the following failure message print?

    REPT OFLBOOT INFO
    OFFLINE BOOT TIMED OUT

    If **YES**, the boot of the off-line side exceeded the time to complete. The off-line side will continue to run, go to the next step.

    If **NO**, go to Step 29.

28. Failure occurred. Take appropriate corrective action. The cause of the failure must be investigated and corrected. The inability of the off-line units to successfully complete a bootstrap is an indication of a potential system outage in the event of a future recovery.

    Refer to the following documents for additional information:

    - 235-105-210, *Routine Operations and Maintenance*
    - 235-105-220, *Corrective Maintenance Procedures*
    - 235-600-700, *Input Messages Manual*
    - 235-600-750, *Output Messages Manual*
    - 235-600-601, *Processor Recovery Messages*.

    Stop the OFLBOOT; go to Step 31.

29. Do you want the off-line side to continue to run?

    If **YES**, the off-line side continues to run after the initialization completes on the off-line side. During this period, the on-line CU monitors the off-line CU. During this monitoring period, a **REPT OFFLINE BOOT IN PROGRESS** message prints periodically.

    If the TTY option was specified, or the IOPy=MAX option was specified and a TTY is equipped under IOP=y, then the off-line side can be accessed. Existing mechanisms can be used to analyze the result of the OFLBOOT initialization (for example, PRMs, error reports, postmortems, log files, etc.).

    STOP! YOU HAVE COMPLETED THIS PROCEDURE.

    If **NO**, go to the next step to stop the OFLBOOT.

    NOTE: If failures occur, go to the next step to stop the OFLBOOT.

30. ***NOTE:*** This step begins the procedure to stop the OFLBOOT.

    At EAI, are both CU "RUN" indicators on?

    If **YES**, the off-line side is still running. Go to Step 33.

    If **NO**, the off-line side is not running, go to next step.

    NOTE: If both CU "RUN" indicators are not on, then the OFLBOOT procedure is already stopped.

31. To determine the status of the MHD that was previously on the off-line, at MCC, enter the following message:

    OP:CFGSTAT, MHD=z;

    Where: z = 0 or 1

    Response: **PF**, followed by the status of the MHD, continue with next step.

    NOTE: From Step 17, if DFC 0 was previously selected for the off-line side, then z is 0. If DFC 1 was previously selected for the off-line side, then z is 1.

32. Is the MHD OOS?

    If **YES**, go to next step.

    If **NO**, go to Step 36.

    NOTE: If MHD=z is not OOS, then the OFLBOOT procedure is already stopped and the information stored in MHD=z is lost.

33. Is the off-line side to be analyzed and/or the execution of the OFLBOOT procedure to be repeated immediately?

    If **YES**, go to next step.

    If **NO**, go to Step 36.

34. To stop the off-line side from running and leave units OSS, at MCC, enter the following message:

    STOP:OFLBOOT;

    Response: **PF**, followed by a completion message.

    Continue with next step.

35. To access the OLBLOG or logfile on the disk that was part of the off-line side, Refer to Steps 39 through Step 46 of this procedure.

    Refer to the following documents for additional information:

    - 235-105-210, *Routine Operations and Maintenance*
    - 235-105-220, *Corrective Maintenance Procedures*
    - 235-600-700, *Input Messages Manual*
    - 235-600-750, *Output Messages Manual*
    - 235-600-601, *Processor Recovery Messages*.

36. To stop the off-line side from running and/or to restore units to service that were part of the off-line side, go to the next step WITHIN 1 HOUR after the OFLBOOT was stopped; otherwise, go to Step 38.

37. To stop the off-line side from running and/or to restore units to service that were part of the off-line side, at MCC, enter the following message:

STOP:OFLBOOT,RST;

NOTE: If the RST option is specified, the system disks that were part of the off-line side will be restored. This implies that logfiles produced by the off-line side will be deleted.

Response: **PF**
STOP OFLBOOT COMPLETED

38. Are any AM, CM, or CNI units not in service?

If **YES**, refer to the appropriate procedure to restore the specific units.

If **NO**, continue with the next step.

39. Allow AMA sessions for stream 1 (ST1), at MCC, enter the following message:

ALW:AMA:SESSION,ST1;

Response: **IP**, followed by the output of the AMA CONTROLFILE when session is allowed:

REPT AMA CONTROLFILE

40. If ST2 data stream is equipped, allow AMA sessions for stream 2, at MCC, enter the following message:

ALW:AMA:SESSION,ST2;

Response: **IP**, followed by the output of the AMA CONTROLFILE when session is allowed:

REPT AMA CONTROLFILE

41. To access the OLBLOG file, restore the DFC controller that was associated with the off-line side. At MCC, enter the following message:

RST:DFC=z,UCL,CONT;

Where: z = 0 or 1 (See Note)

Response: **PF**, followed by the completion message.

NOTE: From Step 17, if DFC 0 was previously selected for the off-line side, then z is 0. If DFC 1 was previously selected for the off-line side, then z is 1.

42. Restore the SBUS that was associated with the off-line side. At MCC, enter the following message:

RST:SBUS=z,UCL,CONT;

Where: z = the value used in Step 41.

Response: **PF**, followed by the completion message.

43. Do you need to print the OLBLOG logfiles on the active disk before the contents of these files are lost?

If **YES**, go to the next step.

If **NO**, go to Step 45.

44. Print the OLBLOG file using the OP:LOG input message described in the 235-600-700, *Input Message Manual*. Also refer to the OPERATIONS chapter of the 235-105-210, *Routine Operations and Maintenance Manual*, for log file handling.

45. The OLBLOG logfiles are located in the "/log/log" directory. To copy the OLBLOG0 file from the OSS disk to the active disk, at MCC, enter the following message:

    COPY:OOSDISK,MHD=z,SRC="/log/log/OLBLOG0",DEST="/log/log/OLBLOG0";

    Where: z = the value used in Step 41.

    Response: **PF**, followed by the completion message.

46. To copy the OLBLOG1 file from the OSS disk to the active disk, at MCC, enter the following message:

    COPY:OOSDISK,MHD=z,SRC="/log/log/OLBLOG1",DEST="/log/log/OLBLOG1";

    Where: z = the value used in Step 41.

    Response: **PF**, followed by the completion message.

47. The OLBLOG files from the off-line side are now on the active disk. A dump of the OLBLOG files can be made using the OP:LOG input message described in the 235-600-700, *Input Message Manual*. Also refer to the OPERATIONS chapter of the 235-105-210, *Routine Operations and Maintenance Manual*, for log file handling. For example, at MCC, enter the following input message:

    OP:LOG,LG="OLBLOG",DEVICE="xxx"

    Where: xxx is the logical output device to which the output should be routed.

    Response: **PF**, followed by the contents of the OLBLOG logfile.

48. Return to Step 36 of this procedure.

5. COMMUNICATIONS MODULE

OVERVIEW

This group of procedures (5.x) is used in recovering the CM, when the fault has been determined to be caused by a CM unit.

Procedure 5.1: CLEAR AM/CM ISOLATION

OVERVIEW

This procedure is used to clear a manual administrative module/communication module (AM/CM) isolation. The AM/CM isolation is most useful when recovering from an AM software or hardware problem. Once the AM problems have been resolved, this procedure should be used to resynchronize the AM and CM in order to resume normal operation of the system.

The AM and CM can usually be resynchronized without an initialization. However, if a CM duplex failure is detected during AM/CM resynchronization, a manual AM initialization must be requested. The CM will then be initialized, if necessary, in order to restore essential functionality.

PROCEDURE

1. At the master control center (MCC) video terminal, is the **EMERGENCY ACTION PAGE** displayed?

   If **YES**, continue with Step 3.

   If **NO**, continue with Step 2.

2. At the MCC video terminal, depress the **EA DISP** key to display the **EMERGENCY ACTION PAGE**.

   Response: The **EMERGENCY ACTION PAGE** is displayed.

3. Enter command **42** on the command input line to enable application parameter entry.

   Response: **PARAMETER** indicator is displayed.

4. Enter application parameter **t** (the letter 't') on the command input line to clear AM/CM isolation.

   Reference: **Section 4.7.2**

5. Enter command **50** on the command input line to perform an AM/CM resynchronization without an AM initialization.

   Response: **OK**

6. At the read-only printer (ROP), look for a processor recovery message (PRM) with the following format:

   PRM_a EE00 0225 xxxx xxxx xx xx xx

   This PRM indicates that CM hardware resynchronization completed successfully. It may take several minutes for this PRM to be printed.

7. Was the PRM shown in Step 6 printed?

   If **YES**, continue with Step 10.

   If **NO**, continue with Step 8.

8. Is AM/CM isolation still in effect?

   If **YES**, continue with Step 9.

   If **NO**, continue with Step 10.

   NOTE: This condition would be indicated by one or more of the following:

   (a) **REPT CM ISOLATED FROM AM** output message printed on the ROP.

   (b) **REPT CM RE-SYNCHRONIZATION WITH THE AM ABORTED** output message printed on the ROP.

   (c) **CM ISOL** indicator backlighted on MCC Page **115**.

9. Enter command **54** on the command input line to invoke an AM initialization with AM/CM resynchronization (D4,S7,H2,C4). If necessary, the CM will be initialized in order to restore essential functionality.

   Reference: **Procedure 4.7**

10. Determine whether call processing is available.

    Reference: **Procedure 8.1**

11. Has call processing been restored?

    If **YES**, continue with Step 12.

    If **NO**, contact your next higher level of support immediately.

12. Monitor call processing and do not proceed any further than this step unless call processing has been lost again or unless directed by your next highest level of support.

    Reference: **Procedure 8.2**

13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 5.2: ANALYZE AND CONTROL THE REPAIR OF CM DUPLEX HARDWARE FAILURE

OVERVIEW

This procedure is intended for use when an essential Communication Module (CM) unit duplex fails and results in the Administrative Module (AM) rolling in initializations. This procedure should only be used if the AM procedures (in Section 4) have determined that the CM is preventing the AM from recovering, and if every attempt to stabilize the CM has failed.

NOTE: This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], before starting this procedure.

This procedure is only intended to recover CM units that are crucial to maintaining call processing. The CM units that are considered essential for call processing include the Message Switch Control Unit (MSCU), Communication Module Processor (CMP), Foundation Peripheral Controller (FPC), and Office Network Timing Complex (ONTC). At least one of each of these units must be in service.

In addition, the AM must be able to communicate with at least one switching module (SM) or switching module-2000 (SM-2000). This requires at least one active Module Message Processor (MMP) or, if equipped, one active quad-link packet switch (QLPS) and one active QLPS gateway processor (QGP). A total failure of all units of one of these types can only cause the AM to initialize if it results in a loss of communication to all SMs/SM-2000s. Other CM units, such as the Pump Peripheral Controller (PPC), dual link interfaces (DLIs) and network link interfaces (NLIs) are not viewed as essential for call processing (unless all DLIs and NLIs in the office fail).

It is assumed that an ONTC duplex failure is normally caused by failure of ONTCCOM (ONTC common) units, rather than DLI, NLI, or QLPS hardware failures. The ONTCCOM units include the LI, MI, NC and TMS for CM1 offices, or the DMI, NC and TMS for CM2 offices. Therefore, only ONTCCOM diagnostics (not ONTC diagnostics) should be run in order to find and repair the fault quickly.

CAUTION 1: This procedure initializes the AM into "MIN MODE" where all the call processing functions are turned off. This means all central call processing is blocked. Therefore, use this procedure only if all of the conventional recovery methods have been exhausted; this includes inhibiting CM hardware [42-f-50 poke on emergency action interface (EAI)] and software checks (36 poke of EAI) (AM Procedure 4.2 and 4.3). If this procedure is needed, work expeditiously to resolve the problem; then refer to Step 19 of this procedure to exit min-mode.

CAUTION 2: This procedure should not be used if the failure Processor Recovery Messages (PRMs) do not indicate that an essential CM unit is preventing the AM from recovering. If the failure PRM implicates the CM, determine if there is a power problem by visually inspecting the CM cabinets and the Power Control Fuse Distribution (PCFD) cabinet that powers the CM. Check to see if CM cabinet unit power converters have shut down or if there are PCFD or CM cabinet fuse alarms. Use Procedures 3.6 and 3.8 to correct any identified power problem.

Once in min-mode, maintenance personnel are required to gather the information on the unit(s) that is preventing the AM from recovering.

PROCEDURE

1. Observe the information provided in Note:

NOTE: This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], before starting this procedure.

2. On the emergency action interface (EAI), perform AM Full Initialization (D4,S7,H4,C4) to enter AM minimum-mode using **poke 42-m-54**.

   NOTE: After the AM completes its initialization into min-mode, the MCC page (111/112) for the AM unit status is displayed.

3. Determine the operational state of MSCU 0 and MSCU 1 by displaying the **1240** and **1250** MCC pages.

4. Is the operational state of either MSCU 0 or MSCU 1 **ACT**?

   If **YES**, continue with the next step.

   If **NO**, repair MSCU 0 using **Procedure 5.3** . If MSCU 0 cannot be recovered, attempt the repair of MSCU 1. If neither MSCU can be recovered, **seek technical assistance** according to local procedure.

5. Determine the operational state of FPC 0 and FPC 1 by displaying the **1241** and **1251** MCC pages.

6. Is the operational status of either FPC 0 or FPC 1 **ACT**?

   If **YES**, continue with the next step.

   If **NO**, repair an FPC, which is the child of an ACT MSCU, using **Procedure 5.3** . If the FPC cannot be recovered, attempt the repair of the mate FPC; note, if only one MSCU is active and the FPC on the active MSCU side cannot be recovered, repair the second MSCU by using **Procedure 5.3** . If neither FPC can be recovered, **seek technical assistance** according to local procedure.

7. Determine the operational state of CMP 0-0 and CMP 1-0 by displaying the **1241** and **1251** MCC pages.

8. Is the operational status of either CMP 0-0 or CMP 1-0 **ACT**?

   If **YES**, continue with the next step.

   If **NO**, repair a CMP, which is the child of an ACT MSCU, using **Procedure 5.3** .

   If the CMP cannot be recovered, attempt the repair of the mate CMP; note, if only one MSCU is active and the CMP on the active MSCU side cannot be recovered, repair the second MSCU by using **Procedure 5.3** . If neither CMP can be recovered, **seek technical assistance** according to local procedure.

9. Determine the operational state of the MMPs on MSGS side 0 and MSGS side 1 by displaying the **1242, 1243, 1252** and **1253** MCC pages.

   NOTE: The goal of this step is to determine if any MMPs are active. As soon as one MMP is found with an operational status of active, this step of this procedure is complete.

10. Is the operational state of any MMP 0-X or MMP 1-X (where X = 0-47) **ACT**?

    If **YES**, continue with the next step.

    If **NO**, repair a MMP, which is the child of an ACT MSCU, using **Procedure 5.3** .

    If the MMP is not recovered, sequentially attempt the repair of each remaining MMP, until one is successfully recovered; note, if only one MSCU is active and the MMPs on this side cannot be recovered, repair the second MSCU by using **Procedure 5.3** .

If all attempts to recover MMPs have been unsuccessful, ***and*** there are no QGPs equipped in the office, **seek technical assistance** according to local procedure; otherwise, if QGPs are equipped, continue with the next step.

11. Determine the operational state of ONTCCOM 0 and ONTCCOM 1 by displaying the **1209** MCC page.

12. Is the operational state of either ONTCCOM 0 or ONTCCOM 1 **ACT** or **DGR**?

    If **YES**, continue with the next step.

    If **NO**, repair ONTCCOM 0 failure using **Procedure 5.3** . If ONTCCOM 0 cannot be recovered, attempt the repair of ONTCCOM 1. If neither ONTCCOM can be recovered, **seek technical assistance** according to local procedure.

13. Is the operational state of any MMP **ACT**?

    If **YES**, go to Step 20.

    If **NO**, continue with the next step.

14. Determine the operational state of the QGPs on MSGS side 0 and MSGS side 1 by displaying the **1380** and **1381** MCC pages.

    NOTE: The goal of this step is to determine if any QGPs are active. As soon as one QGP is found with an operational status of active, this step of this procedure is complete.

15. Is the operational state of QGP 0-0 or QGP 1-0 (or QGP 0-1 or QGP 1-1, if equipped) **ACT**?

    If **YES**, continue with the next step.

    If **NO**, repair a QGP, which is the child of an ACT MSCU, using **Procedure 5.3** .

    If the QGP is not recovered, sequentially attempt the repair of each remaining QGP, until one is successfully recovered; note, if only one MSCU is active and the QGPs on this side cannot be recovered, repair the second MSCU by using **Procedure 5.3** .

    If all attempts to recover QGPs have been unsuccessful, **seek technical assistance** according to local procedure.

16. Determine the operational state of the QLPSs on ONTC side 0 and ONTC side 1 by displaying the **1380** and **1381** MCC pages.

17. Does QGP 0-1 appear on the 1381 MCC page (indicating a four QGP configuration)?

    If **YES**, go to Step 19.

    If **NO**, continue with thte next step.

18. Is the operational state of QLPS 0-0, QLPS 1-0, QLPS 0-1 or QLPS 1-1 **ACT**?

    If **YES**, go to Step 20.

    If **NO**, repair a QLPS, which is the child of an in-service ONTCCOM, using **Procedure 5.3** .

If the QLPS is not recovered, sequentially attempt the repair of each remaining QLPS, until one is successfully recovered; not, if only one ONTCCOM is in-service and the QLPSs on this ONTC side cannot be recovered, repair the second ONTCCOM by using **Procedure 5.3** .

If all attempts to recover QLPSs have been unsuccessful, **seek technical assistance** according to local procedure.

19. Is the operational state of either/both QLPS 0-X or QLPS 1-X **and** either QGP 0-X or QGP 1-X **ACT** for either QLPS network (that is, X = **0** or **1**)?

    If **YES**, continue with the next step.

    If **NO**, and if QGP 0-X or QGP 1-X is ACT, repair QLPS Y-X, which is the child of an in-service ONTCCOM Y, using **Procedure 5.3** .

    If this QLPS is not recovered, attempt the repair of the QLPS in network X on the mate ONTCCOM; note, if only one ONTCCOM is in-service and the QLPSs on this ONTC side cannot be recovered, repair the second ONTCCOM by using **Procedure 5.3** , before seeking technical assistance.

    If attempts to recover both QLPSs in network X have been unsuccessful, **seek technical assistance** according to local procedure.

    NOTE: If the only attempted repairs were associated with **one** QLPS network **X** (either 0 or 1), repeat Steps 15 and 19 for the other QLPS network, **before** seeking technical assistance.

20. At the EAI, restore call processing by exiting minimum mode, perform an AM Full Initialization (D4,S7,H4,C4) using **poke 42-n-54**, and then gather information about this problem.

21. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 5.3: REPAIR FAILURES IN A CM UNIT

OVERVIEW

This section provides craft with a single procedure for diagnosing and restoring a CM unit to an operational state. The procedure is designed to repair any of the following units: MSCU, FPC, CMP, QGP, MMP, PPC, ONTCCOM, DLI/NLI, QLPS, and CLNK.

Basically, this procedure performs a diagnostic test on the desired unit (the specific unit to be repaired must be identified **before** entering this procedure); and, if the diagnostic passes, the unit is restored to an operational state. When the diagnostic finds a fault, a trouble locating procedure (TLP) output message is printed. This information is used to replace the suspected faulty boards. After replacing the board(s), the diagnostic is executed again. This process is repeated until one of the following happens:

- The unit is returned to service and the procedure is completed.
- Despite pack replacement/repair procedure, the unit cannot be recovered. In this case, **seek technical assistance** according to local procedure.

Two methods have been provided to recover the desired unit. Both are software release inclusive and table driven.

(1) The first method uses a single command to conditionally restore the unit. When the unit is restored conditionally, a diagnosis is performed automatically on the unit. If the diagnostic finds a fault, a TLP output message is printed and the unit is not restored. A restoration of the desired unit is performed after the unit passes the diagnostic.

    This method is usually the faster of the two, due to limited manual intervention. It should be noted that the second method has some additional flexibility for QLPS or ONTCCOM diagnostics, in that an OOS FPC can be used as a "helper unit," or diagnostics can be limited to the NC or TMS, rather than the entire ONTCCOM.

(2) The second method uses two commands to diagnose and then restore the unit unconditionally. The manual diagnostic produces a TLP output message if a hardware fault is found or a completed response with an all tests pass (ATP) or conditionally all tests pass (CATP). When the unit passes diagnostics, a second command should be used to restore the unit unconditionally. This method is provided to be consistent with the document in previous software releases.

Internal to this procedure, it is often necessary to remove/replace circuit packs to affect repair, and the following general cautions/guidelines apply.

> **CAUTION 1:** To avoid damage to the equipment when removing and replacing a circuit pack, power down the community, in which the pack to be replaced resides, using the power control switch on the control and display pack (for example, SN516) for the affected unit. It should be noted that some diagnostics execute "interface tests," and it is possible that the suspect pack does NOT belong to the unit being diagnosed.
>
> Note that before powering down a service group/community, you must manually remove all units on that power supply. While some units such as CMPs or DLIs have their own power supply, other units share power supplies. For example, the FPC and the PPC share a power supply, as do up to four MMPs or two QGPs. Another example, the replacement of a minor fabric board in the TMS or a QLPS requires that the entire parent ONTCCOM be removed from service first. The easiest way to ensure all the right units are removed from service is to toggle the RST/ROS switch on the corresponding control and display pack to the ROS (request OOS) position.

The use of unconditional removals or manual override power downs is NOT recommended (unless the office is in AM/CM min mode operation), because call processing may be detrimentally impacted. The failure of conditional removals usually indicates mate hardware should be repaired first.

CAUTION 2: The SM-2000 NLI is an exception to the previous caution. The NLI paddleboards, which connect to the rear of the backplane, are constructed to withstand removal/replacement, while power remains on. However, repair of an even NLI on an EXM-2000 requires that corresponding odd NLI be removed from service before the pack is replaced (due to timing coupling at the TRCU).

PROCEDURE

1. This procedure provides two ways to diagnose and restore the desired unit. Both methods perform the same operation, but one performs the action with one input command and the other with two. Decide which method is used.

   NOTE: The single-step version is faster than the two-step method. It is generally recommended that the single-step version be used for repairing the desired units.

   There are exceptions, however, where the **two-command** format is preferable/necessary, specifically as follows:

   - If an ONTCCOM or QLPS is to be repaired **and** one FPC is thought to be fault-free, but is OOS, the two-command format allows the use of the OOS FPC as a "helper unit."
   - If a QLPS is to be repaired **and** its parent ONTCCOM is thought to be fault-free, but is OOS/UNAV-FRC, the two-command format allows the use of the OOS/UNAV ONTCCOM as a "helper unit." Do not attempt to restore the QLPS until after repair is complete in this case (skip Step 8).
   - Also, if repair of an UNAV-FRC MSCU or ONTCCOM is required, use the two-command format to diagnose/repair the unit, but do not attempt to restore the unit (skip Step 8).
   - To isolate certain NC reference problems, it may be necessary to diagnose only the NC (rather than the more lengthy diagnostics associated with the entire ONTCCOM); the same limitation can occur for TMSLNK repair, where only the TMS diagnostic need be executed. In both of these cases, the two-command format allows execution of only the required ONTCCOM diagnostic phases and saves time.

   If the **two-command** format is used, continue with Step 5.

   Else, continue with the next step.

2. At the master control center (MCC) video terminal, restore the desired unit conditionally. This can be done by entering either the input message or the display page poke for the desired unit as indicated in Table 5.3-1 .

   NOTE: In some cases, diagnostics may have been executed prior to entering this procedure, and a current TLP containing faulty suspect packs may already be available. In this case, go directly to Step 3, or it may be preferable to reexecute the restoration to confirm that the suspect packs in the TLP have not changed (time may be the deciding factor).

   Also, if the unit to be restored is an ONTCCOM or QLPS, the restore may be stopped, because a "helper FPC" is not available; the OOS FPC must be repaired first. If the unit to be restored is a QLPS, the parent ONTCCOM must also be removed as a "helper unit." This request could be denied for a variety of reasons, all implicitly referring to problems with other hardware, which should be resolved first (typical hardware implicated are an OOS/DGR mate ONTCCOM, OOS QLPSs on the mate ONTCCOM, OOS QGPs, or

CLNKs/MMPs).

Finally, as part of a conditional restoration, diagnostics are performed on the indicated unit. If the diagnostic returns all tests pass (ATP) or conditional all tests pass (CATP), the unit is restored to an operational state. If a fault is found, however, the diagnostic output message may include a **SUSPECTED FAULTY EQUIPMENT TLP** list.

If the restoration is successful, the following message forms are printed:

- **DGN UNIT COMPLETED ATP/CATP**
- **RST UNIT COMPLETED ATP/CATP**.

If the diagnostic finds a fault, the following message forms are printed:

- **DGN UNIT SUSPECTED FAULTY EQUIPMENT LAST RECORD**
- **RST UNIT STOPPED** [reason].

3. Was the unit successfully restored? The following four conditions [(a) through (d)] determine the next actions to be performed:

   (a) **YES**, the unit was restored to an operational state. **STOP!** This procedure has been completed; return to the procedure that pointed to this procedure (Procedure 5.2 or 5.4).

   (b) **NO**, the unit was not restored, and the diagnostic printed a **SUSPECTED FAULTY EQUIPMENT** list (see the following note). Replace the first listed circuit pack not previously replaced, and return to Step 2 to conditionally restore unit again.

   (c) **NO**, the unit was not restored, but no **SUSPECTED FAULTY EQUIPMENT** list was printed. Continue with next step.

   (d) **NO**, the unit was not restored, and all of the circuit packs have been tried for the desired unit. Continue with next step.

NOTE: If a note number appears in the last column on the **SUSPECTED FAULTY EQUIPMENT** list, obtain the text for the note prior to replacing the pack to see what precautions or additional procedures are recommended. Obtain the text for the note by entering the **OP:TLPNOTE n** command, where **n** is the note number.

Also, diagnostics associated with some units may execute **interface tests**. This may cause the TLP listing to include suspect packs that are **not** owned by the unit being diagnosed. Some examples include a DLI/NLI diagnostic implicating a TMS pack (when TMSLNK phases are executed), or a QLPS diagnostic implicating a QGP (when QGL phases are executed). When this happens, it is important that conditional restores scheduled in Step 2 are performed on **both** the **original** unit, and also the **parent** of the suspect/replaced circuit pack.

Also, after diagnostics have been executed on the same unit twice and fail, the TLP should be checked to determine if any changes have occurred. When the suspected list of faulty boards changes, the first listed circuit pack on the latest list should be replaced even if it has been changed previously. Then return to Step 2 to conditionally restore the unit again.

4. Visually inspect backplane for wiring open/short circuits, bent pins, loose optical transceivers/NLI packs,

loose/broken electrical/optical cables, or other physical defects.

- If such defects are found **and** can be repaired, return to Step 2 after completing those repairs.
- If no backplane faults can be found, or repair cannot be made, **seek technical assistance** according to local procedure.

5. At the MCC video terminal, diagnose the desired unit. This can be done by entering either the input message or the display page poke for the desired unit as indicated in Table 5.3-2 .

   NOTE: In some cases, diagnostics may have been executed prior to entering this procedure, and a current TLP containing faulty suspect packs may already be available. In this case, go directly to Step 6, or it may be preferable to reexecute the restoration to confirm that the suspect packs in the TLP have not changed (time may be the deciding factor).

   Also, if the unit to be diagnosed is an ONTCCOM, MI, NC, TMS, or QLPS, the diagnostic may be stopped, because a STBY "helper FPC" is not available. Either the OOS FPC must be repaired first, or, if the OOS FPC and its parent MSCU hardware is thought to be fault-free, an option **helper=x** (where **x** is the MSGS side associated with the OOS FPC) attempts to use that FPC as a "helper." If the unit to be diagnosed is a QLPS, the parent ONTCCOM must also be removed as a "helper unit." This request could be denied for a variety of reasons, all implicitly referring to problems with other hardware, which should be resolved first (typical hardware implicated are an OOS/DGR mate ONTCCOM, OOS QLPSs on the mate ONTCCOM, OOS QGPs, or CLNKs/MMPs).

   Finally, after diagnostics are completed, an output message is printed. If no hardware fault was found, message form "A" is printed; if a hardware fault was found, message form "B" is printed.

   (A) **DGN UNIT COMPLETED ATP/CATP**

   (B) **DGN UNIT SUSPECTED FAULTY EQUIPMENT LAST RECORD**.

6. Does diagnostic response end with ATP or CATP? The following three conditions [(a) through (c)] determine the next actions to be performed:

   (a) **YES**, the diagnostic passed and form "A" was printed. Continue with Step 8.

   (b) **NO**, a hardware fault was found by the diagnostic and form "B" was printed (see the following note). Replace the first listed circuit pack not previously replaced, and return to Step 5 to diagnose the unit again.

   (c) **NO**, a hardware fault was found by the diagnostic and form "B" was printed, but all of the boards have been replaced previously. Continue with the next step.

   NOTE: If a note number appears in the last column on the **SUSPECTED FAULTY EQUIPMENT** list, obtain the text for the note prior to replacing the pack to see what precautions or additional procedures are recommended. Obtain the text for the note by entering the **OP:TLPNOTE n** command, where **n** is the note number.

   Also, diagnostics associated with some units may execute **interface tests**. This may cause a TLP listing to include suspect packs, that are **not** owned by the unit being diagnosed. Some examples include a DLI/NLI diagnostic implicating a TMS pack (when TMSLNK phases are executed), or a QLPS diagnostic implicating a QGP (when QGL phases are executed). When this happens, it is important that diagnostics/unconditional restores scheduled in Steps 5 and 8 are performed on **both** the **original** unit and also the **parent** of the suspected/replaced circuit pack.

After diagnostics have been executed on the same unit twice and fail, the TLP should be checked to determine if any changes have occurred. When the suspected list of faulty boards changes, the first listed circuit pack on the latest list should be replaced even if it has been changed previously. Then return to Step 5 to diagnose the unit again.

7. Visually inspect backplane for wiring open/short circuits, bent pins, loose optical transceivers/NLI packs, loose/broken electrical/optical cables, or other physical defects.

   - If such defects are found **and** can be repaired, return to Step 5 after completing those repairs.
   - If no backplane faults can be found or repair cannot be made, **seek technical assistance** according to local procedure.

8. At the MCC video terminal, restore unconditionally the desired unit. This can be done by entering either the input message or the display page poke, with the UCL option, for the desired unit as indicated in Table 5.3-2 .

   NOTE: As part of an unconditional restore, diagnostics are omitted on the indicated unit.

   See comments in Step 1 concerning the diagnostics of QLPSs under an OOS/UNAV ONTCCOM, or the diagnostic of an UNAV-FRC MSCU or ONTCCOM. In these cases, the unconditional restore should not be attempted.

   If the restoration is successful, the following message form is printed:

   RST UNIT COMPLETED

   If the restoration fails, the following message form is printed:

   RST UNIT STOPPED [reason]

9. Did the unit restore?

   - **YES**, the unit was restored to an operational state. **STOP!** This procedure has been completed; return to the procedure that pointed to this procedure (Procedure 5.2 or 5.4).
   - **NO**, the unit was not restored; **seek technical assistance** according to local procedure.

NOTE: It is possible to re-initialize the entire CM without re-initializing the AM. This feature is termed "AM/CM Decoupling for CM-Only Init." and is available in 5E12 and later software releases as a secured feature. For the procedure to perform the CM-only initialization, refer to 235-105-220, *Corrective Maintenance Manual*.

Table 5.3-1 Input Messages or Command Pokes for Diagnosing and Restoring (In One Step) CM Units for Each Software Release

INPUT MESSAGE	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
RST:MSCU=0;	1240	360	ALL
RST:MSCU=1;	1250	361	ALL
RST:FPC=0;	1241	340	ALL
RST:FPC=1;	1251	341	ALL
RST:PPC=0;	1241	350	ALL
RST:PPC=1;	1251	351	ALL
RST:CMP=0-XX;	1241	3XX	ALL

XX = CMP number	CMP range 00-00		
RST:CMP=1-XX;	1251	3XX	ALL
XX = CMP number	CMP range 00-00		
RST:QGP=0-Y;	1241	370Y	ALL
Y=QGP number	QGP range 0-1		
RST:QGP=1-Y;	1251	371Y	ALL
Y=QGP number	QGP range 0-1		
RST:MMP=0-XX;	1242	3XX	ALL
XX = MMP number	MMP range 00-23		
RST:MMP=0-XX;	1243	3XX	ALL
XX = MMP number	MMP range 24-47		
RST:MMP=1-XX;	1252	3XX	ALL
XX = MMP number	MMP range 00-23		
RST:MMP=1-XX;	1253	3XX	ALL
XX = MMP number	MMP range 24-47		
RST:ONTCCOM=0;	1209	310	ALL
RST:ONTCCOM=1;	1209	311	ALL
RST:QLPS=0-Y;	1209	320Y	ALL
Y=QLPS number	QLPS range 0-1		
RST:QLPS=1-Y;	1209	321Y	ALL
Y=QLPS number	QLPS range 0-1		
RST:DLI=X-0;	1200,X	300	ALL
X=SM number	SM range 1-192		
RST:DLI=X-1;	1200,X	301	ALL
X=SM number	SM range 1-192		
RST:NLI=X-YY-0;	1200,X	30YY	ALL
X=SM number	SM range 1-192		
YY=NLI number	NLI range 00-11		
	(SM-2000)		
	NLI range 00-23		
	(EXM-2000)		
RST:NLI=X-YY-1;	1200,X	31YY	ALL
X=SM number	SM range 1-192		
YY=NLI number	NLI range 00-11		
	(SM-2000)		
	NLI range 00-23		
	(EXM-2000)		

Table 5.3-2 Input Messages or Command Pokes for Diagnosing and Restoring (In Two Steps)

INPUT MESSAGES	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
DGN:MSCU=0,RAW,TLP;	1240	560	ALL
RST:MSCU=0,UCL;	1240	360,UCL	ALL
DGN:MSCU=1,RAW,TLP;	1250	561	ALL
RST:MSCU=1,UCL;	1250	361,UCL	ALL
DGN:FPC=0,RAW,TLP;	1241	540	ALL
RST:FPC=0,UCL;	1241	340,UCL	ALL
DGN:FPC=1,RAW,TLP;	1251	541	ALL
RST:FPC=1,UCL;	1251	341,UCL	ALL
DGN:PPC=0,RAW,TLP;	1241	550	ALL
RST:PPC=0,UCL;	1241	350,UCL	ALL
DGN:PPC=1,RAW,TLP;	1251	551	ALL
RST:PPC=1,UCL;	1251	351,UCL	ALL
DGN:CMP=0-XX,RAW,TLP;	1241	5XX	ALL
RST:CMP=0-XX,UCL;	1241	3XX,UCL	ALL
XX = CMP number	CMP range 00-00		
DGN:CMP=1-XX,RAW,TLP;	1251	5XX	ALL
RST:CMP=1-XX,UCL;	1251	3XX,UCL	ALL
XX = CMP number	CMP range 00-00		
DGN:QGP=0-Y,RAW,TLP;	1241	570Y	ALL
RST:QGP=0-Y,UCL;	1241	370Y,UCL	ALL
Y=QGP number	QGP range 0-1		
DGN:QGP=1-Y,RAW,TLP;	1251	571Y	ALL
RST:QGP=1-Y,UCL;	1251	371Y,UCL	ALL
Y=QGP number	QGP range 0-1		
DGN:MMP=0-XX,RAW,TLP;	1242	5XX	ALL
RST:MMP=0-XX,UCL;	1242	3XX,UCL	ALL
XX = MMP number	MMP range 00-23		

DGN:MMP=0-XX,RAW,TLP;	1243	5XX	ALL
RST:MMP=0-XX,UCL;	1243	3XX,UCL	ALL
XX = MMP number	MMP range 24-47		
DGN:MMP=1-XX,RAW,TLP;	1252	5XX	ALL
RST:MMP=1-XX,UCL;	1252	3XX,UCL	ALL
XX = MMP number	MMP range 00-23		
DGN:MMP=1-XX,RAW,TLP;	1253	5XX	ALL
RST:MMP=1-XX,UCL;	1253	3XX,UCL	ALL
XX = MMP number	MMP range 24-47		
DGN:ONTCCOM=0,RAW,TLP;	1209	510	ALL
RST:ONTCCOM=0,UCL;	1209	310,UCL	ALL
DGN:ONTCCOM=1,RAW,TLP;	1209	511	ALL
RST:ONTCCOM=1,UCL;	1209	311,UCL	ALL
DGN:NC=0,RAW,TLP;	1210	520	ALL
RST:ONTCCOM=0,UCL;	1210	300,UCL	ALL
DGN:NC=1,RAW,TLP;	1210	521	ALL
RST:ONTCCOM=1,UCL;	1210	301,UCL	ALL
DGN:TMS=0,RAW,TLP;	1220	510	ALL
RST:ONTCCOM=0,UCL;	1220	300,UCL	ALL
DGN:TMS=1,RAW,TLP;	1220	511	ALL
RST:ONTCCOM=1,UCL;	1220	301,UCL	ALL
DGN:DLI=X-0,RAW,TLP;	1200,X	500	ALL
RST:DLI=X-0,UCL;	1200,X	300,UCL	ALL
X = SM number	SM range 1-192		
DGN:DLI=X-1,RAW,TLP;	1200,X	501	ALL
RST:DLI=X-1,UCL;	1200,X	301,UCL	ALL
X = SM number	SM range 1-192		

Procedure 5.4: ANALYZE/RESOLVE COMMUNICATION MODULE HARDWARE PROBLEMS

OVERVIEW

This procedure is designed to analyze/resolve Communication Module (CM) hardware problems. The following CM units are covered in the procedure: MSCU, FPC, CMP, PPC, MMP, ONTCCOM, NC reference/oscillator, TMSLNK, DLI/NLI, QGP, QLPS, and CLNK. If a unit/complex on the CM status display page (MCC poke 115) is shown as off-normal (backlighted), go to the procedure specified in the following list. The following is a list of the eight procedures in this section:

(a) Procedure 5.4.1 — Message Switch Analysis

(b) Procedure 5.4.2 — Office Network Timing Complex Common Analysis

(c) Procedure 5.4.3 — Network Clock Analysis

(d) Procedure 5.4.4 — Time Multiplex Switch/Dual Link Interface Analysis

(e) Procedure 5.4.5 — Time Multiplex Switch Links/Network Link Interface Analysis

(This procedure is normally started from steps performed in Procedure 5.4.4 .)

(f) Procedure 5.4.6 — Communication Link Analysis

(g) Procedure 5.4.7 — Quad-Link Packet Switch Gateway Processor Analysis

(This procedure is normally started from steps performed in Procedure 5.4.1 .)

(h) Procedure 5.4.8 — Quad-Link Packet Switch Analysis.

PROCEDURE

1. If a unit/complex on the CM status display page **(MCC poke 115)** is shown as off-normal (backlighted), go to the procedure specified in the following list.

   If any **MSGS Box 1240-1243, 1250-53** is backlighted, then go to Procedure 5.4.1 .
   If **ONTC Box 1209** is backlighted, then go to Procedure 5.4.2 .
   If **MI/NC Box 1210** is backlighted, then go to Procedure 5.4.3 .
   If any **TMS Box 1221-1228, 1231-1238** is backlighted, then go to Procedure 5.4.4 . If **CLNKS Box 1260** is backlighted, then go to Procedure 5.4.6 .

   If either **QLPS NETWK Box 1380-1381** is backlighted, then go to Procedure 5.4.8 .

2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 5.4.1: MESSAGE SWITCH ANALYSIS

PROCEDURE

1. Based upon the off-normal (backlighted) boxes on the 115 MCC page, bring up the MCC page specified by the off-normal indicator and transition to the step indicated in the following list (if several of the following designated boxes are backlighted, take action in the order of the listing).

   If **Box 1240** or **1250** is off-normal, then continue with Step 2.
   If **Box 1241** or **1251** is off-normal, then go to Step 21.
   If **Box 1242-3** or **1252-3** is off-normal, then go to Step 55.

   Otherwise, return to Procedure 5.4 to reevaluate the status of other CM units.

2. Is the MSCU in an out-of-service (OOS) or unavailable (UNAV) state?

   If **YES**, then go to Step 6.

   If **NO**, then continue with Step 3.

3. Are hardware checks inhibited on the MSCU?

   If **YES**, then continue with Step 4.

   If **NO**, then go to Step 19.

4. Use MCC **poke 96x** or the **op:cfgstat:mscu=x** command (where x = MSGS side) to determine if hardware checks were manually or automatically inhibited.

   NOTE: The MSCU hardware checks are inhibited automatically (INH-AUTO) only after an automatic AM/CM hardware initialization has escalated.

5. If it is determined that MSCU hardware checks can be allowed, use **poke 76x** or the **alw:hdwchk,mscu=x** command (where x = MSGS side), and then return to Step 2.

   If the decision is made to leave hardware checks inhibited, return to Procedure 5.4 to reevaluate status of other CM units.

6. Output the MSCU hardware state to the ROP using MCC **poke 96x** or the **op:cfgstat,mscu=x** command (where x = MSGS side).
   If the state is **OOS-MAN-RMV**, then continue with Step 7.
   If the state is **OOS-AUTO-RMV**, then go to Step 15.
   If the state is **OOS-MAN-DGN**, then go to Step 11.
   If the state is **OOS-AUTO-DGN**, then go to Step 11.
   If the state is **OOS-MAN-EX**, then go to Step 11.
   If the state is **OOS-MAN-REX**, then go to Step 11.
   If the state is **OOS-AUTO-REX**, then go to Step 11.
   If the state is **OOS-MAN-TEMP**, then go to Step 16.
   If the state is **OOS-MAN-FLT**, then go to Step 9.
   If the state is **OOS-AUTO-FLT**, then go to Step 9.
   If the state is **OOS-AUTO-TBLA**, then go to Step 12.
   If the state is **OOS-AUTO-PWRALM**, then go to Step 13.
   If the state is **UNAV-MAN-PWROFF**, then go to Step 14.
   If the state is **UNAV-FRCD-RMV**, then go to Step 18.


```
If the state is UNAV-FRCD-PWROFF, then go to Step 14.
If the state is UNAV-FRCD-DGN, then go to Step 11.
If the state is UNAV-FRCD-EX, then go to Step 11.
If the state is UNAV-FRCD-TEMP, then go to Step 16.
If the state is UNAV-FRCD-FLT, then go to Step 17.
If the state is UNAV-FRCD-PWRALM, then go to Step 13.
```

7. Restore the MSCU that was removed using MCC **poke 36x** or the **rst:mscu=x** command (where x = MSCU side).

8. Did the MSCU restore successfully?

   If **YES**, then return to Step 1.
   If **NO**, then return to Step 6.

9. The MSCU is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.3 to repair the unit, and then continue to the next step.

10. Did Procedure 5.3 result in the successful restoral of the MSCU?

    If **YES**, then return to Step 1.
    If **NO**, then return to Procedure 5.4 to evaluate other CM units.

11. The MSCU is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 1.

12. The MSCU is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.

13. The MSCU has lost power autonomously. Refer to power repair guidelines in Section 3 . Once the problem is resolved, return to Step 1.

14. The MSCU has been manually powered off. Power up the MSCU at the corresponding control and display pack, and then return to Step 6.

15. The MSCU has been automatically removed for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP via the **op:dmq,cm** command.

    If the MSCU is not in queue, then return to Step 7.
    If the MSCU is in queue, wait for diagnostics to complete, then return to Step 1.

16. The MSCU is being utilized as a "helper unit" to execute diagnostic tests for other hardware. When the diagnostic testing is complete, the MSCU state changes. Once the diagnostic completes, return to Step 1.

17. The forced unavailable MSCU is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.3 to repair the unit (execute only diagnostics, and make no attempt to restore the unit). When the repair is complete, return to Step 1.

18. The MSCU has been forced unavailable. To clear the force, use the clear force **poke 402** or the **clr:frc,mscu** command, and then return to Step 6.

19. On MCC Page **1240** or **1250**, is the indicator for community 0-1 or 8-9 backlighted?

    If **YES**, then continue with Step 20.

    If **NO**, then go to Step 53.

20. Go to MCC Display Page **1241** or **1251**, respectively.

21. Is the CMP in an OOS, UNAV, or INIT state?

    If **YES**, then go to Step 25.

    If **NO**, then continue with Step 22.

22. Are CMP hardware checks inhibited?

    If **YES**, then continue with Step 23.

    If **NO**, then go to Step 36.

23. Use MCC **poke 9yy** or the **op:cfgstat,cmp=x-yy** command (where x = MSGS side and yy = CMP number) to determine if hardware checks were manually or automatically inhibited.

    NOTE: The CMP hardware checks are inhibited automatically only after an automatic AM/CM hardware initialization or CMP duplex-fail recovery has escalated.

24. If it is determined that CMP hardware checks can be allowed, use **poke 7yy** or the **alw:hdwchk,cmp=x-yy** command (where x = MSGS side and yy = CMP number), and then return. If **NO**, then go to Step 21.

    If the decision is made to leave hardware checks inhibited, return to Procedure 5.4 to reevaluate status of other CM units.

25. Output the CMP hardware state to the ROP using MCC **poke 9yy** or the **op:cfgstat,cmp=x-yy** command (where x = MSGS side and yy = CMP number).

    If the state is **OOS-MAN-RMV**, then continue with Step 26.
    If the state is **OOS-DACT-RMV**, then continue with Step 26.
    If the state is **OOS-AUTO-RMV**, then go to Step 34.
    If the state is **OOS-MAN-DGN**, then go to Step 30.
    If the state is **OOS-AUTO-DGN**, then go to Step 30.
    If the state is **OOS-MAN-EX**, then go to Step 30.
    If the state is **OOS-MAN-REX**, then go to Step 30.
    If the state is **OOS-AUTO-REX**, then go to Step 30.
    If the state is **OOS-MAN-FLT**, then go to Step 28.
    If the state is **OOS-AUTO-FLT**, then go to Step 28.
    If the state is **OOS-AUTO-PWRALM**, then go to Step 32.
    If the state is **OOS-AUTO-TBLA**, then go to Step 31.
    If the state is **OOS-MAN-FE**, then go to Step 35.
    If the state is **OOS-AUTO-FE**, then go to Step 35.
    If the state is **UNAV-MAN-PWROFF**, then go to Step 33.
    If the state is **INIT-NULL-NULL**, then see note.
    If the state is **INIT-DACT-NULL**, then see note.

    NOTE: The INIT-NULL-NULL and INIT-DACT-NULL states are transient, used while the CMP is being initialized. Allow the recovery to complete, and return to Step 21.

26. Restore the CMP that was removed using MCC **poke 3yy** or the **rst:cmp=x-yy** command (where x = MSGS side and yy = CMP number).

27. Did the CMP restore successfully?

    If **YES**, then return to Step 22.

If **NO**, then go to Step 25.

28. The CMP is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.3 to repair the unit, and then continue to the next step.

29. Did Procedure 5.3 result in the successful restoral of the CMP?

    If **YES**, then return to Step 22.

    If **NO**, then return to Procedure 5.4 to evaluate other CM units.

30. The CMP is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 21.

31. The CMP is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.

32. The CMP has lost power autonomously. Refer to power repair guidelines in Section 3 . Once the problem is resolved, return to Step 21.

33. The CMP has been manually powered off. Power up the CMP community at the corresponding control and display pack, and then return to Step 25.

34. The CMP has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP by using the **op:dmq,cm** command.

    If the CMP is not in the queue, then return to Step 26.

    If the CMP is in the queue, wait for diagnostics to complete, and then return to Step 21.

35. The CMP is in the OOS family of equipment (OOSF) state, indicating the CMP's parent MSCU is OOS or UNAV. Go back to Step 1.

36. Is the FPC (or PPC) in an OOS or UNAV state?

    If **YES**, then go to Step 40.

    If **NO**, then continue with Step 37.

37. Are FPC (or PPC) hardware checks inhibited?

    If **YES**, then continue with Step 38.

    If **NO**, then go to Step 52.

38. Use MCC **poke 94x** (or **poke 95x**), or the **op:cfgstat,fpc=x** (or **op:cfgstat,ppc=x**) command (where x = MSGS side), to determine if hardware checks were manually or automatically inhibited.

    NOTE: The FPC/PPC hardware checks are inhibited automatically only after an automatic AM/CM hardware initialization has escalated.

39. If it is determined that FPC (or PPC) hardware checks can be allowed, then use **poke 74x** (or **poke 75x**), or the **alw:hdwchk,fpc=x** (or **alw:hdwchk,ppc=x**) command (where x = MSGS side), and return to Step 36.

    If the decision is made to leave hardware checks inhibited, return to Procedure 5.4 to reevaluate status of other CM units.

40. Output the FPC (or PPC) hardware state to the ROP using MCC **poke 94x** (or **95x**), or the **op:cfgstat,fpc=x** (or **op:cfgstat,ppc=x**) command (where x = MSGS side).
    If the state is **OOS-MAN-RMV**, then continue with Step 41.
    If the state is **OOS-AUTO-RMV**, then go to Step 49.
    If the state is **OOS-MAN-DGN**, then go to Step 45.
    If the state is **OOS-AUTO-DGN**, then go to Step 45.
    If the state is **OOS-MAN-EX**, then go to Step 45.
    If the state is **OOS-MAN-REX**, then go to Step 45.
    If the state is **OOS-AUTO-REX**, then go to Step 45.
    If the state is **OOS-MAN-TEMP**, then go to Step 51.
    If the state is **OOS-AUTO-TEMP**, then go to Step 51.
    If the state is **OOS-MAN-FLT**, then go to Step 43.
    If the state is **OOS-AUTO-FLT**, then go to Step 43.
    If the state is **OOS-AUTO-PWRALM**, then go to Step 47.
    If the state is **OOS-AUTO-TBLA**, then go to Step 46.
    If the state is **OOS-MAN-FE**, then go to Step 50.
    If the state is **OOS-AUTO-FE**, then go to Step 50.
    If the state is **UNAV-MAN-PWROFF**, then go to Step 48.

41. Restore the FPC (or PPC), that was removed, by using MCC **poke 34x** (or **poke 35x**), or the **rst:fpc=x** (or **rst:ppc=x**) command (where x = MSGS side).

42. Did the FPC (or PPC) restore successfully?

    If **YES**, then go to Step 37.

    If **NO**, then go to Step 40.

43. The FPC or PPC is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.3 to repair the unit, and then continue to the next step.

44. Did Procedure 5.3 result in the successful restoral of the FPC or PPC?

    If **YES**, then return to Step 37.

    If **NO**, then return to Procedure 5.4 to evaluate the status of other CM units.

45. The FPC (or PPC) is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 36.

46. The FPC or PPC is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.

47. The combined FPC/PPC community has lost power autonomously. Refer to power repair guidelines in **Section 3** . Once the problem is resolved, return to Step 36.

48. The combined FPC/PPC community has been manually powered off. Power up the FPC/PPC community at the corresponding control and display pack, and then return to Step 40.

49. The FPC (or PPC) has been automatically removed by fault recovery for the purpose of running diagnostics. Output the diagnostic queue to the ROP via the **op:dmq,cm** command.

    If the FPC (or PPC) is not on the queue, return to Step 41.

If the FPC (or PPC) is on the queue, wait for the diagnostics to complete, and then return to Step 36.

50. The FPC or PPC is in the OOS family of equipment (OOSF) state, which implies its parent MSCU is OOS or UNAV. Go to Step 1.

51. The FPC or PPC is being utilized as a "helper unit" to execute diagnostic tests for other hardware. When the diagnostic testing is complete, the FPC/PPC state will change. Once the diagnostic completes, return to Step 36.

52. Are any QGPs OOS or UNAV, or are QGP interrupts inhibited?

    If **YES**, then go to Procedure 5.4.7 .

    If **NO**, then continue with Step 53.

53. On MCC Display Page **1240** or **1250**, is the community 2-7 or 10-15 indicator backlighted?

    If **YES**, then continue with Step 54.

    If **NO**, then return to Procedure 5.4 to reevaluate the status of other CM hardware.

54. Go to MSGS Community display page that is backlighted.

    MSGS 0 - Communities 2-7 - use MCC **poke 1242**.
    MSGS 0 - Communities 10-15 - use MCC **poke 1243**.
    MSGS 1 - Communities 2-7 - use MCC **poke 1252**.
    MSGS 1 - Communities 10-15 - use MCC **poke 1253**.

55. Are there any MMPs in an OOS or UNAV state?

    If **YES**, then go to Step 59.

    If **NO**, then continue with Step 56.

56. Are any MMP hardware checks inhibited?

    If **YES**, then continue with Step 57.

    If **NO**, then return to Procedure 5.4 to reevaluate CM hardware status.

57. Use MCC **poke 9yy** or the **op:cfgstat,mmp=x-yy** command (where x = MSGS side and yy = MMP number) to determine if hardware checks were manually or automatically inhibited.

    NOTE: The MMP hardware checks are inhibited automatically only after an automatic AM/CM hardware initialization has escalated or during duplex/quadruplex fail recovery.

58. If it is determined that MMP hardware checks can be allowed, use **poke 7yy** or the **alw:hdwchk,mmp=x-yy** command (where x = MSGS side and y = MMP number), and then return to Step 55.

    If the decision is made to leave hardware checks inhibited, return to Procedure 5.4 to reevaluate status of other CM units.

59. Output the MMP hardware state to the ROP using MCC **poke 9yy** or the **op:cfgstat,mmp=x-yy** command (where x = MSGS side and yy = MMP number).
    `If the state is` **`OOS-MAN-RMV`**`, then continue with Step 60.`
    `If the state is` **`OOS-AUTO-RMV`**`, then go to Step 68.`
    `If the state is` **`OOS-MAN-DGN`**`, then go to Step 64.`

```
If the state is OOS-AUTO-DGN, then go to Step 64.
If the state is OOS-MAN-EX, then go to Step 64.
If the state is OOS-MAN-REX, then go to Step 64.
If the state is OOS-AUTO-REX, then go to Step 64.
If the state is OOS-MAN-FLT, then go to Step 62.
If the state is OOS-AUTO-FLT, then go to Step 62.
If the state is OOS-AUTO-PWRALM, then go to Step 66.
If the state is OOS-AUTO-TBLA, then go to Step 65.
If the state is OOS-UNEQ-NULL, then go to Step 69.
If the state is OOS-GROW-XXX, then go to Step 70.
If the state is OOS-MAN-FE, then go to Step 71.
If the state is OOS-AUTO-FE, then go to Step 71.
If the state is OOS-MAN-TEMP, then go to Step 72.
If the state is OOS-AUTO-TEMP, then go to Step 72.
If the state is OOS-MAN-MIP, then go to Step 73.
If the state is OOS-AUTO-MIP, then go to Step 73.
If the state is OOS-AUTO-DFRIP, then see note and go to Step 60.
If the state is UNAV-MAN-PWROFF, then go to Step 67.
```

NOTE: The OOS-AUTO-DFRIP state only occurs when a group of MMPs serving the same SM cannot be restored (periodic restoral attempts will occur, but generally escalation to an AM/CM initialization is avoided). Generally, hardware is faulty, but craft intervention is necessary to diagnose/repair the unit (a restore request should result in a diagnostic failure and a stable OOS-MAN-FLT state, suitable for further analysis).

60. Restore the MMP that was removed using the MCC poke **3yy** or the **rst:mmp=x-yy** command (where x = MSGS side and yy = MMP number).

61. Did the MMP restore successfully?

    If **YES**, then go to Step 56.

    If **NO**, then go to Step 59.

62. The MMP is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.3 to repair the unit, and then continue to the next step.

63. Did Procedure 5.3 result in the successful restoral of the MMP?

    If **YES**, then return to Step 56.

    If **NO**, then return to Procedure 5.4 to evaluate other CM units.

64. The MMP is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 55.

65. The MMP is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.

66. The MMP community has lost power autonomously. Refer to power repair guidelines in **Section 3** . Once the problem is resolved, return to Step 55.

67. The MMP community has been manually powered off. Power up the MMP community at the corresponding control and display pack, and then return to Step 55.

68. The MMP has been automatically removed by fault recovery for the purpose of executing diagnostics. Output the diagnostic queue to the ROP via the **op:dmq,cm** command.

    If the MMP is not on the queue, then return to Step 60.

    If the MMP is on the queue, wait for the diagnostics to complete, and then return to Step 55.

69. The MMP is unequipped. No further action can be performed. Go to Step 53.

70. The MMP is in a growth state. Refer to the MMP growth procedures (applicable 555A Installation Handbook), and then return to Step 53.

71. The MMP is in the OOS family of equipment (OOSF) state, which indicates the parent MSCU is OOS or UNAV. Go to Step 1.

72. The MMP is being utilized as a "helper unit" to execute diagnostic tests for other hardware. When the diagnostic testing is complete, the MMP state will change. Once the diagnostic completes, return to Step 53.

73. The MMP is being pumped/restarted (maintenance in progress), which should only take several seconds to complete. After a short wait, return to Step 53.

Procedure 5.4.2: OFFICE NETWORK TIMING COMPLEX COMMON ANALYSIS

PROCEDURE

1. Go to MCC Page **1209** to display the status of both ONTCCOMs.
2. Is an ONTCCOM in an OOS or UNAV state?

   If **YES**, then go to Step 7.

   If **NO**, then continue with Step 3.
3. Are hardware checks inhibited on an ONTC?

   If **YES**, then go to Step 5.

   If **NO**, then continue with Step 4.
4. Are any QLPSs in an OOS state?

   If **YES**, then go to Procedure 5.4.8 .

   If **NO**, then return to Procedure 5.4 to evaluate other CM units.
5. Use MCC **poke 91x** or the **op:cfgstat,ontccom=x** command (where x = ONTC side) to determine if hardware checks were manually or automatically inhibited.

   NOTE: The ONTC hardware checks are inhibited automatically only after an automatic AM/CM hardware initialization has escalated.
6. If it is determined that ONTC hardware checks can be allowed, use **poke 70x** or the **alw:hdwchk,ontc=x** command (where x = ONTC side), and then return to Step 2.

   If the decision is made to leave hardware checks inhibited, return to Procedure 5.4 to reevaluate status of other CM units.
7. Output the ONTCCOM hardware state to the ROP using MCC **poke 91x** or the **op:cfgstat,ontccom=x** command (where x = ONTC side).
   If the state is **OOS-MAN-RMV**, then continue with Step 8.
   If the state is **OOS-AUTO-RMV**, then go to Step 10.
   If the state is **OOS-AUTO-DGN**, then go to Step 13.
   If the state is **OOS-MAN-DGN**, then go to Step 13.
   If the state is **OOS-MAN-EX**, then go to Step 13.
   If the state is **OOS-AUTO-REX**, then go to Step 13.
   If the state is **OOS-MAN-REX**, then go to Step 13.
   If the state is **OOS-MAN-TEMP**, then go to Step 19.
   If the state is **OOS-AUTO-TEMP**, then go to Step 19.
   If the state is **OOS-AUTO-FLT**, then go to Step 11.
   If the state is **OOS-MAN-FLT**, then go to Step 11.
   If the state is **OOS-AUTO-PWRALM**, then go to Step 15.
   If the state is **OOS-AUTO-TBLA**, then go to Step 14.
   If the state is **OOS-AUTO-DFRIP**, then see note.
   If the state is **UNAV-MAN-PWROFF**, then go to Step 16.
   If the state is **UNAV-FRCD-RMV**, then go to Step 17.


```
If the state is UNAV-FRCD-DGN, then go to Step 13.
If the state is UNAV-FRCD-EX, then go to Step 13.
If the state is UNAV-FRCD-FLT, then go to Step 18.
If the state is UNAV-FRCD-PWROFF, then go to Step 16.
If the state is UNAV-FRCD-PWRALM, then go to Step 15.
```

NOTE: The OOS-AUTO-DFRIP state only occurs when both ONTCCOMs cannot be restored. If system software checks are allowed, take no action, as the failure of fault recovery to restore one of the ONTCCOMs will result in escalation to an AM/CM initialization. If software checks are inhibited, escalation to an initialization will not occur, and the ONTCCOM should be restored via Step 8.

8. Restore the ONTCCOM that was removed using MCC **poke 31x** or the **rst:ontccom=x** command (where x = ONTCCOM side).

9. Did the ONTCCOM restore to an active (ACT) or degraded (DGR) state?

   If **YES**, then return to Step 3.

   If **NO**, then return to Step 7.

   NOTE: If an FPC is OOS/UNAV, it cannot be used as a "helper unit" for the ONTCCOM diagnostic. Return to Procedure 5.4.1 of this procedure to repair the FPC before continuing.

10. The ONTCCOM has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP via the **op:dmq,cm** command.

    If the ONTCCOM is not on the queue, return to Step 8.

    If the ONTCCOM is on the queue, wait for diagnostics to complete, and then return to Step 2.

11. The ONTCCOM is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.3 to repair the unit, and then continue to the next step.

12. Did Procedure 5.3 result in the successful restoral of the ONTCCOM?

    If **YES**, then return to Step 3.

    If **NO**, then return to Procedure 5.4 to evaluate other CM units.

13. The ONTCCOM is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 2.

14. The ONTCCOM is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.

15. The ONTCCOM or one of its shelf units has lost power autonomously. Refer to power repair guidelines in **Section 3** . Once the problem is resolved, return to Step 2.

16. The ONTCCOM or one of its shelf units has been manually powered off. Power up the ONTCCOM/shelf unit at the corresponding control and display pack, and then return to Step 2.

17. The ONTCCOM has been forced unavailable. To clear the forced unavailable state, use MCC **poke 402** or the **clr:frc,ontccom** command, and return to Step 2.

18. The forced unavailable ONTCCOM is faulty. Find the most recent printed TLP list on the ROP, and use Procedure 5.3 to repair the unit (execute only diagnostics, and make no attempt to restore the unit). When

the repair is complete, return to Step 2.

19. The ONTCCOM is being utilized as a "helper unit" to execute diagnostic tests for other hardware. When the diagnostic testing is complete, the ONTCCOM state will change. Once the diagnostic completes, return to Step 2.

Procedure 5.4.3: NETWORK CLOCK ANALYSIS

PROCEDURE

1. On the MCC Display Page **115**, the MI/LI/NC (CM1) or MI/NC (CM2) 0/1 is indicated to be off-normal. Go to the **1210** page.

   NOTE: This box is lighted only if the NC cross-couples or external references (or oscillator or oscillator cross-couples in CM2 offices) are off-normal.

2. Is a NC cross couple (XC) in an OOS state?

   If **YES**, then continue with Step 3.

   If **NO**, then go to Step 10.

3. At the **1210** page, dump the status of the NC XCs, which are indicated to be off-normal, by using MCC **poke 91x** or the **op:cfgstat,ncref,nc=x** command (where x = NC XC number).

   If the state is **OOS-MAN-RMV**, then continue with Step 4.

   If the state is **OOS-AUTO-FE**, then go to Step 6.

   If the state is **OOS-MAN-FE**, then go to Step 6.

   If the state is **OOS-AUTO-FLT**, then go to Step 7.

4. The NC XC has been manually removed and can be restored by using MCC **poke 31x** or the **rst:ncref,xc=x** command (where x = NC XC number).

5. Did the NC XC restore successfully?

   If **YES**, then go to Step 10.

   If **NO**, then go to Step 7.

6. The NC XC is in an OOS family of equipment (OOSF) state, which implies the parent ONTCCOM is OOS/UNAV. Return to Procedure 5.4.2 of this procedure.

7. The NC XC is faulty. Diagnose the "slave" NC unit (the NC pointed to by the XC line on the MCC page), using Procedure 5.3 to repair the unit, and then continue to the next step.

8. Did Procedure 5.3 result in the successful restoral of the ONTCCOM?

   If **YES**, then continue with Step 9.

   If **NO**, then return to Procedure 5.4 to evaluate other CM units.

9. Did the NC XC restore successfully?

   If **YES**, then continue with Step 10.

   If **NO**, then **seek technical assistance** according to local procedure.

10. Choose one of the following branches, dependent upon the vintage of the NC in the office (NC1 or NC2).

(NC1 Only) Is the "T1" box backlighted?

If **YES**, then continue with Step 11.

If **NO**, then return to Procedure 5.4 and evaluate other CM units.

(NC2 Only) Is the "SEE PAGE 1211" box backlighted?

If **YES**, then bring up MCC Page **1211**, and go to Step 19.

If **NO**, then return to Procedure 5.4 to evaluate other CM units.

11. (NC1 Only) The T1 carrier used as a timing reference may be faulty. Gather any **REPT NC** messages on the ROP (looking for potential problems, such as reference jitter, out-of-frame problems, phase-lock loop problems, etc.), and decode them according to the 235-600-750, *Output Manual*. Work with transmission personnel (using any gathered data and local carrier group alarms) to ensure the synchronization source is fault-free. When the problems are identified/corrected, continue with the next step.

12. (NC1 Only) The NC cannot synchronize to the external T1 carrier reference (NCREF). Restore the T1 carrier by using the **rst;ncref,prim** command.

13. (NC1 Only) Did the T1 carrier reference (NCREF) restore successfully?

    If **YES**, then continue with Step 14.

    If **NO**, then go to Step 16.

14. (NC1 Only) The T1 carrier (NCREF) restored to a STBY state and must be switched to by using the **sw:ncref** command.

15. (NC1 Only) Was the switch successful?

    If **YES**, then return to Procedure 5.4 to reevaluate CM hardware status.

    If **NO**, then continue with Step 16.

16. (NC1 Only) The T1 carrier (NCREF) interface is nonfunctional, which could be due to a latent fault in the NC. Diagnose that NC via a **poke 52x** or the **dgn:nc=x** command (where x = NC side being fed by the OOS NCREF).

17. (NC1 Only) Did the NC diagnostic complete ATP?

    If **YES**, then continue with Step 18.

    If **NO**, then gather TLP data, and go to Procedure 5.3 to repair the NC. Upon completion of repairs, return to Procedure 5.4 to reevaluate status of all CM units.

18. (NC1 Only) Restore the ONTCCOM unconditionally by using the **poke 30x,ucl** or the **rst:ontccom=x,ucl** command (where x = ONTC side associated with the OOS NCREF).

    Since faults in the NCREF cannot be isolated to CM hardware and the synchronization source has been certified by transmission personnel, **seek technical assistance** according to local procedure.

19. (NC2 Only) Is an NC reference backlighted?

    If **YES**, then continue with Step 20.

If **NO**, then go to Step 23.

20. (NC2 Only) The source used as a timing reference may be faulty. Gather any **REPT NC** messages on the ROP (looking for potential problems, such as reference jitter, out-of-frame problems, phase-lock loop problems, etc.), and decode them according to the 235-600-750, *Output Manual*. Work with transmission personnel (using any gathered data and local carrier group alarms) to ensure the synchronization source is fault-free. When the problems are identified/corrected, continue with the next step.

21. (NC2 Only) Attempt to restore an NC reference, which is OOS, by using the **poke 32x** or the **rst:ncref,refx** command (where refx = the OOS NC reference number).

22. (NC2 Only) Did the NC reference restore successfully?

    If **YES**, then go to Step 19.

    If **NO**, then **seek technical assistance** according to local procedure.

23. (NC2 Only) Is an NC oscillator cross-couple (OSCXC) in an OOS state?

    If **YES**, then continue with Step 24.

    If **NO**, then return to Procedure 5.4 to reevaluate status of all CM units.

24. (NC2 Only) Attempt to restore the NC OSCXC, which is OOS, by using the **poke 34x** or the **rst:oscxc=x** command (where x = number of the OOS OSCXC).

25. (NC2 Only) Did the OSCXC restore successfully?

    If **YES**, then go to Step 23.

    If **NO**, then continue with Step 26.

26. (NC2 Only) Is an NC oscillator (NCOSC) in an OOS or UNAV state?

    If **YES**, then continue with Step 27.

    If **NO**, then return to Procedure 5.4 to reevaluate CM hardware status.

27. (NC2 Only) Dump the status of the NCOSC by using **poke 93x** or the **op:cfgstat,ncosc=x** command (where x = ONTC side).

    If the NCOSC is in a warm-up state (OOS-AUTO-WMUP, OOS-MAN-WMUP, UNAV-FRC-WMUP), then continue with Step 28.

    If the NCOSC is in any other OOS state, then go to Step 29.

28. (NC2 Only) No action can be performed currently. Wait for the warm-up to complete (which could take up to an hour for a medium-stability NC, or up to 16 hours for a high-stability NC), and then return to Procedure 5.4 to reevaluate the status of other CM units.

29. (NC2 Only) Attempt to restore the NCOSC by using the **poke 33x** or the **rst:ncosc=x** command (where x = ONTC side).

30. (NC2 Only) Did the NCOSC restore successfully?

    If **YES**, then return to Procedure 5.4 to reevaluate CM hardware status.

If **NO**, then **seek technical assistance** according to local procedure.

Procedure 5.4.4: TIME MULTIPLEX SWITCH/DUAL LINK INTERFACE ANALYSIS

PROCEDURE

1. On MCC Page 115, note the MCC page number inside of the TMS link (TMSLNK) box that is off-normal (backlighted), and then enter the number for that box.

   TMS 0 - TMSLNK Boxes: 1221 through 1228.
   TMS 1 - TMSLNK Boxes: 1231 through 1238.

2. On the TMSLNK status page (1221-1228 or 1231-1238), locate the OOS TMSLNK(s), and pick an SM/SM-2000 to be analyzed.

   NOTE: There may be cases when there are OOS TMSLNKs on both ONTC sides. When this occurs, work on resolving the problems on the ONTC side that is in the degraded minor (DGR-MIN) state first.

3. After choosing an SM/SM-2000 to analyze, enter **1201,1,x** (where x = SM/SM-2000 number). On that page, note whether it displays an SM served by **DLIs**, or an SM-2000 served by **NLIs**, and then return to the original 1221-1228 or 1231-1238 page used in Step 2.

   If **DLI**, then continue with Step 4.

   If **NLI**, then go to Procedure 5.4.5 to evaluate **this SM/SM-2000**.

4. Is the SM summary box, associated with a pair of TMSLNKs, backlighted (indicating the parent DLI is OOS)?

   If **YES**, then go to Step 7.

   If **NO**, then continue with Step 5.

5. Restore the TMSLNK using **poke 3yyy** or the **rst:tmslnk=x-yyy** command (where x = ONTC side and yyy = TMSLNK number).

6. Did the TMSLNK restore successfully?

   If **YES**, then go to Step 1.

   If **NO**, then continue with Step 7.

7. The TMSLNK(s) may have been automatically removed (OOS-AUTO-TBLA state), due to problems in parent circuits; the parent DLI or ONTCCOM may currently be in-service or OOS/UNAV. Go to MCC Page **1200,x** (DLI summary, where x = SM/SM-2000 number) to determine the equipment status.

   If the parent ONTCCOM is OOS/UNAV, then return to Procedure 5.4.2 .

   If the parent ONTCCOM is ACT/DGR, then continue with Step 8.

8. Is the associated DLI OOS?

   If **YES**, then continue with Step 9.

   If **NO**, then go to Step 20.

9. Output the hardware status to the ROP using the **op:cfgstat,dli=x-y** command (where x = SM number and y = ONTC side).


```
If the state is OOS-MAN-RMV, then continue with Step 10.
If the state is OOS-AUTO-RMV, then go to Step 12.
If the state is OOS-AUTO-DGN, then go to Step 15.
If the state is OOS-MAN-DGN, then go to Step 15.
If the state is OOS-MAN-EX, then go to Step 15.
If the state is OOS-AUTO-REX, then go to Step 15.
If the state is OOS-MAN-REX, then go to Step 15.
If the state is OOS-AUTO-FLT, then go to Step 13.
If the state is OOS-MAN-FLT, then go to Step 13.
If the state is OOS-AUTO-PWRALM, then go to Step 17.
If the state is OOS-AUTO-TBLA, then go to Step 16.
If the state is OOS-MAN-FE, then go to Step 19.
If the state is OOS-AUTO-FE, then go to Step 19.
If the state is UNAV-MAN-PWROFF, then go to Step 18.
```

10. Restore the DLI that was removed using MCC **poke 30x** or the **rst:dli=x-y** command (where x = SM number and y = ONTC side).

11. Did the DLI restore successfully?

    If **YES**, then return to Procedure 5.4 to reevaluate the status of other CM hardware.

    If **NO**, then go to Step 9.

12. The DLI has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP using the **op:dmq,cm** command.

    If the DLI is not on the queue, then return to Step 10.

    If the DLI is on the queue, wait for diagnostics to complete, then return to Step 8.

13. The DLI is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.3 to repair the unit, and then continue to the next step.

14. Did Procedure 5.3 result in the successful restoral of the DLI?

    If **YES**, then return to Step 1.

    If **NO**, then return to Procedure 5.4 to evaluate the status of other CM units.

15. The DLI is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 8.

16. The DLI is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.

17. The DLI has lost power autonomously. Refer to power repair guidelines in **Section 3** . Once the problem is resolved, return to Step 1.

18. The DLI has been manually powered off. Power up the DLI at the corresponding control and display pack, and then return to Step 9.

19. As the DLI's parent ONTCCOM is OOS or UNAV, refer to Procedure 5.4.2 .

20. Diagnose/restore the DLI with the OOS TMSLNK by using Procedure 5.3 , and then continue to the next step.

21. Did Procedure 5.3 result in the successful restoration of the DLI?

    If **YES**, then go to Step 22.

    If **NO**, then return to Procedure 5.4 to evaluate the status of other CM hardware.

22. Did the child TMSLNK restore successfully?

    If **YES**, then continue with Step 23.

    If **NO**, then **seek technical assistance** according to local procedure.

23. Are any TMSLNK boxes still indicating an off-normal condition?

    If **YES**, then return to Step 1.

    If **NO**, then return to Procedure 5.4 to reevaluate the status of other CM hardware.

Procedure 5.4.5: TIME MULTIPLEX SWITCH LINKS/NETWORK LINK INTERFACE ANALYSIS

PROCEDURE

1. On MCC Page **115**, note the MCC page number inside of the TMS Link (TMSLNK) box that is off-normal (backlighted), and then enter the number for that box.

   TMS 0 - TMSLNK Boxes: 1221 through 1228.
   TMS 1 - TMSLNK Boxes: 1231 through 1238.

2. On the TMSLNK status page (1221-1228 or 1231-1238), locate the OOS TMSLNK(s), and pick an SM/SM-2000 to be analyzed.

   NOTE: There may be cases when there are OOS TMSLNKs on both ONTC sides. When this occurs, work on resolving the problems on the ONTC side that is in the degraded minor (DGR-MIN) state first.

3. After choosing an SM/SM-2000 to analyze, enter **1201,1,x** (where x = SM/SM-2000 number). On that page, note whether it displays an SM served by **DLIs**, or an SM-2000 served by **NLIs**, and then return to the original 1221-1228 or 1231-1238 page used in Step 2.

   If **NLI**, then continue to Step 4.

   If **DLI**, then go to Procedure 5.4.4 to evaluate **this SM/SM-2000**.

4. Is the SM summary box, associated with a pair of TMSLNKs for SM-2000s or a single TMSLNK for EXM-2000s, backlighted (indicating the parent NLI is OOS)?

   If **YES**, then go to Step 8.

   If **NO**, then continue with Step 5.

5. Restore the TMSLNK using **poke 3yyy** or the **rst:tmslnk=x-yyy** command (where x = ONTC side and yyy = TMSLNK number).

6. Did the TMSLNK restore successfully?

   If **YES**, then go to Step 1.

   If **NO**, then continue with Step 7.

7. The TMSLNK(s) may have been automatically removed (OOS-AUTO-TBLA state), due to problems in parent circuits; the parent NLI or ONTCCOM may currently be in-service or OOS/UNAV. Go to MCC Page **1200,x** (NLI summary, where x = SM/SM-2000 number) to determine the equipment status.

   If the parent ONTCCOM is OOS/UNAV, then return to Procedure 5.4.2 .

   If the parent ONTCCOM is ACT/DGR, then continue with Step 8.

8. Is the associated NLI OOS?

   If **YES**, then continue with Step 9.

   If **NO**, then go to Step 18.

9. Output the NLI hardware status to the ROP using the **op:cfgstat,nli=x-yy-z** command (where x = SM-2000 number, yy = NLI number, and z = ONTC side).
   If the state is **OOS-MAN-RMV**, then continue with Step 10.
   If the state is **OOS-AUTO-RMV**, then go to Step 12.
   If the state is **OOS-AUTO-DGN**, then go to Step 15.
   If the state is **OOS-MAN-DGN**, then go to Step 15.
   If the state is **OOS-MAN-EX**, then go to Step 15.
   If the state is **OOS-AUTO-REX**, then go to Step 15.
   If the state is **OOS-MAN-REX**, then go to Step 15.
   If the state is **OOS-AUTO-FLT**, then go to Step 13.
   If the state is **OOS-MAN-FLT**, then go to Step 13.
   If the state is **OOS-AUTO-TBLA**, then go to Step 16.
   If the state is **OOS-MAN-FE**, then go to Step 17.
   If the state is **OOS-AUTO-FE**, then go to Step 17.

10. Restore the NLI that was removed using MCC **poke 3zyy** or the **rst:nli=x-yy-z** command (where x = SM-2000 number, yy = NLI number, and z = ONTC side).

11. Did the NLI restore successfully?

    If **YES**, then return to Procedure 5.4 to reevaluate the status of other CM hardware.

    If **NO**, then go to Step 9.

12. The NLI has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP using the **op:dmq,cm** command.

    If the NLI is not on the queue, then return to Step 10.

    If the NLI is on the queue, wait for the diagnostics to complete, and then return to Step 8.

13. The NLI is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.3 to repair the unit, and then continue to the next step.

14. Did Procedure 5.3 result in the successful restoral of the NLI?

    If **YES**, then return to Step 1.

    If **NO**, then return to Procedure 5.4 to evaluate the status of other CM units.

15. The NLI is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 8.

16. The NLI is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.

17. As the NLI's parent ONTCCOM is OOS or UNAV, refer to Procedure 5.4.2 .

18. Diagnose/restore the NLI with the OOS TMSLNK by using Procedure 5.3 , and then continue to the next step.

19. Did Procedure 5.3 result in the successful restoration of the NLI?

    If **YES**, then go to Step 20.

    If **NO**, then return to Procedure 5.4 to evaluate the status of other CM hardware.

20. Did the child TMSLNK restore successfully?

    If **YES**, then continue with Step 21.

    If **NO**, then **seek technical assistance** according to local procedure.

21. Are any TMSLNK boxes still indicating an off-normal condition?

    If **YES**, then return to Step 1.

    If **NO**, then return to Procedure 5.4 to reevaluate the status of other CM hardware.

Procedure 5.4.6: COMMUNICATION LINK ANALYSIS

PROCEDURE

1. On MCC Display Page 115, the CLNKs indicator is off-normal.

   NOTE: If there are any other CM units out of service, repair those OOS units before attempting to repair the CLNKs.

2. Go to the CLNK MAP display page by entering **poke 1260**.

3. Go to the MCC page for the SM/SM-2000, which is indicating CLNKs OFF-NORMAL, by entering **poke 1900,x** (where x = SM/SM-2000 number).

4. If any CLNK is OOS (except due to OOS parent hardware), restore that CLNK via **poke 3yyy** or the **rst:clnk=x-y-y-y** command (where x = SM/SM-2000 number and y-y-y = the CLNK to be restored).

5. Did the CLNK restore successfully?

   If **YES**, then return to Procedure 5.4 to evaluate other CM units.

   If **NO**, then **seek technical assistance** according to local procedure.

Procedure 5.4.7: QUAD-LINK PACKET SWITCH GATEWAY PROCESSOR ANALYSIS

PROCEDURE

1. On MCC Pages **1241**, **1251**, **1380**, or **1381**, are any QGPs in an OOS or UNAV state?

   If **YES**, then go to Step 5.

   If **NO**, then continue with Step 2.

2. Are there any QGPs with hardware checks inhibited?

   If **YES**, then continue with Step 3.

   If **NO**, then return to Procedure 5.4.1 .

3. Use MCC **poke 97xy** or the **op:cfgstat,qgp=x-y** command (where x = MSGS side and y = QGP number) to determine if hardware checks were manually or automatically inhibited.

   NOTE: The QGP hardware checks are inhibited automatically after an automatic AM/CM hardware initialization has escalated or as a result of duplex/quadruplex failed QGP recovery.

4. If it is determined that QGP hardware checks can be allowed, use **poke 77xy** or the **alw:hdwchk,qgp=x-y** command (where x = MSGS side and y = QGP number), and then return to Step 1.

   If the decision is made to leave hardware checks inhibited, return to Procedure 5.4 to reevaluate status of other CM units.

5. Output the QGP hardware state to the ROP using MCC **poke 97xy** or the **op:cfgstat,qgp=x-y** command (where x = MSGS side and y = QGP number).
   If the state is **OOS-MAN-RMV**, then continue with Step 6.
   If the state is **OOS-AUTO-RMV**, then go to Step 1.
   If the state is **OOS-MAN-DGN**, then go to Step 10.
   If the state is **OOS-AUTO-DGN**, then go to Step 10.
   If the state is **OOS-MAN-EX**, then go to Step 10.
   If the state is **OOS-MAN-REX**, then go to Step 10.
   If the state is **OOS-AUTO-REX**, then go to Step 10.
   If the state is **OOS-MAN-FLT**, then go to Step 8.
   If the state is **OOS-AUTO-FLT**, then go to Step 8.
   If the state is **OOS-AUTO-DFRIP**, then see note and go to Step 6.
   If the state is **OOS-AUTO-PWRALM**, then go to Step 12.
   If the state is **OOS-AUTO-TBLA**, then go to Step 11.
   If the state is **OOS-UNEQ-NULL**, then go to Step 15.
   If the state is **OOS-GROW-XXX**, then go to Step 16.
   If the state is **OOS-MAN-FE**, then go to Step 17.
   If the state is **OOS-AUTO-FE**, then go to Step 17.
   If the state is **OOS-MAN-MIP**, then go to Step 18.
   If the state is **OOS-AUTO-MIP**, then go to Step 18.
   If the state is **UNAV-MAN-PWROFF**, then go to Step 13.

   NOTE: The OOS-AUTO-DFRIP state only occurs when no QGPs can be restored (periodic restoral attempts occur, but generally escalation to an AM/CM initialization is avoided). Usually, hardware is faulty, and craft intervention is necessary to diagnose/repair the unit. A restore request should result in a diagnostic failure, followed by a stable OOS-MAN-FLT state, further analysis can then be performed.

6. Restore the QGP that was removed using MCC **poke 37yy** or the **rst:qgp=x-y** command (where x = MSGS side and y = QGP number).

7. Did the QGP restore successfully?

   If **YES**, then go to Step 1.

   If **NO**, then go to Step 5.

8. The QGP is faulty. Find the most recent printed TLP list on the ROP; use Procedure 5.3 to repair the unit, and then continue to the next step.

9. Did Procedure 5.3 result in the successful restoral of the QGP?

   If **YES**, then return to Step 1.

   If **NO**, then return to Procedure 5.4 to evaluate the status of other CM hardware.

10. The QGP is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 1.

11. The QGP is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.

12. The QGP community has lost power autonomously. Refer to power repair guidelines in **Section 3** . Once the problem is resolved, return to Step 1.

13. The QGP community has been manually powered off. Power up the QGP community at the corresponding control and display pack, and then return to Step 5.

14. The QGP has been automatically removed for the purpose of running diagnostics. Output the diagnostic queue to the ROP via the **op:dmq,cm** command.

    If the QGP is not on the queue, then return to Step 6.

    If the QGP is on the queue, wait for the diagnostics to complete, then return to Step 1.

15. The QGP is unequipped. No further action can be performed, go back to Step 1 and investigate other QGPs.

16. The QGP is in a growth state. Refer to QGP growth procedure (applicable 555A Installation Handbook), and then return to Step 1 to investigate other QGPs.

17. The QGP is in the OOS family of equipment (OOSF) state. This means that the QGP's parent MSCU is OOS or UNAV. Return to Procedure 5.4.1 .

18. The QGP is being pumped/restarted (maintenance in progress), which should only take seconds to complete. After a short wait, return to Step 1.

Procedure 5.4.8: QUAD-LINK PACKET SWITCH ANALYSIS

PROCEDURE

1. On MCC Page **115**, note the page number in the QLPS network box that is off-normal (backlighted), and then enter the number in that box.

   If **QLPS network 0**, enter **poke 1380**.

   If **QLPS network 1**, enter **poke 1381**.

2. Is either QGP in an OOS or UNAV state, or have hardware checks inhibited?

   If **YES**, return to Procedure 5.4.7 .

   If **NO**, continue with Step 3.

3. Is either QLPS in an OOS state?

   If **YES**, continue with Step 4.

   If **NO**, go to Step 13.

4. Output the QLPS hardware status to the ROP by entering **poke 92xy** or by using the **op:cfgstat,qlps=x-y** command (where x = ONTC side and y = QLPS network).
   If the state is **OOS-MAN-RMV**, continue with Step 5.
   If the state is **OOS-AUTO-RMV**, go to Step 10.
   If the state is **OOS-MAN-DGN**, go to Step 8.
   If the state is **OOS-AUTO-DGN**, go to Step 8.
   If the state is **OOS-MAN-EX**, go to Step 8.
   If the state is **OOS-MAN-REX**, go to Step 8.
   If the state is **OOS-AUTO-REX**, go to Step 8.
   If the state is **OOS-AUTO-FLT**, go to Step 6.
   If the state is **OOS-MAN-FLT**, go to Step 6.
   If the state is **OOS-AUTO-TBLA**, go to Step 9.
   If the state is **OOS-AUTO-FE**, go to Step 11.
   If the state is **OOS-MAN-FE**, go to Step 11.
   If the state is **OOS-UNEQ-NULL**, go to Step 12.
   If the state is **OOS-GROW-XXX**, go to Step 12.

5. Unconditionally restore the QLPS that was removed by entering **poke 32xy,ucl** or by using the **rst:qlps=x-y,ucl** command (where x = ONTC side and y = QLPS network), and return to Step 3 when the restoral is complete.

   NOTE: If the parent ONTCCOM is OOS or UNAV, do **not** attempt the QLPS restoral. Instead, return to Procedure 5.4.2 to resolve the parent ONTCCOM problems first.

   When executing this step, it is preferable to restore **conditionally** (that is, leave off the **ucl** option on the cited poke/command). This is not the default, because this step may be executed in many cases, where it is known in advance, that the parent ONTCCOM cannot be removed as a "helper unit" for the diagnostic execution.

6. The QLPS is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.3 to repair the unit, and then continue to the next step.

7. Did Procedure 5.3 result in the successful restoral of the QLPS, or, at least, ATP diagnostics, if the parent ONTCCOM is OOS/UNAV (QLPS state will be OOS-MAN-FE)?

   If **YES**, return to Step 3.

   If **NO**, return to Procedure 5.4 to evaluate other CM units.

8. The QLPS is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 1.

9. The QLPS is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.

10. The QLPS has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP using the **op:dmq,cm** command.

    If the QLPS is not on the queue, see note.

    If the QLPS is on the queue, wait for diagnostics to complete, and then return to Step 1.

    NOTE: It is possible that the QLPS could validly remain in an OOS-AUTO-RMV state for a long period of time, due to the unavailability of diagnostic "helper units" (an FPC and the parent ONTCCOM). This inability to access "helper units" could be due to problems in an MSCU, FPC, ONTCCOM, or even QGPs, MMPs, CLNKs, or another QLPS. If such units are OOS/UNAV, return to Procedure 5.4 of this procedure to reevaluate them; otherwise, go to Step 5.

11. The QLPS's parent ONTCCOM is in an OOS or UNAV state. Refer to Procedure 5.4.2 .

12. The QLPS is unequipped or in a growth state (both of these states could only occur in midst of a growth procedure). Refer to the QLPS growth/degrowth procedures (555A Installation Handbook Procedures), and then return to Procedure 5.4 of the procedure to reevaluate other CM units.

13. Are any QLPS TMS Links (QTMSLNKs) or QLPS Gateway Links (QGLs) in an OOS state, or are any "QPIPE OOS" or "QLNK/MH QPIPE OOS" indicators backlighted?

    If **YES**, continue with Step 14.

    If **NO**, go to Step 15.

14. These are minor QLPS network elements, and they should not be the cause of system recovery actions. Therefore, refer to the 235-105-220, *Corrective Maintenance Procedures*, manual for procedures to resolve these problems.

15. Return to Procedure 5.4 of this procedure to reevaluate the status of other CM hardware.

16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 5.5: PERFORM CMP FULL INITIALIZATION

OVERVIEW

Due to the unique architecture of the communication module processor (CMP), it is possible to perform manual full initializations with pump with only several seconds of call processing downtime. The recommended procedure is to initialize the standby CMP first, hard switch the CMPs, and then initialize the new standby CMP. Call processing should only be interrupted during the hard switch.

NOTE: This procedure should only be used for a scheduled manual CMP initialization during low traffic periods. Technical support should be notified before proceeding.

The CMPs must be in the **ACT-STBY** configuration on MCC Page **1851** before beginning this procedure.

PROCEDURE

1. Pump the standby CMP.
   Enter **923** on MCC Page **1851**.

   Response: On MCC Page **1851**, has the **MATE STAT** changed to **POSTINIT**?
   This could take several minutes.

   If **YES**, continue with Step 2.

   If **NO**, seek technical assistance.

2. Hard switch CMPs by typing in the following message:

   RMV:CMP=y-0,UCL

   Where: y = MSGS side number (0/1) of PRIMARY CMP.

   Response: Has the **CLR TRN COMPLETED** message been printed to the ROP for all switching module/switching module-2000s (SM/SM-2000s) and the administrative module (AM)?

   If **YES**, continue with Step 3.

   If **NO**, seek technical assistance.

3. Repump the other side of the CMP by typing in the following message:

   RST:CMP=y-0,UCL,STBY;

   Where: y = MSGS side number (0/1) of the CMP removed in Step 2.

   Response: On MCC Page **1851**, has the **MATE STAT** changed to **POSTINIT**?
   This could take several minutes.

   If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

   If **NO, Seek technical assistance.**

6. SWITCHING MODULE/SWITCHING MODULE-2000 AND REMOTES

OVERVIEW

The procedures (6.x) in this section are used to recover from critical problems affecting switching modules (SMs) and switching module-2000s (SM-2000s).

NOTE: If manual action is found to be necessary, the craft person should contact the Electronic Switching Action Center (ESAC), the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC), or Customer Technical Support (CTS) (1-800-225-4672). The craft person should follow these procedures until support can be obtained. Once support is obtained, the craft person should assist in clearing the problem.

Procedures 6.1 and 6.2 support trouble analysis and recovery for an SM/SM-2000 that is undergoing an automatic initialization.

Procedure 6.3 is used to reestablish communication to an isolated SM/SM-2000. The SM/SM-2000 isolation is indicated on master control center (MCC) displays by a status of ISOLATED, COMM LOST, STNDALONE, or INIT ISOL.

NOTE: This procedure is also used to reestablish CLNKs to an SM-2000 that can only communicate with the AM through the quad link packet switch (QLPS) networks (as indicated by a status of CLNK LOST). For remote switching modules (RSMs), Procedure 6.4 should be used instead.

Procedure 6.4 is used to reestablish communication to an isolated RSM. The RSM isolation is indicated on MCC displays by a status of ISOLATED, COMM LOST, STNDALONE, or INIT ISOL.

Procedures 6.5 and 6.6 are used to off-line pump an SM/SM-2000 outside of a software release retrofit, software release update, or large terminal growth scenario.

Procedure 6.7 is used to resolve Integrated Digital Carrier Unit (IDCU) duplex fail conditions.

Procedure 6.8 is used to resolve Local Digital Service Function (LDSF) duplex fail conditions.

Procedure 6.9 is used to resolve Digital Network Unit- SONET (DNU-S) duplex fail conditions.

Procedure 6.10 is used to reestablish communication to an SM-2000 through the QLPS networks.

Procedure 6.11 is used to help resolve Packet Switch Unit (PSU) duplex failures.

NOTE: If the SM-2000 is completely isolated from the AM (as indicated by a status of ISOLATED, COMM LOST, STNDALONE, or INIT ISOL), this procedure is invoked by Procedure 6.3 . If only QLPS communication has been lost (status of QLNK LOST or QLPS ISOL), this procedure should be used directly.

Procedure 6.1: ANALYZE SM/SM-2000 INITIALIZATION FAULT

OVERVIEW

This procedure is used to investigate a switching module/switching module-2000 (SM/SM-2000) that is undergoing an automatic initialization. The strategy used is to first determine if the SM/SM-2000 is isolated from the administrative module (AM). If the SM/SM-2000 is isolated, communication must be established before further recovery can be attempted. Once communication is established, the initialization is monitored to determine if the SM/SM-2000 is automatically recovering itself. If automatic recovery is failing, each module controller time slot interchange (MCTSI) is forced, one at a time, and a full initialization with pump is initiated.

PROCEDURE

1. ***NOTE:*** This procedure is associated with a service outage, therefore, the craft person should seek technical assistance per local procedures and/or contact the Electronic Switching Action Center (ESAC). If the problem presists, or if manual action is neccessary the craft person or the technical support center should contact Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)]. The craft person should follow this procedure until support can be obtained. Once support is obtained, the craft person should assist in clearing the problem. Lucent Technologies support should be contacted no later than 10 minutes after the start of a service outage triggered by an SM initialization failure.

   NOTE: When call processing is restored during this procedure, gather any information associated with the initialization for later analysis. If the SM/SM-2000 is in an off-normal state (for example, hardware and software checks inhibited), wait for technical assistance before removing any inhibits.

2. Access master control center (MCC) Display Page **1800,X**.

   Where: x = SM/SM-2000 number.

3. On MCC Display Page **1800,X**, is the SM/SM-2000 shown as **COMM LOST**, **INIT ISOL**, **STNDALONE**, or **ISOLATED**?

   If **YES**, continue with Step 4.

   If **NO**, continue with Step 5.

4. Establish communication with isolated SM/SM-2000. When needed, go to Procedure 6.3 and for RSMs use Procedure 6.4 .

5. Determine if the automatic recovery actions have been exhausted. When needed, go to Procedure 6.2

6. Have the automatic recovery actions been exhausted?

   If **YES**, continue with Step 9.

   If **NO**, continue with Step 7.

7. Has the automatic recovery sequence reached one of the progress markers shown in Table 6.1-1 ?

Table 6.1-1 Initialization Complete Progress Markers

PROGRESS MARKERS	
BACKOUT CLNK LOST CLNK OFFN E911 CRIT FORCED HASH ERR INHIBITS	OVERLOAD POSTINIT QLNK LOST QLNK OFFN QLPS ISOL QMAN ISOL QPIPE_OOS

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with Step 8.

8. Has the hardware level counter (**HWLVL=**) in the SM/SM-2000 stimulus message reached the value **14**?

   If **YES**, continue with Step 9.

   If **NO**, allow automatic recovery to continue.

9. On MCC Display Page **1800,X**, enter command **608** to inhibit all hardware checks.

   Response: **INH HDWCHK** present in box 08.

10. On MCC Display Page **1800,X**, enter command **604** to inhibit software checks.

    Response: **INH SFTCHK** present in box 04.

11. On MCC Display Page **1800,X**, enter command **605** to inhibit sanity timer.

    Response: **INH** present in box 05.

12. On MCC Display Page **1800,X**, is either MCTSI shown as unavailable (**UNV** or **UNVP**)?

    If **YES**, continue with Step 13.

    If **NO**, continue with Step 20.

13. Is the MCTSI powered down?

    If **YES**, continue with Step 14.

    If **NO**, continue with Step 15.

14. Power up MCTSI.

15. Are any fuses associated with the MCTSI blown?

    If **YES**, continue with Step 16.

    If **NO**, continue with Step 17.

16. Replace blown fuse. When needed, go to Procedure 3.3 .

17. On MCC Display Page **1800,X**, is either MCTSI shown as **ACTF**?

    If **YES**, continue with Step 18.

If **NO**, continue with Step 19.

18. On MCC Display Page **1800,X**, enter command **422** to clear force on MCTSI.

19. On MCC Display Page **1800,X**, did the MCTSI state change from **UNV** or **UNVP** to **OOS**?

    If **YES**, continue with Step 20.

    If **NO**, **seek technical assistance**.

20. ***NOTE:*** When the system responds with yes or no (y/n) after entering command 923, enter y.

    On MCC Display Page **1800,X**, enter command **923** to perform a full initialization with pump.

    Comment: The full initialization with pump should complete in approximately 2 to 10 minutes.

21. On MCC Display Page **1800,X,** does the initialization reach one of the progress markers shown in the illustration after Step 7 of this procedure?

    If **YES**, continue with Step 22.

    If **NO**, continue with Step 23.

22. Can you complete calls from the SM/SM-2000?

    If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

    If **NO**, continue with Step 23.

23. ***NOTE:*** If an MCTSI cannot be forced using Page **1800,X,** manually power down one MCTSI at the SM control cabinet.

    On MCC Display Page **1800,X**, enter command **420** to force MCTSI 0 active.

    Response: **ACTF** for MCTSI0 shown in MCTSI box.

24. On MCC Display Page **1800,X**, enter command **923** to perform a full initialization with pump.

    Comment: The full initialization with pump should complete in approximately 2 to 10 minutes.

25. Determine if the SM/SM-2000 is rolling in initializations. When needed, go to Procedure 6.2 .

26. Is the SM/SM-2000 rolling in initializations?

    If **YES**, continue with Step 28.

    If **NO**, continue with Step 27.

27. Can you complete calls from the SM/SM-2000?

    If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

    If **NO**, continue with Step 28.

28. On MCC Display Page **1800,X**, enter command **422** to clear force on MCTSI 0.

29. ***NOTE:*** If an MCTSI cannot be forced using Page **1800,X**, manually power down one MCTSI at the switching module control cabinet.

    On MCC Display Page **1800,X**, enter command **421** to force MCTSI 1 active.

    Response: **ACTF** or MCTSI 1 shown in MCTSI box.

30. On MCC Display Page **1800,X**, enter command **923** to perform a full initialization with pump.

    Comment: The full initialization with pump should complete in approximately 2 to 10 minutes.

31. Determine if the SM/SM-2000 is rolling in initializations. When needed, go to Procedure 6.2 .

32. Is the SM/SM-2000 rolling in initializations?

    If **YES**, **seek technical assistance**.

    If **NO**, continue with Step 33.

33. Can you complete calls from the SM/SM-2000?

    If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

    If **NO**, **seek technical assistance.**

Procedure 6.2: ANALYZE SWITCHING MODULE/SWITCHING MODULE-2000 (SM/SM-2000) INITIALIZATION

OVERVIEW

The purpose of this procedure is to determine if the switching module/switching module-2000 (SM/SM-2000) is rolling in initializations. The SM/SM-2000 progress type phrases are first observed on MCC Display Page 1800,X. If the progress type phrases are reaching a certain level and then starting over, the SM/SM-2000 is not completing the initialization. The SM/SM-2000 stimulus message printed on the receive-only printer (ROP) is then observed to determine how many times the SM/SM-2000 has tried to initialize. If the hardware level counter (HWLVL=) has reached a level of 14, then it is unlikely the SM/SM-2000 can recover itself without manual intervention.

PROCEDURE

1. On master control center (MCC) Display Page **1800,X**, are any initialization progress type phrases (Tables 9.3-7 and 9.3-8) present under the **SM MODE** indicator?

   If **YES**, continue with Step 2.

   If **NO**, the SM/SM-2000 is not undergoing an initialization.

   STOP. YOU HAVE COMPLETED THIS PROCEDURE.

2. Are the two digits associated with the progress type phrases increasing in value?

   If **YES**, continue with Step 4.

   If **NO**, continue with Step 3.

3. On MCC Display Pages **141-144**, are initialization progress type phrases present for other SM/SM-2000s?

   If **YES**, continue with Step 4.

   If **NO**, ***seek technical assistance.***

4. Monitor the initialization until one of the initialization progress type phrases shown in the Figure 6.2-1 is present under the SM MODE indicator.

```
            INITIALIZATION COMPLETE PROGRESS MARKERS

              HASH ERR                 QMAN ISOL
              BACKOUT                  QLPS ISOL
              OVERLOAD                 QPIPE_OOS
              E911 CRIT                QLNK LOST
              FORCED                   CLNK LOST
              INHIBITS                 QLNK OFFN
              CLNK OFFN
              POSTINIT
```

Figure 6.2-1 SM/SM-2000 Initialization Progress Markers

5. Did the initialization complete?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with Step 6.

6. Did the initialization progress type phrases return to **CLNK** and start incrementing to higher numbers?

   If **YES**, continue with Step 7.

   If **NO**, ***seek technical assistance.***

7. At the MCC ROP, is there an SM/SM-2000 stimulus message Figure 6.2-2 ?

   If **YES**, continue with Step 8.

   If **NO**, ***seek technical assistance.***

```
REPT SM=2 HWLVL=14 SWLVL=FI MP FROM-MATE EVENT-NO=145 IN PROGRESS
UNK-ERR FAIL-ADDR=H'21C46 ROM-UNK DATA-BUS=H'1F TIME=0:0:0
PROGRESS:BG=0,0, CM=NONE, FG+NONE,,       UNKNOWN
68000-REGISTERS:    SSP=H'237FA  PC=H'62B0 SR=H'2700
                    USP=H'83672  FP=H'23756 TP=H'2030   A4=H'0
```

Figure 6.2-2 SM/SM-2000 Stimulus Message

8. Has the hardware level counter **HWLVL=** reached the value **14**?

   If **YES**, continue with Step 9.

   If **NO**, continue with Step 10.

9. The automatic recovery actions have been exhausted, and the SM/SM-2000 is still rolling in initializations. Manual intervention is required ***seek next level of technical assistance.***

   STOP. YOU HAVE COMPLETED THIS PROCEDURE.

10. Allow the automatic initialization sequence to continue until the initialization is complete (see Figure 6.2-1) or the hardware level counter of the stimulus message is indicating **14**.

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 6.3: ESTABLISH COMMUNICATION WITH ISOLATED SM/SM-2000

OVERVIEW

This procedure is used to reestablish communication to an isolated switching module/switching module-2000 (SM/SM-2000). Total loss of communication between the AM and an SM/SM-2000 can be indicated on master control center (MCC) Display Page **1800,X** (where X is the SM/SM-2000 number) by one of the following status indications: COMM LOST, INIT ISOL, STNDALONE, or ISOLATED. To simplify this procedure, these SM/SM-2000 status indications are referred to as ISOLATED.

The following are additional communication loss issues:

(a) ***Other SM Communication Loss:*** If the SM is an SM-2000 equipped with quad-link packet switch (QLPS) connectivity, and QLPS gateway processors (QGPs) are equipped, then the SM-2000 must lose communication via ***both*** (1) the communication links (CLNKs) and (2) the QLPS communication links (QLNKs) to become totally isolated from the AM. Communication via the CLNKs and QLNKs can fail (and be recovered) independently. Loss of only CLNKs cause a status display of CLNK LOST. Loss of only QLPS communication cause a status display of QLPS ISOL or QLNK LOST.

(b) ***RSM Communication Loss:*** To establish communication with an isolated remote switching module (RSM), see Procedure 6.4 . It covers communication-related problems unique to RSMs as well as problems common to all SM/SM-2000 types.

This procedure assumes that communication was previously established to the SM/SM-2000 for which recovery is necessary. It does not attempt to recover from static ODD problems or an inability to establish communication during SM/SM-2000 growth.

The recovery actions performed by this procedure address problems that can cause an SM/SM-2000 to lose CLNKs (CLNK LOST) and/or become totally isolated from the AM (ISOLATED). If the SM/SM-2000 is CLNK LOST or ISOLATED, use this procedure. Procedure 6.10 performs additional recovery actions that may be needed in order to reestablish communication via the QLPS networks. If the SM/SM-2000 is QLPS ISOL or QLNK LOST, use Procedure 6.10 to restore QLPS communication.

NOTE: The MCC Display Page **1800,X** is partially updated by the SM/SM-2000. When communication between the administrative module (AM) and SM/SM-2000 is lost, this page displays the stored information the AM has about the SM/SM-2000. Therefore, not all indicators on the page reflect the true status of an SM/SM-2000 that has lost communication. When AM/SM/SM-2000 communication is restored, the page is updated to reflect the current status of the SM/SM-2000.

Following each recovery action specified by this procedure, pause briefly (15-30 seconds) to allow the SM/SM-2000 to reestablish communication (if possible) and update the MCC display.

After AM/SM/SM-2000 communication is restored, verify that the SM/SM-2000 status indication is NORMAL, and take appropriate actions to remedy any off-normal conditions in the SM/SM-2000.

PROCEDURE

1. On the master control center (MCC) Display Page **1800,X** for SM X, is the SM/SM-2000 shown as **ISOLATED** or **CLNK LOST**?

   NOTE: To simplify this procedure, SM/SM-2000 status indications of ISOLATED, COMM LOST, STNDALONE, and INIT ISOL are referred to as **ISOLATED**.

If **YES**, continue with Step 2.

If **NO**, go to Step 65.

2. On MCC Display Page **1800,X**, is the SM/SM-2000 shown as **CLNK LOST**?

   If **YES**, go to Step 6.

   If **NO**, continue with Step 3.

3. On MCC Display Page **1800,X**, enter command **403** to manually isolate the SM/SM-2000.

   Response: **SET** present in box 03. SM/SM-2000 status changes to **MAN ISOL**.

4. On MCC Display Page **1800,X**, enter command **503** to clear manual SM/SM-2000 isolation.

   Response: **SET** cleared from box 03. SM/SM-2000 status is no longer **MAN ISOL**.

5. On MCC Display Page **1800,X**, is the SM/SM-2000 shown as **ISOLATED** or **CLNK LOST**?

   If **YES**, continue with Step 6.

   If **NO**, go to Step 65.

6. On MCC Display Page **1900,X**, are the office network and timing complexes (ONTCCOMs) shown as active major **(ACT MAJOR)** and active minor **(ACT MINOR)**?

   If **YES**, go to Step 23.

   If **NO**, continue with Step 7.

7. Is an ONTCCOM out-of-service or unavailable and capable of being restored successfully (no known problems)?

   If **YES**, continue with Step 8.

   If **NO**, go to Step 9.

8. Attempt to restore the out-of-service or unavailable ONTCCOM.

   If the ONTCCOM has lost power, restore power to it.

   If the ONTCCOM is forced unavailable, clear the ONTCCOM force using the **CLR:FRC,ONTCCOM** input message.

   Enter the **RST:ONTCCOM=Y,UCL** input message (where Y is the ONTCCOM side to restore).

   If the ONTCCOM does not restore successfully, continue with this procedure in order to reestablish communication to the isolated SM/SM-2000. After completing this procedure, diagnose/repair the ONTCCOM problem as described in Procedures 5.4.2 and 5.4.3 .

9. Is this SM an SM-2000?

   If **YES**, go to Step 17.

If **NO**, continue with Step 10.

NOTE: SM X is an SM-2000 if network link interfaces (NLIs) are shown on MCC Display Page **1200,X** (rather than dual link interfaces [DLIs]).

10. Enter poke **1201,1,X** to display the status of DLIs and TMSLNKs for SM X.

11. Is either DLI powered down **(UNVP)** but capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 12.

    If **NO**, go to Step 13.

12. At DLI control and display pack, power up DLI(s).

13. Is either DLI out-of-service **(OOS)** but capable of being restored successfully (no known problems and parent ONTCCOM is in-service)?

    If **YES**, go to Step 15.

    If **NO**, continue with Step 14.

14. Are any TMSLNKs out-of-service with an active parent DLI?

    If **YES**, continue with Step 15.

    If **NO**, go to Step 16.

15. Enter command **300,UCL** and/or **301,UCL** to unconditionally restore each OOS DLI and each DLI associated with an OOS TMSLNK.

    If any DLI or TMSLNK does not restore successfully, continue with this procedure in order to reestablish communication to the isolated SM. After completing this procedure, diagnose/repair the DLI or TMSLNK problem as described in Procedure 5.4.4 .

16. Are there any active TMSLNKs for this SM?

    If **YES**, go to Step 22.

    If **NO**, then ONTCs/DLIs/TMSLNKs must be repaired and restored to service before communication can be established to this SM. Refer to Procedures 5.4.2 and 5.4.3 . If communication still cannot be established after supporting hardware has been restored, return to the beginning of this procedure.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

17. Enter poke **1201,1,X** to display the status of the primary network link interfaces (NLIs) and TMSLNKs for SM-2000 X.

    NOTE: The first set of NLIs equipped on an SM-2000 are called the *primary* NLIs. Only the first TMSLNK associated with each primary NLI is used to support CLNK/QLPS communication to the SM-2000.

18. Is any primary NLI out-of-service **(OOS)** but capable of being restored successfully (no known problems and parent ONTCCOM is in-service)?

    If **YES**, go to Step 20.

    If **NO**, continue with Step 19.

19. Is the first TMSLNK associated with any active primary NLI out-of-service?

    If **YES**, continue with Step 20.

    If **NO**, go to Step 21.

20. Enter commands **30XX,UCL** (for ONTC side 0 NLIs) and/or **31XX,UCL** (for ONTC side 1 NLIs) (where XX is the NLI number) to unconditionally restore each OOS NLI and each NLI for which the first TMSLNK is OOS.

    If any NLI or TMSLNK does not restore successfully, continue with this procedure in order to reestablish communication to the isolated SM-2000. After completing this procedure, diagnose/repair the NLI or TMSLNK problem as described in Procedure 5.4.5 .

21. Is the first TMSLNK associated with any primary NLI active?

    If **YES**, go to Step 22.

    If **NO**, then ONTCs/NLIs/TMSLNKs must be repaired and restored to service before communication can be established to this SM-2000. Refer to Procedures 5.4.2 , 5.4.3 , and 5.4.5 to diagnose and repair the necessary communication module hardware. If communication still cannot be established after supporting hardware has been restored, return to the beginning of this procedure.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

22. Is the SM/SM-2000 status still **ISOLATED** or **CLNK LOST**?

    If **YES**, continue with Step 23.

    If **NO**, go to Step 65.

23. On MCC Display Pages **1240** and **1250**, is either message switch control unit (MSCU) shown as out-of-service or unavailable and capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 24.

    If **NO**, go to Step 25.

24. Attempt to restore the out-of-service or unavailable MSCU.

    If the MSCU has lost power, restore power to it.

    If the MSCU is forced unavailable, clear the MSCU force using the **CLR:FRC,MSCU** input message.

    Enter the **RST:MSCU=A,UCL** input message (where A is the MSCU side to restore).

    If the MSCU does not restore successfully, continue with this procedure in order to reestablish communication to the isolated SM/SM-2000. After completing this procedure, diagnose/repair the MSCU problem as described in Procedure 5.4.1 .

25. On MCC Display Page **1900,X**, is any module message processor (MMP) under an active MSCU powered down **(UNVP)** but capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 26.

    If **NO**, go to Step 27.

26. Power up the MMP community containing the UNVP MMP.

27. On MCC Display Page **1900,X**, are any MMPs out-of-service **(OOS)** but capable of being restored successfully (no known problems and parent MSCU is active)?

    If **YES**, continue with Step 28.

    If **NO**, go to Step 29.

28. Enter the input message **RST:MMP=A-B,UCL** (where A is the MSCU side and B is the MMP number) to unconditionally restore the OOS MMP(s).

    If any MMP does not restore successfully, continue with this procedure in order to reestablish communication to the isolated SM/SM-2000. After completing this procedure, diagnose/repair the MMP problem as described in Procedure 5.4.1 .

29. On MCC Display Page **1900,X**, are any MMPs shown as out-of-service family of equipment (OOSF)?

    If **YES**, continue with Step 30.

    If **NO**, go to Step 32.

30. Power down all MMP communities on the out-of-service MSCU side.

31. Power up all MMP communities powered down in the previous step.

32. Are there any active MMPs associated with this SM/SM-2000?

    If **YES**, go to Step 36.

    If **NO**, continue with Step 33.

33. On MCC Display Page **1900,X**, is the SM/SM-2000 shown as **CLNK LOST**?

    If **YES**, go to Step 34.

    If **NO**, continue with Step 35.

34. The MSCUs/MMPs must be repaired and restored to service before CLNK communication can be established to this SM/SM-2000. Refer to Procedure 5.4.1 to diagnose and repair the necessary communication module hardware. Communication to the SM/SM-2000 is currently available only via the QLPS networks. If CLNKs still cannot be established after supporting hardware has been restored, return to the beginning of this procedure.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

35. The MSCUs/MMPs must be repaired and restored to service before CLNK communication can be established to this SM/SM-2000.

    If the SM is an SM-2000 with QLPS connectivity and QGPs are equipped, use Procedure 6.10 to attempt to restore communication to the SM-2000 via the QLPS networks. Otherwise, refer to Procedure 5.4.1 to diagnose and repair the necessary communication module hardware.

    If CLNKs still cannot be established after supporting hardware has been restored, return to the beginning of this procedure.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

36. On MCC Display Page **1900,X**, is the SM/SM-2000 status still **ISOLATED** or **CLNK LOST**?

    If **YES**, continue with Step 37.

    If **NO**, go to Step 65.

37. Enter the input message **INH:CLNORM** to inhibit CLNK normalization.

    Response: An **INH CLNORM COMPLETED** output message prints. Box **08** on MCC Display Page **110** indicates that CLNORM is inhibited.

38. Enter the input message **ALW:CLNORM** to allow CLNK normalization.

    Response: An **ALW CLNORM COMPLETED** output message prints. Box **08** on MCC Display Page **110** indicates that CLNORM is allowed.

39. Pause for a minute to allow CLNK normalization to occur, and then check the SM/SM-2000 status on MCC Display Page **1900,X**.

    Is the SM/SM-2000 still **ISOLATED** or **CLNK LOST**?

    If **YES**, continue with Step 40.

    If **NO**, go to Step 65.

40. On MCC Display Page **1900,X**, is any CLNK shown in the **INIT** state?

    If **YES**, continue with Step 41.

    If **NO**, go to Step 42.

41. Enter command **2ABC** to remove *each* CLNK in the INIT state to an out-of-service state.

    Where: ABC = The 3-digit CLNK number.

42. Select a CLNK to restore manually.

43. On MCC Display Page **1900,X**, enter command **3ABC** to manually restore the selected CLNK.

    Where: ABC = The 3-digit CLNK number.

44. Pause for a minute to allow the CLNK to be established and the MCC display to be updated. Then check the SM/SM-2000 status on MCC Display Page **1900,X**.

    Is the SM/SM-2000 still **ISOLATED** or **CLNK LOST**?

    If **YES**, continue with Step 45.

    If **NO**, go to Step 65.

45. If the restored CLNK remains in the **INIT** state, enter command **2ABC** to manually remove the CLNK.

    Where: ABC = The 3-digit CLNK number.

46. Has an attempt been made to manually restore each CLNK shown on MCC Display Page **1900,X**?

    If **YES**, go to Step 47.

    If **NO**, select a different CLNK to restore manually, and repeat from Step 43.

47. On MCC Display Page **1800,X**, enter the following input message to clear module controller time slot interchanger (MCTSI) forces on the SM/SM-2000:

    ORD:CPI=X,CMD=CLR,UCL;

    Where: X = The SM/SM-2000 number.

    NOTE: Enter this command even if MCC Display Page **1800,X** does not indicate that a force is in effect. Two different output message responses are possible.

    Response:

    ```
    ORD CPI X CMD CLR COMPLETED
    ```

    Or:

    ```
    ORD CPI X CMD CLR NOT COMPLETED

    UNIT     RESULT

    X       STATUS UNKNOWN
    Where:  X = The SM/SM-2000 number.
    ```

    Pause for a minute to allow the SM/SM-2000 to attempt to reestablish communication.

48. Is the SM/SM-2000 still **ISOLATED** or **CLNK LOST**?

    If **YES**, continue with Step 49.

    If **NO**, go to Step 65.

49. On MCC Display Page **1800,X**, enter the poke command **705,UCL** to allow the SM/SM-2000 sanity timer. Enter this command even if MCC Display Page **1800,X** does not indicate that the sanity timer is inhibited. Two different output message responses are possible.

    Response:

    ```
    ORD CPI X CMD ALW COMPLETED
    ```

    Or:

    ```
    ORD CPI X CMD ALW NOT COMPLETED

    UNIT     RESULT

    X       STATUS UNKNOWN
    Where:  X = The SM/SM-2000 number.
    ```

    Pause for a minute to allow the SM/SM-2000 to attempt to reestablish communication.

50. Is the SM/SM-2000 still **ISOLATED** or **CLNK LOST**?

    If **YES**, continue with Step 51.

    If **NO**, go to Step 65.

51. Is the SM/SM-2000 status **CLNK LOST**?

    If **YES**, continue with Step 52.

    If **NO**, go to Step 53.

52. Communication to the SM-2000 is currently available only through the QLPS networks. Additional recovery actions that can be taken in order to restore CLNK communication (such as use of manual SM-2000 isolation and/or initializations, and power-cycling the SM-2000) would cause a complete loss of communication to the SM-2000.

    If possible, these recovery actions should be deferred until a low-traffic period. Also, if any CLNK supporting hardware remains out-of-service, diagnose/repair/restore it as described in Procedure 5.4 .

    Note that the SM-2000 may currently be providing normal service *including call processing*. However, CLNK communication must be reestablished if a pump of the SM-2000 is required.

    Seek technical assistance.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

53. Is this SM an SM-2000 with MH QPIPEs equipped?

    If **YES**, continue with Step 54.

    If **NO**, go to Step 56.

    NOTE: The input message **OP:QNETSTAT,SRCSM=X,ALL** (where X is the SM/SM-2000 number) can be used to determine if an SM/SM-2000 is equipped with MH QPIPEs. If so, the status of the MH QPIPEs is reported in an **OP QNETSTAT** output message.

54. Is the office equipped with QLPS gateway processors (QGPs)?

    If **YES**, continue with Step 55.

    If **NO**, go to Step 56.

    NOTE: MCC Display Page **1380** shows the QGP status if equipped.

55. Execute Procedure 6.10 to attempt to reestablish communication with SM-2000 through the QLPS networks.

    If the SM-2000 remains **ISOLATED** after executing Procedure 6.10 , continue with Step 56. Otherwise, go to Step 50.

56. At the MCTSI 0 control and display pack, power down MCTSI 0.

57. Pause for a minute to allow the SM/SM-2000 to attempt to reestablish communication. Then check the SM/SM-2000 status again.

    Is the SM/SM-2000 still **ISOLATED** or **CLNK LOST**?

If **YES**, continue with Step 58.

If **NO**, go to Step 65.

58. At the MCTSI 0 control and display pack, power up MCTSI 0.

59. Pause for a minute to allow the SM/SM-2000 to attempt to reestablish communication. Then check the SM/SM-2000 status again.

    Is the SM/SM-2000 still **ISOLATED** or **CLNK LOST**?

    If **YES**, continue with Step 60.

    If **NO**, go to Step 65.

60. At the MCTSI 1 control and display pack, power down MCTSI 1.

61. Pause for a minute to allow the SM/SM-2000 to attempt to reestablish communication. Then check the SM/SM-2000 status again.

    Is the SM/SM-2000 still **ISOLATED** or **CLNK LOST**?

    If **YES**, continue with Step 62.

    If **NO**, go to Step 65.

62. At the MCTSI 1 control and display pack, power up MCTSI 1.

63. Pause for a minute to allow the SM/SM-2000 to attempt to reestablish communication. Then check the SM/SM-2000 status again.

    Is the SM/SM-2000 still **ISOLATED** or **CLNK LOST**?

    If **YES**, continue with Step 64.

    If **NO**, go to Step 65.

64. The SM/SM-2000 is unable to establish or maintain communication.

    Seek technical assistance.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

65. On MCC Display Page **1900,X**, are any CLNKs shown as **ACT**?

    If **YES**, continue with Step 66.

    If **NO**, go to Step 67.

66. The SM/SM-2000 is no longer isolated and communication has been reestablished via the CLNKs. If the SM/SM-2000 status is still **QLPS ISOL** or **QLNK LOST**, refer to Procedure 6.10 for further corrective actions.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

67. The SM/SM-2000 is unable to maintain communication or has problems (indicated by the SM/SM-2000 status phrase on the MCC display) more severe than loss of CLNKs.

Seek technical assistance.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 6.4: ESTABLISH COMMUNICATION WITH ISOLATED RSM

OVERVIEW

This procedure is used to reestablish communication to an isolated remote switching module (RSM). The loss of communication can be indicated on master control center (MCC) Display Page **1800,RSM** by one of the following status indications: COMM LOST, INIT ISOL, STNDALONE, or ISOLATED. To simplify this procedure, these SM status indications are referred to as ISOLATED.

The following is an additional communication loss issue:

RSM Communication Loss: The ISOLATED status could be the result of any of the following:

(a) Faulty transmission lines (called T1 lines) connecting the host switching module (HSM) and RSM,

(b) Faulty interface circuits on the interfacing units in the HSM and RSM

(c) Faulty hardware in the communication module (CM), HSM, or RSM

(d) A software deficiency.

This procedure assumes that communication was previously established to the RSM for which recovery is necessary. It does not attempt to recover from static ODD problems or an inability to establish communication during RSM growth.

The recovery actions performed by this procedure address problems that are unique to RSMs and problems common to all SM/SM-2000 types. If the isolated SM is not an RSM, Procedure 6.3 should be used to reestablish communication. The recovery strategy is to perform the least service-affecting steps before escalating to more severe steps. Also steps that can be performed at the host office are attempted before steps that must be performed at the RSM site.

NOTE: The MCC Display Page **1800,RSM** is partially updated by the RSM. When communication between the administrative module (AM) and RSM is lost, this page displays stored information the AM has about the RSM. Therefore, not all indicators on the page reflect the true status of an RSM that has lost communication. When AM/RSM communication is restored, the page is updated to reflect the current status of the RSM. Following each recovery action specified by this procedure, pause briefly (15-30 seconds) to allow the RSM to reestablish communication (if possible) and update the MCC display.

After AM/RSM communication is restored, verify that the RSM status indication is NORMAL, and take appropriate actions to remedy any off-normal conditions in the RSM.

BACKGROUND INFORMATION

The terms *transmission line*, *T1 line*, *transmission facility*, or simply *facility* (FAC) denote the same entity and are used interchangeably. From the HSM/RSM perspective, a facility may be referred to as a host umbilical.

The digital line trunk unit (DLTU) is a unit that houses the digital facility interface (DFI) circuits which terminate the transmission facilities between HSM and RSM. Host DFIs (HDFIs) reside in the HSM and are linked by FACs to remote DFIs (RDFIs) in the RSM. For software release 5E13 and later, the DNU-S can also terminate the transmission facilities between the HSM and RSM. These transmission facilities, whether hosted by a DLTU or a DNU-S, are referred to as host umbilicals. Two new MCC pages, 1740 and 1741, have been created to display and manage RSM host umbilicals. The type of "HOST FACILITY" is indicated by FAC: (hosted by a DLTU) or DS1: (hosted by a DNU-S). The "REMOTE FACILITY" (that is, the RSM end of the host umbilical) type is always an

RFAC/RDFI termination. Host umbilicals are numbered from 1 through 20, with 1 through 4 reserved as Control Time Slot (CTS) host umbilicals. For a 2-CTS configuration, host umbilicals 1 and 2 are the CTS umbilicals. For a 4-CTS configuration, host umbilicals 1-4 are CTS umbilicals, with 1 and 3, and 2 and 4 being pairs. A "*" indicates which host umbilical has a CTS path established to carry a CLNK. Host umbilicals can be removed, restored, and tested.

The communication links (CLNKs) between the AM and RSM pass through the control time slot (CTS) channel on the FAC. The CTS FACs are always FAC 0 on the RDFIs. When RDFIs 1-4 are fully equipped, there are four CTS FACs (FAC 0 on each RDFI). The CTS FACs on RDFIs 1 and 3 are backups of each other, as are the CTS FACs on RDFIs 2 and 4. When a CTS FAC (that is, a host umbilical 1 through 4) is out of service (OOS) or its parent circuit is OOS, and the backup FAC is active, the AM and RSM can establish communication through the backup FAC.

An OOS parent circuit for a DLTU hosted umbilical can be a host DFI (HDFI). An OOS parent circuit(s) for a DNU-S hosted DS1 umbilical circuit can be a higher-level SONET facility, a TMUX (when there is no spare TMUX available), or a CD or SFI (if they are duplex failed). The MCC Display Page 1120, Z, HSM for DLTU Z shows the status of DLTU circuits hosting the RSM.

The MCC Display Page 1510, Y, HSM for DNU-S Y shows the status of DNU-S circuits hosting the RSM. The MCC Display Page 1511, Y, Z, HSM for DNU-S Y, STS Z, shows the status of the DNU-S STS facility hosting the RSM.

Table 6.4-1 specifies all the possible states of a parent circuit and its subtending host umbilical circuits when the RSM is isolated. Table 6.4-1 guides maintenance personnel to perform recovery actions on the parent circuits/FACs to recover the RSM. Restoral of a parent circuit/host umbilical might lead to a new status which might lead to a new set of recovery actions. The recovery action should be taken on the parent circuit/host umbilical in proper priority as specified in the table and it should be attempted once. The table should also be used to recover OOS parent circuits/host umbilicals even after RSM communication is restored.

Table 6.4-1 Isolated RSM Host Umbilical Parent States

PRECEDENCE	Parent STATUS	Host Umbilical STATUS	RECOVERY ACTIONS
1	OOS	OOSF	Restore the parent circuit.
2	OOS	OOS	Restore the parent circuit.
3	ACT	OOS with no CGA	Restore the host umbilical.
4	ACT	OOS with Remote CGA	Restore the host umbilical. If host umbilical status does not change, restore the parent circuit.
5	ACT	OOS with Local CGA or with AIS	Perform Transmission Test. Verify RSM Site Service.
6	ACT	ACT	Perform host umbilical Connectivity Test.

NOTES on the preceding table

The **UCL** option ***should not be used*** in association with the restore command since it may affect service.

To perform the recovery actions listed, enter the following input messages or poke commands on either (1) MCC Display Page 1120 for DLTU parent circuits, or (2) MCC Display Page 1510 for DNU-S parent circuits, or (3) MCC Display Page 1511 for DNU-S STS higher-level facilities (STE, STS, or VT), or (4) MCC Display Page 1740 for host umbilicals.

If the RSM is hosted by a DLTU:

- Restore HDFI: **RST:DFI=A-X-YY** or **30XX**
- Restore HFAC or UMBIL (UMBIL is just a different way to reference the HFAC):
  RST:FAC=A-X-YY-Z or **31XXY** OR

RST:UMBIL=A-B-C or **3XX**

- Perform the host umbilical connectivity test:
  TST:FAC=A-X-YY-Z or **51XXY** OR
  TST:UMBIL=A-B-C or **5XX**

Where: **A** is the HSM number.
B is the RSM number.
C is the UMBIL number.
X is the DLTU number.
YY is the HDFI number.
Z is the HFAC number.

If the RSM is hosted by a DNU-S:

- Restore DNU-S CD if duplex failed:
  RST: DNUSCD=A-R-S-T or **31XY**
- Restore DNU-S SFI if duplex failed:
  RST:SFI=A-R-S-U or **32XY**
- Restore DNU-S TMUX if spare OOS:
  RST:TMUX=A-R-S-V or **33XY**
- Restore DNU-S EC1STE if OOS:
  RST:EC1STE=A-R-S-W or **34XY**
- Resore DNU-S STSFAC if OOS:
  RST:STSFAC=A-R-S-W-X or **3000**
- Restore DNU-S VT1FAC if OOS:
  RST:VT1FAC=A-R-S-W-X-Y-Z or **31XY**
- Restore DNU-S DS1SFAC or UMBIL (UMBIL is just a different way to reference a host DS1SFAC):
  RST:DS1SFAC:A-R-S-W-X-Y-Z or **32XY** OR
  RST:UMBIL:A-B-C or **3XX**
- Perform the host umbilical connectivity test:
  TST:UMBIL=A-B-C

Where: **A** is the HSM number.
B is the RSM number.
C is the UMBIL number.
R is the DNU-S number.
S is the Data group number.
T is the Common data number.
U is the STSX-1 facility interface number.
V is the TMUX number.
W is the SONET Termination Equipment (STE) facility number.
X is the Synchronous Transport Signal (STS) facility number.
Y is the Virtual tributary group (VTG) number.
Z is the Virtual tributary member (VTM) number.

Perform the host umbilical connectivity test: If test failed, then verify that the host umbilical is connected to the correct RDFI. Failure of this test indicates that the facility may have been incorrectly patched. Consequently, the HDFIs may not be connected to the correct RDFIs.

PROCEDURE

1. On the master control center (MCC) Display Page **1800,RSM** for remote switching module "RSM," is the RSM shown as **ISOLATED**?

   NOTE: To simplify this procedure, RSM status indications of ISOLATED, COMM LOST, STNDALONE, and INIT ISOL are referred to as **ISOLATED**.

   If **YES**, continue with Step 2.
   If **NO**, go to Step 89.

2. On MCC Display Page **1800,HSM** for host switching module "HSM," is the HSM shown as **ISOLATED**?

   If **YES**, continue with Step 3.
   If **NO**, go to Step 4.

3. Establish communication with the isolated HSM, once communication has been reestablished, continue with this procedure ***only*** if the RSM is still **ISOLATED**. If additional action is required see **Procedure 6.3** .

4. On MCC Display Page **1800,RSM**, enter command **403,NOSEP** to manually isolate the RSM.

   Response: **SET** present in box **03**. RSM status changes to **MAN ISOL**.

5. On MCC Display Page **1800,RSM**, enter command **503** to clear manual RSM isolation.

   Response: **SET** cleared from box 03. RSM status is no longer **MAN ISOL**.

6. Pause for a few minutes to allow the RSM to establish CLNKs while observing MCC Display Page **1800,RSM**.

   Is the RSM still shown as **ISOLATED**?

   If **YES**, continue with Step 7.
   If **NO**, go to Step 89.

7. At the digital cross connect (DSX) panel at the host office, verify that the facilities connecting the HSM are correctly connected. Verify that the plugs are fully inserted.

8. On MCC Display Page **1120,Z,HSM** for digital line trunk unit (DLTU) hosted umbilicals or MCC Display Page **1510/1511** for DNU-S hosted umbilicals, use the recovery actions specified by Table 6.4-1 to restore the host parent circuit(s) or use MCC Display Page **1740** to restore the host umbilicals connecting to the RSM.

9. On MCC Display Page **1800,RSM**, is the RSM still shown as **ISOLATED**?

   If **YES**, continue with Step 10.
   If **NO**, go to Step 89.

10. On MCC Display Page **1900,RSM**, is an active major **(ACT MAJOR)** office network and timing complex (ONTCCOM) shown?

If **YES**, go to Step 22.
If **NO**, continue with Step 11.

11. Enter poke **1201,1,HSM** to display the status of the HSM's dual link interfaces (DLIs) and TMSLNKs.

12. Is the DLI associated with the **MAJOR** ONTC powered down **(UNVP)** but capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 13.
    If **NO**, go to Step 14.

13. At DLI control and display pack, power up the DLI.

14. Is the DLI associated with the **MAJOR** ONTC out-of-service **(OOS)** but capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 15.
    If **NO**, go to Step 18.

15. Enter command **300,UCL** (for a DLI on ONTC side 0) or **301,UCL** (for a DLI on ONTC side 1) to unconditionally restore the OOS HSM DLI associated with the **MAJOR** ONTC.

16. Was the DLI restored successfully to the **ACTIVE** state?

    If **YES**, go to Step 18.
    If **NO**, continue with Step 17.

17. An RSM can only establish CLNKs via the **MAJOR** ONTC. Since the HSM's DLI on the **MAJOR** ONTC side did not restore successfully, the problem must be diagnosed/repaired or an ONTC switch must be performed before communication to the RSM can be established. Since the mate ONTC is also either OOS or degraded, refer to Procedures 5.4.2 , 5.4.3 , and 5.4.4 to diagnose/repair ONTC/DLI/TMSLNK problems. If communication still cannot be established after supporting hardware has been restored, return to Step 1.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

18. Is any TMSLNK on the **MAJOR** ONTC side out-of-service with an active parent DLI?

    If **YES**, continue with Step 19.
    If **NO**, go to Step 20.

19. Restore the OOS TMSLNKs using the input message **RST:TMSLNK=Y-Z** (where Y is the **MAJOR** ONTC side and Z is the TMSLNK number shown on the MCC display).

    If any TMSLNK does not restore successfully, continue with this procedure in order to reestablish communication to the isolated RSM. After completing this procedure, diagnose/repair the TMSLNK problem as described in Procedure 5.4.4 .

20. Are there any active TMSLNKs to the HSM on the **MAJOR** ONTC side?

    If **YES**, continue with Step 21.
    If **NO**, ONTCs/DLIs/TMSLNKs must be repaired and restored to service before communication can be established to the RSM. Refer to Procedures 5.4.2 , 5.4.3 , and 5.4.4 to diagnose and repair the necessary communication module hardware. If communication still cannot be established after supporting hardware has been restored, return to Step 1.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

21. On MCC Display Page **1900,RSM**, is the RSM still shown as **ISOLATED**?

    If **YES**, continue with Step 22.
    If **NO**, go to Step 89.

22. On MCC Display Pages **1240** and **1250**, is either message switch control unit (MSCU) shown as out-of-service or unavailable and capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 23.
    If **NO**, go to Step 24.

23. Attempt to restore the out-of-service or unavailable MSCU.

    If the MSCU has lost power, restore power to it.

    If the MSCU is forced unavailable, clear the MSCU force using the **CLR:FRC,MSCU** input message.

    Enter the **RST:MSCU=A,UCL** input message (where A is the MSCU side to restore).

    If the MSCU does not restore successfully, continue with this procedure in order to reestablish communication to the isolated RSM. After completing this procedure, diagnose/repair the MSCU problem as described in Procedure 5.4.1 .

24. On MCC Display Page **1900,RSM**, is any module message processor (MMP) under an active MSCU powered down **(UNVP)** but capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 25.
    If **NO**, go to Step 26.

25. Power up the MMP community containing the UNVP MMP.

26. On MCC Display Page **1900,RSM**, are any MMPs out-of-service **(OOS)** but capable of being restored successfully (no known problems and parent MSCU is active)?

    If **YES**, continue with Step 27.
    If **NO**, go to Step 28.

27. Enter the input message **RST:MMP=A-B,UCL** (where A is the MSCU side and B is the MMP number) to unconditionally restore the OOS MMP(s).

    If any MMP does not restore successfully, continue with this procedure in order to reestablish communication to the isolated RSM. After completing this procedure, diagnose/repair the MMP problem as described in Procedure 5.4.1 .

28. On MCC Display Page **1900,RSM**, are any MMPs shown as out-of-service family of equipment (OOSF)?

    If **YES**, continue with Step 29.
    If **NO**, go to Step 31.

29. Power down all MMP communities on the out-of-service MSCU side.

30. Power up all MMP communities powered down in the previous step.

31. On MCC Display Page **1900,RSM**, are there any active MMPs associated with this RSM?

If **YES**, go to Step 33.
If **NO**, continue with Step 32.

32. The MSCUs/MMPs must be repaired and restored to service before communication can be established to this RSM. Refer to Procedure 5.4.1 to diagnose and repair the necessary communication module hardware. If communication still cannot be established after supporting hardware has been restored, return to Step 1.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

33. On MCC Display Page **1900,RSM**, is the RSM still shown as **ISOLATED**?

    If **YES**, continue with Step 34.
    If **NO**, go to Step 89.

34. Enter the input message **INH:CLNORM** to inhibit CLNK normalization.

    Response: An **INH CLNORM COMPLETED** output message prints. Box **08** on MCC Display Page **110** indicates that CLNORM is inhibited.

35. Enter the input message **ALW:CLNORM** to allow CLNK normalization.

    Response: An **ALW CLNORM COMPLETED** output message prints. Box **081** on MCC Display Page **110** indicates that CLNORM is allowed.

    Pause for a minute to allow CLNK normalization to occur.

36. On MCC Display Page **1900,RSM**, is the RSM still **ISOLATED**?

    If **YES**, continue with Step 37.
    If **NO**, go to Step 89.

37. On MCC Display Page **1900,RSM**, is any CLNK shown in the **INIT** state?

    If **YES**, continue with Step 38.
    If **NO**, go to Step 39.

38. Enter command **2XYZ** to remove *each* CLNK in the INIT state to an OOS state.

    Where: XYZ = The 3-digit CLNK number.

39. On MCC Display Page **1900,RSM**, identify the **MAJOR** ONTC. Select a CLNK XYZ that is associated with **MAJOR** ONTC X to restore manually.

    Where: X = MAJOR ONTC side.

40. On MCC Display Page **1900,RSM**, enter command **3XYZ** to manually restore the selected CLNK.

    Where: XYZ = The 3-digit CLNK number.

41. Pause for a minute to allow the CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

Is the RSM still **ISOLATED**?

If **YES**, continue with Step 42.
If **NO**, go to Step 89.

42. If the restored CLNK remains in the **INIT** state, enter command **2XYZ** to manually remove the CLNK.

    Where: XYZ = The 3-digit CLNK number.

43. Has an attempt been made to manually restore each CLNK associated with the **MAJOR** ONTC on MCC Display Page **1900,RSM**?

    If **YES**, go to Step 44.
    If **NO**, select a different CLNK associated with the **MAJOR** ONTC to restore manually, and repeat from Step 40.

44. Has an attempt been made to manually restore each CLNK on both ONTC sides?

    If **YES**, go to Step 51.
    If **NO**, continue with Step 45.

45. On MCC Display Page **1209**, is the mate ONTC (*not* the major ONTC) out-of-service **(OOS)** but capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 46.
    If **NO**, go to Step 48.

46. On MCC Display Page **1209**, enter command **30X,UCL** to manually restore the OOS ONTC, and wait for the restore to complete.

    Where: X = OOS ONTC side.

47. On MCC Display Page **1209**, what is the state of the restored ONTC?

    If **ACT MAJ**, repeat from Step 36 with the new **MAJOR** ONTC.
    If **ACT MIN**, go to Step 49.
    If any other state, go to Step 51.

48. On MCC Display Page **1209**, is the mate ONTC shown as **ACT MIN**?

    If **YES**, continue with Step 49.
    If **NO**, go to Step 51.

49. On MCC Display Page **1209**, enter command **403** to switch the ONTCs.

50. Did the ONTC switch complete successfully?

    If **YES**, repeat from Step 36 with the new **MAJOR** ONTC.
    If **NO**, go to Step 51.

51. On MCC Display Page **1900,RSM**, is the RSM still shown as **ISOLATED**?

    If **YES**, continue with Step 52.
    If **NO**, go to Step 89.

52. On MCC Display Page **1800,RSM**, enter the following input message to clear module controller time slot interchanger (MCTSI) forces on the RSM:

    ORD:CPI=X,CMD=CLR,UCL;

    Where: X = The RSM number.

    NOTE: Enter this command even if MCC Display Page **1800,RSM** does not indicate that a force is in effect. Two different output message responses are possible.

    Response:

    ORD CPI X CMD CLR COMPLETED

    Or:

    ORD CPI X CMD CLR NOT COMPLETED

    UNIT RESULT

    X STATUS UNKNOWN

    Where: X = The RSM number.

    Pause for a minute to allow the RSM to attempt to reestablish communication.

53. Is the RSM status still **ISOLATED**?

    If **YES**, continue with Step 54.
    If **NO**, go to Step 89.

54. On MCC display Page **1800,RSM**, enter the poke command **705,UCL** to allow the RSM sanity timer. Enter this command even if MCC Display Page **1800,RSM** does not indicate that the sanity timer is inhibited. Two different output message responses are possible.

    Response:

    ORD CPI X CMD ALW COMPLETED

    Or:

    ORD CPI X CMD ALW NOT COMPLETED

    UNIT RESULT

    X STATUS UNKNOWN

    Where: X = The RSM number.

    Pause for a minute to allow the RSM to attempt to reestablish communication.

55. Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 56.
    If **NO**, go to Step 89.

56. Go to the RSM site to recover the RSM.

57. Check the power fuses. Replace bad fuses if necessary.

58. At the DSX panel at the RSM site, verify that the facilities connecting the RSM are correctly connected. Verify

that the plugs are fully inserted.

59. At the facility interface unit (FIU) packs, are any FIUs to the isolated RSM pulled out of position?

    If **YES**, continue with Step 60.
    If **NO**, go to Step 62.

60. At the FIU packs, plug in each pulled FIU pack.

61. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 62.
    If **NO**, go to Step 89.

62. At DLI 0 control and display pack, power down DLI 0.

63. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 64.
    If **NO**, go to Step 89.

64. At DLI 0 control and display pack, power up DLI 0.

65. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 66.
    If **NO**, go to Step 89.

66. At DLI 1 control and display pack, power down DLI 1.

67. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 68.
    If **NO**, go to Step 89.

68. At DLI 1 control and display pack, power up DLI 1.

69. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 70.
    If **NO**, go to Step 89.

70. Press the CI1 key on the monitor panel of the RSM.

71. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 72.
    If **NO**, go to Step 89.

72. Press the CI0 key on the monitor panel of the RSM.

73. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 74.
    If **NO**, go to Step 89.

74. At MCTSI 0 control and display pack, power down MCTSI 0.

75. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 76.
    If **NO**, go to Step 89.

76. At MCTSI 0 control and display pack, power up MCTSI 0.

77. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 78.
    If **NO**, go to Step 89.

78. At MCTSI 1 control and display pack, power down MCTSI 1.

79. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 80.
    If **NO**, go to Step 89.

80. At MCTSI 1 control and display pack, power up MCTSI 1.

81. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

If **YES**, continue with Step 82.
If **NO**, go to Step 89.

82. At the DLTU shelf of the indicated RSM, reseat the RDFI packs connecting to the HSM.

83. Pause for a minute to allow a CLNK to be established and the MCC display to be updated. Then check the RSM status on MCC Display Page **1900,RSM**.

    Is the RSM still **ISOLATED**?

    If **YES**, continue with Step 84.
    If **NO**, go to Step 89.

84. Replace RDFI packs with DFI packs that are known to be good.

85. Are the peripheral interface control buses (PICBs), peripheral interface data buses (PIDBs), and facility interface data buses (FIDBs) intact and connected correctly?

    If **YES**, go to Step 87.
    If **NO**, reconnect the misplaced wires.

86. Go to Step 62.

87. On MCC Display Page **1900,RSM**, is the RSM still shown as **ISOLATED**?

    If **YES**, continue with Step 88.
    If **NO**, go to Step 89.

88. The RSM is unable to establish or maintain communication.

    Seek technical assistance.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

89. On MCC Display Page **1900,RSM**, are any CLNKs shown as **ACT**?

    If **YES**, continue with Step 90.
    If **NO**, go to Step 91.

90. Communication to the RSM has been reestablished successfully.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

91. The RSM is unable to establish or maintain communication.

    Seek technical assistance.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 6.5: OFF-LINE PUMP FOR VERIFICATION OF SM/SM-2000 FILES ON DISK

OVERVIEW

The term switching module/switching module-2000 (SM/SM-2000) as used in this procedure refers to all modules; local SMs (LSMs), host SMs (HSMs), remote SMs (RSMs), etc. This is a general procedure that can be used to validate an SM/SM-2000 image or office dependent data (ODD) on the AM disk. This procedure will perform an off-line pump of the module processor of one SM/SM-2000, a range of SM/SM-2000s, or all SM/SM-2000s in the office. This procedure does **not** involve switching the active side of the SM/SM-2000 to the side which is off-line pumped.

PROCEDURE

1. Save original status of all message classes:

   MSG: **CHG:LPS,MSGCLS=ALL,TOBKUP;**

   Response: **OK**

2. Turn all message classes on:

   MSG: **CHG:LPS,MSGCLS=ALL,PRINT=ON;**

   Response: **OK**

3. Inhibit REX:

   MSG: **INH:REX;**

   Response: **OK**

4. On MCC Page 1950, enter command **9103** to display temporary SU(s).

   Response: In field adjacent to poke 9103, **IN PROGRESS** backlights followed by either **COMPLETED** or **ABORTED**.

   Comment: **COMPLETED** followed by an output list of SUs to the ROP indicates there may be temporary SUs active within the switch. If all SUs have been made official, then no temporary SU is active within the switch. In addition, MCC Page 1940 or MCC Page 1960 can be accessed to ensure there are no temporary SUs.

   ABORTED most likely indicates there are either no temporary SUs in the switch (UPD USRERR 4 on ROP) or no SUs in the switch at all (UPD USRERR 1 on ROP).

5. If any SU(s) are in a temporary state, they must be made official or backed out.

   Reference: 235-105-210, *Routine Operations and Maintenance.*

6. If CM system status indicator is not normal, go to master control center (MCC) Page 1209 and ensure the

office network and timing complexes (ONTC) are ACTIVE MAJOR/MINOR before proceeding.

7. Check all SM/SM-2000s to be off-line pumped for duplex communication links (CLNK).

   (a) Access the MCC Page 115. If the 1260 box is not backlighted (that is, all CLNKs are normal and duplexed), go to Step 8. If the box is backlighted, some or all CLNKs have an off-normal status. Access MCC Page 1260 and note the SM/SM-2000(s) which have the off-normal CLNKs.

   (b) Go to MCC Page 1900,**x** where **x** is the number of the SM/SM-2000 whose CLNKs are off-normal. Then restore the CLNKs of that SM/SM-2000 with the message:

   MSG: **RST:CLNK=w-x-y-z;**

   Where: w = SM/SM-2000 number.
   x = Office Network Timing Complex (ONTC) number.
   y = Module Message Processor (MMP) number.
   z = Message Switch Side (MSGS).

   Response: **RST CLNK=w-x-y-z COMPLETED**

   CAUTION: If you are unable to restore the CLNKs, seek technical assistance.

8. ***NOTE:*** If any module controller/time slot interchange unit (MCTSI) is out of service (OOS) in any SM/SM-2000 that is to be off-line pumped, it must be restored to service **before** continuing with this procedure.

   Determine the status of the MCTSIs by either of the following methods:

   (a) Using MCC Page **1190,x** (where x = number of an SM/SM-2000), verify that the MCTSIs in all SM/SM-2000s being off-line pumped are either active (ACT) or standby (STBY).

   or

   (b) Type in:

   MSG: **OP:SYSSTAT,UCL;**

   Response: **OP SYSSTAT SUMMARY LAST RECORD**
   SYS: NORMAL
   AM: NORMAL
   w x y,z: .... (repeated for each SM/SM-2000)

   Where: w = B (Basic), S (Standard), L (Loaded) or K (SM-2000).
   x = LSM (local SM), HSM (host SM), RSM (remote SM), ORM (optically remote module), or TRM (2-mile optically remote module).
   y = SM/SM-2000 number.
   z = Active MCTSI in SM/SM-2000 y.

   NOTE: If the status printed for an SM/SM-2000 which is to be off-line pumped includes **MATE_OOD** or **MATE_PUMP**, one of its MCTSIs is OOS and must be restored. Access Page **1190,x** and restore the appropriate MCTSI.

9. Ensure no off-normal status is indicated for any SM/SM-2000 which is to be off-line pumped. After the

SM/SM-2000s are duplex, enter the **OP:SYSSTAT,UCL** message again.

CAUTION: Do not proceed to the next step until the MCTSIs of the SM/SM-2000s to be off-line pumped are either active (ACT) or standby (STBY), and all SM/SM-2000s to be off-line pumped have duplex CLNKs.

10. To switch and force the MCTSI for **all** SM/SM-2000s, go to Substep (a).
To switch and force the MCTSI for a **range** of SM/SM-2000s, go to Substep (b).
To switch and force the MCTSI for **one** SM/SM-2000, go to Substep (c).

(a) To switch and force MCTSI Side 0 active for **all** SM/SM-2000s, enter message:

MSG: **ORD:CPI=1&&192,CMD=SW-0;**

Response: **ORD CPI 192 CMD SW 0 COMPLETED**
On MCC Pages 141, 142, etc., all SM/SM-2000s should indicate **FORCED.**

If the switch and force is successful, go to Step 11.

If this message fails, repeat Substep (a) for efficiency since this message broadcasts the "CPI" command to all SM/SM-2000s simultaneously. If it fails a second time, proceed to Substep (b) for a range of SM/SM-2000s; but do not use the range **1&&192** since it may not give the deemed results. For all SM/SM-2000s, **1&&191** should be used for Substep (b) and then Substep (c) should be use for SM/SM-2000 **192**.

(b) To switch and force MCTSI Side 0 active for a **range** of SM/SM-2000s, enter message:

NOTE: This message has a 15-second *delay* between sending the "CPI" command to each SM/SM-2000.

MSG: **ORD:CPI=x&&y,CMD=SW-0,UCL;**

Where: x = *lower* bound of SM/SM-2000 range.
y = *higher* bound of SM/SM-2000 range.

Response: **ORD CPI** z **CMD SW 0 COMPLETED** (repeated for each SM/SM-2000)

Where: z = SM/SM-2000 number.

If the switch and force is successful, go to Step 11.

If it fails, proceed to Substep (c) for each failing SM/SM-2000.

(c) To switch and force a **single** SM/SM-2000, enter message:

MSG: **ORD:CPI=**x**,CMD=SW-0,UCL;**

Where: x = SM/SM-2000 number.

Response: **ORD CPI** x **CMD SW 0 COMPLETED**

If the switch and force is successful, go to Step 11.

If it fails, proceed to Substep (d) for the failing SM/SM-2000.

(d) For any SM/SM-2000 that fails to switch and force, enter message:

MSG: **SET:MCTSI=**x**-0,FRC;**

Where: x = SM/SM-2000 being recovered.

Response: **SET MCTSI=**x**-0 COMPLETED**

11. Enter the **OP:SYSSTAT,UCL** message to verify that the MCTSI is switched and forced active on the targeted SM/SM-2000(s) in Step 10. Each SM/SM-2000 to be off-line pumped should have a status of **FORCED**.

12. **THIS IS IMPORTANT.** If any SM/SM-2000 that is to be off-line pumped fails the MCTSI switch (Step 10), record the SM/SM-2000 number, analyze the problem, and resolve it before continuing. **Seek technical assistance if necessary.**

13. To off-line pump **one** SM/SM-2000, go to Substep (b).
To off-line pump **all** SM/SM-2000s or a **range** of SM/SM-2000s, continue with Substep (a).

(a) To off-line pump **all** SM/SM-2000s or a **range** of SM/SM-2000s in the office:

MSG: **ST:OPUMP,SM=**x**&&**y**,ACTDISK,VFY,NPERF;**

Where: x = *Lower* bound of SM/SM-2000 range.
y = *Higher* bound of SM/SM-2000 range.

NOTE: For **all** SM/SM-2000s, set x = 1 and y = 192.

Response: **REPT SM=x OFFLINE PUMP COMPLETED**
. . .
REPT SM=y OFFLINE PUMP COMPLETED

(b) To perform an off-line pump for **one** SM/SM-2000, enter message:

MSG: **ST:OPUMP,SM=**x**,ACTDISK,VFY,NPERF;**

Where: x = SM/SM-2000 number

Response: **REPT SM=**x **OFFLINE PUMP COMPLETED**

14. Verify that the SM/SM-2000(s) off-line pumped correctly.

Use MCC Pages 181, 182, etc., to view the off-line pump status for the SM/SM-2000(s). Table 6.5-1 shows the different states of the mate memory that will be output on MCC Page 181 during off-line pump.

Table 6.5-1 Status of Mate Memory for Off-Line Pump Using MCC Page 181

STATUS	DESCRIPTION
OPUMPHLDn	Off-line pump hold, nth attempt **(n= 1 to 4)**
OPUMPn	Off-line pumping, nth attempt **(n= 1 to 4)**
OHASHCKn	Off-line pump hashsum check, nth attempt **(n= 1 to 4)**
OVRFYm	Off-line verifying, mth minute **(m= 1 to 10)**
OVRFIED	Off-line verification complete
MATE_PUMP	Off-line pump is complete
OPBCPHLDs	Off-line broadcast pump hold, sth stage **(s= 1 or 2)**

OPBCPODD	Off-line broadcast pump, ODD stage
OPBCPRELO	Off-line broadcast pump relocatable images stage
OPORELOC	Off-line image relocation
OPBCPTEXT	Off-line broadcast pump text stage
OPUMPERFp	Off-line pumping peripherals, pth peripheral **(p= 1 to 8)**
ORST	Duplex peripherals restoring
OPUMPFAIL	Off-line SM pump failed
OVFYFAIL	Off-line verification failed
ORELOFAIL	Off-line broadcast pump of relocatable images failed
OPERFFAIL	Off-line peripheral pump failed
OPERF_OOD	Off-line peripheral out of date
ORSTFAIL	Failure to restore a peripheral

15. **THIS IS IMPORTANT.** Ensure that all SM/SM-2000s that were off-line pumped indicate **MATE PUMP** before proceeding. If the SM/SM-2000s indicates **ORELOFAIL, OPUMPFAIL,** or **OVFYFAIL**, go to Step 13 and retry the off-line pump of that SM/SM-2000. If the off-line pump fails the second time, analyze the problem and resolve it before continuing with the current procedure. **Seek technical assistance if necessary.**

16. ***NOTE:*** At this point, either one SM/SM-2000, a range of SM/SM-2000s, or all of the SM/SM-2000s (depending on the use of this procedure) have been successfully off-line pumped and verified. The remaining steps involve clearing the force and restoring the MCTSI.

To clear the force in **all** SM/SM-2000s, go to Substep (a).
To clear the force in a **range** of SM/SM-2000s, go to Substep (b).
To clear the force in **one** SM/SM-2000, go to Substep (c).

(a) To clear the force in **all** SM/SM-2000s, enter the message:

MSG: **ORD:CPI=1&&192,CMD=CLR;**

Response: **ORD CPI 192 CMD SW 0 COMPLETED**

If clearing the force is successful, go to Step 17. If this message fails, repeat Substep (a) for efficiency since this message broadcasts the "CPI" command to all SM/SM-2000s simultaneously. If it fails a second time, proceed to Substep (b) for a range of SM/SM-2000s; but do not use the range **1&&192** since it may not give the deemed results. For all SM/SM-2000s, **1&&191** should be used for Substep (b) and then Substep (c) should be use for SM/SM-2000 **192**.

(b) To clear the force for a **range** of SM/SM-2000s, enter the message:

NOTE: This message has a 15-second *delay* between sending the "CPI" command to each SM/SM-2000.

MSG: **ORD:CPI=x&&y,CMD=CLR,UCL;**

Where: x = *Lower* bound of SM/SM-2000 range.
y = *Higher* bound of SM/SM-2000 range.

Response: **ORD CPI z CMD CLR COMPLETED** (repeated for each SM/SM-2000)

Where: z = SM/SM-2000 number.

If the switch and force is successful, go to Step 17.

If it fails, proceed to Substep (c) for each failing SM/SM-2000.

(c) To clear the force in a **single** SM/SM-2000, enter message:

MSG: **ORD:CPI=x,CMD=CLR,UCL;**

Where: x = SM/SM-2000 number.

Response: **ORD CPI x CMD CLR COMPLETED**

If clearing the force is successful, go to Step 17.

If it fails, proceed to Substep (d).

(d) If an SM/SM-2000 still fails to clear the force, enter message:

MSG: **CLR:MCTSI=x,FRC;**

Where: x = SM/SM-2000 number.

Response: **CLR MCTSI=**x **COMPLETED**

17. To duplex the MCTSI for **all** or a **range** of SM/SM-2000s, go to Substep (a).
To duplex the MCTSI for **one** SM/SM-2000, go to Substep (b).

(a) To duplex the MCTSIs in **all** SM/SM-2000s or a **range** of SM/SM-2000s:

MSG: **RST:MCTSI=x&&y-1,STBY,UCL;**

Where: x = *Lower* bound of SM/SM-2000 range.
y = *Higher* bound of SM/SM-2000 range. ***Note:*** For **all** SM/SM-2000s, set x = 1 and y = 192.

Response: **RST MCTSI=z-1 COMPLETED** (repeated for each SM/SM-2000 being duplexed)

Where: z = Number of the SM/SM-2000 that was duplexed.

If the MCTSIs are restored, proceed to Step 19.

If any MCTSI fails to be restored, proceed to Substep (c).

(b) To duplex the MCTSIs in one SM/SM-2000:

MSG: **RST:MCTSI=x-1,STBY,UCL;**

Where: x = SM/SM-2000 number.

Response: **RST MCTSI=x-1 COMPLETED**

If the MCTSI is restored, proceed to Step 19.

If any MCTSI that still fails to be restored, proceed to Substep (c).

(c) For any MCTSI that fails to duplex, duplex that MCTSI by entering the message:

MSG: **RST:MCTSI=x-1,STBY;**

Where: x = SM/SM-2000 number.

Response: **RST MCTSI=x-1 COMPLETED**

18. Allow REX:

    MSG: **ALW:REX;**

    Response: **OK**

19. Restore original status of all message classes.

    MSG: **CHG:LPS,MSGCLS=ALL,FROMBKUP;**

    Response: **OK**

20. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 6.6: OFF-LINE PUMP FOR RECOVERY OF A FUNCTIONAL SM/SM-2000

OVERVIEW

The term switching module/switching module-2000 (SM/SM-2000) as used in this procedure refers to all modules; local SMs (LSMs), host SMs (HSMs), remote SMs (RSMs), etc. This procedure involves a switch of the active side of the SM/SM-2000 to the side which is off-line pumped. The procedure is used to perform an off-line pump of an SM/SM-2000 to restore the SM/SM-2000 image when large scale corruption of the SM/SM-2000 image is suspected, or when the SM-2000 Message Handler (MH) is degraded (indicated by MHDGRD SM status.) This procedure can be performed on multiple SM/SM-2000s concurrently by specifying a range of SM/SM-2000s on the SM/SM-2000 specific input commands.

CAUTION: This procedure should only be performed under the direction of Customer Technical Support (CTS) since it results in a loss of the following:

- Call processing
- Billing data for existing calls
- Some calls.

NOTE: The DBshpage tool may be used to detect shared data pages and report references to illegal data pages. This tool is run only on the disk ODDs, for example, at the MCC terminal type and enter:

- EXC:ENVIR:UPROC,FN="/no5text/rcv/DBshpage", ARGS="/no5odd/smdata1/imodd*xx*.out" (where *xx* = SM number)
  or
- EXC:ENVIR:UPROC,FN="/no5text/rcv/DBshpage", ARGS="/no5odd/cidata/imrodd.out"
  or
- EXC:ENVIR:UPROC,FN="/no5text/rcv/DBshpage", ARGS="/no5odd/data0/cmpodd.out"

If errors are detected, do not perform the off-line pump until the errors are resolved by a 5ESS-2000 data base expert.

PROCEDURE

1. Access **MCC Page 197.** Check to see if cutover has been enabled. If it has been enabled, ***do not*** continue with this procedure. **Seek technical support.**

2. On **MCC Page 1950**, enter command **9103** to display temporary software updates SU(s).

   Response: In field adjacent to poke 9103, **IN PROGRESS** backlights followed by either **COMPLETED** or **ABORTED**.

   Comment: **COMPLETED** followed by an output list of SUs to the ROP indicates there may be temporary SUs active within the switch. If all SUs have been made official, then no temporary SU is active within the switch. In addition, **MCC Page 1940** or **MCC Page 1960** can be accessed to ensure there are no temporary SUs.

   ABORTED most likely indicates there are either no temporary SUs in the switch (UPD

USRERR 4 on ROP) or no SUs in the switch at all (UPD USRERR 1 on ROP).

3. If any SU(s) are in a temporary state, they must be made official or backed out.

   Reference: 235-105-210, *Routine Operations and Maintenance.*

4. If CM system status indicator is not normal, go to **MCC Page 1209** and ensure the office network and timing complexes (ONTC) are ACTIVE MAJOR/MINOR before proceeding.

5. Check the SM/SM-2000 for duplex communication links (CLNK).

   (a) Access the **MCC Page 1900**,*x* where *x* is the SM/SM-2000 being recovered. Check to see if the CLNKs for that SM/SM-2000 are normal and duplex.

   (b) If they are off-normal, restore the CLNKs of that SM/SM-2000, enter: **RST:CLNK=***w***-***x***-***y***-***z***;**

   Where: *w* = SM/SM-2000 being recovered.
   x = Office Network Timing Complex (ONTC) number.
   y = Module Message Processor (MMP) number.
   z = Message Switch Side (MSGS).

   Response: **RST:CLNK=***w***-***x***-***y***-***z* **COMPLETED**

CAUTION: If unable to restore the CLNKs, seek technical assistance.

6. Inhibit Recent Change, enter: **INH:RC;**

7. Inhibit REX, enter: **INH:REX;**

   Response **OK**

8. Inhibit hardware checks in the SM/SM-2000, enter: **INH:HDWCHK,SM=***x***;**

   Where: *x* = SM/SM-2000 being recovered.

   Response: **INH HDWCHK SM=***x* **COMPLETED**

NOTE: The response may take a few minutes.

9. Inhibit software checks in the SM/SM-2000, enter: **INH:SFTCHK,SM=***x***;**

   Where: *x* = SM/SM-2000 being recovered.

   Response: **OK**

10. Manually force the active MCTSI side, enter: **SET:MCTSI=***x***-***y***,FRC;**

    Where: *x* = SM/SM-2000 being recovered.
    y = Currently active MCTSI side.

    Response: **SET MCTSI=***x***-***y* **COMPLETED**

11. Perform an off-line pump of the SM/SM-2000 specified, enter: **ST:OPUMP,SM=*x*,ACTDISK,VFY,PERF;**

    Where: *x* = SM/SM-2000 being recovered.

    Response: **REPT SM=*x* OFFLINE PUMP COMPLETED**

    NOTE: The PERF option results in integrated services line unit (ISLUs) and integrated digital carrier unit (IDCUs) put in simplex mode.

12. Verify that the SM/SM-2000 off-line pumped correctly.

    Use **MCC Pages 181, 182,** etc., to view the off-line pump status for the SM/SM-2000. Table 6.6-1 shows the different states of the mate memory that are displayed on **MCC Page 181** during off-line pump.

Table 6.6-1 Status of Mate Memory for Off-Line Pump Using MCC Page 181

STATUS	DESCRIPTION
OPUMPHLDn	Off-line pump hold, nth attempt **(n= 1 to 4)**
OPUMPn	Off-line pumping, nth attempt **(n= 1 to 4)**
OHASHCKn	Off-line pump hashsum check, nth attempt **(n= 1 to 4)**
OVRFYm	Off-line verifying, mth minute **(m= 1 to 10)**
OVRFIED	Off-line verification complete
MATE_PUMP	Off-line pump is complete
OPBCPHLDs	Off-line broadcast pump hold, sth stage **(s= 1 or 2)**
OPBCPODD	Off-line broadcast pump, ODD stage
OPBCPRELO	Off-line broadcast pump relocatable images stage
OPORELOC	Off-line image relocation
OPBCPTEXT	Off-line broadcast pump text stage
OPUMPERFp	Off-line pumping peripherals, pth peripheral **(p= 1 to 8)**
ORST	Duplex peripherals restoring
OPUMPFAIL	Off-line SM pump failed
OVFYFAIL	Off-line verification failed
ORELOFAIL	Off-line broadcast pump of relocatable images failed
OPERFFAIL	Off-line peripheral pump failed
OPERF_OOD	Off-line peripheral out of date
ORSTFAIL	Failure to restore a peripheral

13. **THIS IS IMPORTANT.** If the SM/SM-2000 indicates **MATE PUMP**, go to Step 16. If the SM/SM-2000 indicates **OPERFFAIL**, go to Step 14. If the SM/SM-2000 indicates **OPUMPFAIL, OVFYFAIL**, or **ORELOFAIL**, go to Step 11 and retry the off-line pump of that SM/SM-2000. If the off-line pump fails the second time, analyze the problem and resolve it before continuing with the current procedure. **Seek technical assistance if necessary.**

14. Perform an off-line peripheral pump of the SM/SM-2000 specified, enter: **ST:OPUMP,SM=*x*,PERF;**

    Where: *x* = SM/SM-2000 being recovered.

    Response: **REPT SM=*x* OFFLINE PERIPHERAL PUMP COMPLETED**

15. If the SM/SM-2000 indicates **MATE PUMP**, go to Step 16. If off-line peripheral pump fails the second time, analyze the problem and resolve it before continuing with the current procedure. **Seek technical assistance if necessary.**

16. Flush AMA data from SM/SM-2000 to AM where it is written to disk, enter: **WRT:AMADATA;**

    Response: **WRT AMA DATA HAS BEEN WRITTEN TO DISK**
    READY TO TRANSFER DATA FROM DISK TO OUTPUT MEDIUM

NOTE: Additional output messages including a critical alarm, processor recovery message (PRMs), and reports can be expected on the receive-only printer (ROP).

17. **CAUTION:** Switching to the off-line pumped side has a series of side effects. Some of these are as follows:

    - Loss of call processing for several minutes during Generic Retrofit Selective Init
    - Loss of billing data for existing calls
    - Loss of some calls.
    - All Recent Changes may not automatically roll forward
    - The auto pump is inhibited.
    - Many of the messages that appear on the ROP indicate this is part of the retrofit process, even though this is not the case.
    - The appllog file which is used by retrofit is not automatically cleaned up.

    NOTE: This step should be performed ***only*** under the direction of customer technical support.

    Access the **MCC Page 1800,***x* where *x* is the number of the SM/SM-2000 that was off-line pumped. Remain on this page to monitor that the switch completes successfully.

    Switch the SM/SM-2000 that was off-line pumped.

    If active side equals 0, enter: **UPD:GEN:SMSWITCH,SM=***x***,UCL;**
    If active side equals 1, enter: **UPD:GEN:SMBKOUT,SM=***x***,UCL;**

    Where: *x* = SM/SM-2000 being recovered.

    Response: If active side equals 0, **UPD GEN SMSWITCH COMPLETED SUCCESSFULLY**
    If active side equals 1, **UPD GEN SMBKOUT COMPLETED SUCCESSFULLY**

    Ensure that the MCTSI side has switched on the **MCC Page 1800,***x* where *x* is the number of the SM/SM-2000 that was off-line pumped.

18. **THIS IS IMPORTANT.** Before continuing, make sure the SM/SM-2000 is not continually initializing, and that calls are being processed by performing call-through tests. If the SM/SM-2000 is not processing calls, do not continue with this procedure, but **escalate to the next level of support.** Should any HASH ERRORs occur from this point on, seek **technical support**.

    Verify the event history data has been printed to the ROP. If the event history is not automatically printed, enter: **OP:POSTMORT,SM=***x***;**

    Where: *x* = SM/SM-2000 being recovered.

    NOTE: Not all call-through tests may pass until recent changes are rolled forward.

19. Roll forward recent changes, enter: **EXC:ODDRCVY=ALL,SM=***x***;**

Where: *x* = SM/SM-2000 being recovered.

Response: **EXC ODDRCVY=ALL SM=*x* NON-FATAL ERRORS=*y* COMPLETED**

Where: *y* = The number of recent change roll forward errors, which is typically 0.

20. **CAUTION:** If the current state of the switch is not desired, do not proceed with this procedure since switching back is not possible. to switch back. Seek technical support if necessary.

Clear the MCTSI force, enter: **CLR:MCTSI=*x*,FRC;**

Where: *x* = SM/SM-2000 being recovered.

Response: **CLR MCTSI=*x* COMPLETED**

21. Allow auto pump in the SM/SM-2000, enter: **ALW:PUMP,SM=*x*;**

Where: *x* = SM/SM-2000 being recovered.

Response: **OK**

22. Allow software checks in the SM/SM-2000, enter: **ALW:SFTCHK,SM=*x*;**

Where: *x* = SM/SM-2000 being recovered.

Response: **OK**

23. Allow hardware checks in the SM/SM-2000, enter: **ALW:HDWCHK,SM=*x*;**

Where: *x* = SM/SM-2000 being recovered.

Response: **ALW HDWCHK SM=*x* COMPLETED**

NOTE: The response may take a few minutes.

24. Remove the appllog file which is created while performing the switch. If this file is not removed, any future Retrofit procedures fails during the Retrofit Begin stage. Enter the following: **CLR:FILESYS,FILE,FN="/etc/log/appllog";**

Response: **CLR FILESYS FILE COMPLETED**

25. Restore the peripherals since they were off-line pumped when the "PERF" option was used with the "ST:OPUMP" command in Step 11. Enter the following: **RST:PERF,SM=*x*;**

Where: *x* = SM/SM-2000 being recovered.

Response: **REPT RST PERF=*x* COMPLETED**

NOTE: This response is only printed for SM/SM-2000s equipped with one or more of the following: ISLU, IDCU, or Digital Network Unit - SONET (DNU-S).

26. Access the **MCC Page 1190,***x* where *x* is the number of the SM/SM-2000 that was just off-line pumped. If the bootstrapper is displayed and out of service (OOS), restore the bootstrapper by entering the following command: **RST:BTSR=***x***,UCL;**

    Where: *x* = SM/SM-2000 being recovered.

    Response: **RST BTSR=***x* **COMPLETED**

27. Duplex the MCTSI, enter: **RST:MCTSI=***x***-***y***,STBY;**

    Where: *x* = SM/SM-2000 being recovered.
    y = OOS MCTSI (0 or 1) number.

    Response: **RST MCTSI=***x***-***y* **COMPLETED**

28. Allow Recent Change, enter: **ALW:RC;**

29. Allow REX, enter: **ALW:REX;**

    Response **OK**

30. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 6.7: IDCU DUPLEX FAILURE

OVERVIEW

The intent of this procedure is to resolve Integrated Digital Carrier Unit (IDCU) duplex fail conditions and to identify carrier system faults that result in a service interruption. This procedure requires maintenance personnel to diagnose the IDCU and to investigate potential digital facilities problems. While the diagnostics can be executed from the master control center (MCC) and/or a Trunk Line Work Station (TLWS), facility problems may require an on-site inspection. When working to resolve IDCU functionality problems, support personnel should set the verbose flag on the switching module/switching module-2000 (SM/SM-2000) inhibit and recovery Display Page **1800,x** and utilize the fault recovery messages forwarded to the receive-only printer (ROP).

NOTE: Due to potential EMI emissions, all DS1 facilities connected to an IDCU are required to be properly terminated. DS1s that are connected to a remote terminal or digital cross-connect (DSX) are properly terminated.

Proper termination for an unassigned DS1 can be provided by looping transmit to receive or providing a 100-ohm resistive connection between tip and ring of the transmit line.

PROCEDURE

1. ***NOTE:*** This procedure is associated with a service outage, therefore, the craft person should seek technical assistance per local procedures and/or contact the Electronic Switching Action Center (ESAC). If the problem persists or if manual action is necessary for recovery then the craft person or the technical support center should contact Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], while continuing to follow this procedure. Lucent Technologies support (RTAC or CTS) can provide additional support, if necessary, to resolve the problem. Lucent Technologies support should be contacted no later than 30 minutes after the start of a service outage triggered by an IDCU duplex failure.

Verify IDCU hardware reliability by performing an integrity check on IDCU service groups (SG) zero and one. If a diagnostic failure is detected in either SG, utilize the suspected faulty hardware list when replacing circuit packs. If both SGs fail diagnostics, update the standby or out-of-service (OOS) module controller/time slot interchange (MCTSI) to the active state and repeat the test.

Enter the following command (poke or manual request) to restore IDCU SG 0. If SG 0 is diagnosed and restored to the in-service active state, enter the following command to restore IDCU SG 1.

IDCU Display Page 1860,y,z

Where: y = IDCU unit number
z = SM/SM-2000 number

or

RST:IDCU=z-y-0 (restore IDCU SG 0)

RST:IDCU=z-y-1 (restore IDCU SG 1)

NOTE: If at least one SG is upgraded to the in-service active state and if electrical line interface (ELI) #0 and #1 is also active, verify whether IDCU functionality has returned.

2. Restore the ELIs that are OOS by entering the following:.

   RST:IDCUELI=z-y-0 (restore IDCU ELI 0)

   RST:IDCUELI=z-y-1 (restore IDCU ELI 1)

   NOTE: Each ELI provides a carrier interface for up to 20 DS1 systems. When the ELI is OOS, the carrier systems assigned to the ELI are unterminated; and a service interruption exists until the ELI is returned to the in-service active state.

3. Investigate the cause of a Carrier Group Alarm (CGA). Identify what type of carrier interfaces exists between the ELI and remote systems. Pursue potential problems with the ELI circuit packs and the transmission facilities.

   Determine whether the CGA is caused by a local or outside plant (remote) problem.

4. Display the IDCU facility Page **1870,y,z** and determine the CGA type.

5. For local alarms, loop the out-going DS1 circuit to the associated incoming circuit at the DSX bay. If the local CGA is retired, the problem is between the output of DSX circuit and the remote site.

   NOTE: If it is determined that the ELI is defective, remove the ELI circuit from service unconditionally, replace the pack, and return the ELI to the in-service active state. Remember, service is interrupted to all systems assigned to the ELI while it is OOS.

6. For remote alarms, go to the remote location and make a visual inspection of the equipment associated with the alarm. The remote alarm may be caused by the quality of the incoming signal or the remote hardware unit. Check the Remote Terminal for lighted light-emitting diode (LED). If the **RCV LED** for *SLC*® 96 RTs (**CLF** LED for "SERIES-V" RTs) on the line interface unit (LIU) is lighted, the RT cannot frame up on the incoming signal.

   To isolate remote alarm problems, loop the incoming DS1 circuit at the DSX bay of the remote site to the out-going circuit. If the remote CGA is retired, the problem is between the remote DSX circuit and the remote terminal. If the remote CGA is not retired, the problem is with the incoming signal.

7. Determine what transmission equipment interfaces between the DSX bay and the remote site.

8. Have transmission organization provide a description or a pictorial of the interconnections between the two locations and inspect the quality of the DS1 signal and investigate any transport system problems.

9. Perform carrier transmission tests. Connect an error rate test set at different test points of the carrier system and verify whether there are bipolar violations or framing errors.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 6.8: LDSF DUPLEX FAILURE

OVERVIEW

The intent of this procedure is to resolve Switching Module-2000 (SM-2000) Local Digital Service Function (LDSF) duplex failures.

NOTE: The SM-2000 verbose flag can be used as a tool to determine the frequency of LDSF interrupts. If used, output messages that are not normally printed will be forwarded to the read only printer (ROP).

```
LDSF Unit Status Page:          1014,x
LDSF Unit 0 Detail Page:        1080,0,x
LDSF Unit 1 Detail Page:        1080,1,x

                                      Where x = SM-2000 Number
```

PROCEDURE

1. Determine the status of LDSF unit 0 and unit 1.

   • At MCC/STLWS, enter poke: **1014,x**

2. Enter the input message or the LDSF display page poke commands to **unconditionally restore** (without diagnostics) the out-of-service (OOS) and/or degraded LDSF units to the active state.

   ```
   Where:  x = SM-2000 Number
           y = LDSF Unit Number
   ```

   • On MCC/STLWS command line, enter: **rst:ldsf=x-y,ucl**

   • On **1080,0,x** page, enter poke: **340,ucl** (restore LDSF 0)

   • On **1080,1,x** page, enter poke: **340,ucl** (restore LDSF 1)

3. Did at least one LDSF restore and remain in the active state ?

   If **YES**, proceed to Step 6.
   If **NO**, continue with Step 4.

4. Enter the following input message to output the SM-2000 maintenance resource administrator (MRA) diagnostic queue to the ROP.

   • **op:dmq,sm=x** (where **x** = SM-2000 number)

5. Observe the contents of the SM-2000 diagnostic queue, then proceed base on the applicable substep.

   (a) If the LDSF is in the process of being restored (entry on diagnostic queue), return to Step 3.

   (b) If there are no LDSF entries on the MRA diagnostic queue, and the response to the manual request to restore the LDSF was **not started previous request in progress**, enter the following command to purge the diagnostic queue of all entries, then repeat Step 2.

   • **init:spp,sm=x,pid=4** (where **x** = SM-2000 Number)

6. Is the affected SM processing calls ?

   If **YES**, proceed to Step 8.
   If **NO**, continue with Step 7.

7. Determine the reliability of the LDSF hardware by **conditionally restoring** (diagnose then restore) the LDSF units. Target the OOS or degraded, if any, LDSF unit first. Then proceed base on the applicable substep.
   `Where:` **`x`** `= SM-2000 Number`
   `y` `= LDSF Unit Number`

   - On MCC/STLWS command line, enter: **rst:ldsf=x-y**

   - On 1080,0,x page, enter poke: **340** (restore LDSF 0)

   - On 1080,1,x page, enter poke: **340** (restore LDSF 1)

   (a) If the LDSF diagnoses ATP and restores active, check for dial tone and/or make test calls. If call processing has been restored, continue with Step 8.

   (b) If a diagnostic failure is detected, utilize the Trouble-Locating Procedure (TLP) list when replacing circuit packs. If the diagnostics continues to fail, escalate to the next level of support.

8. If you have reached this point call processing has been restored. Identify the stimulus for the duplex failure by securing and analyzing the output messages associated with the problem SM-2000.

   (a) If available, use the office surveillance system (such as the SCC mini) to search on LDSF interrupts and defensive check failures.

   (b) Use the **op:postmort,sm=x** (x = SM-2000 Number) command to request an output of the SM-2000 critical event history.

9. If both LDSF units have returned to the active state, and the data to perform a post recovery analysis has been preserved (if applicable), you have completed this procedure. If a diagnostic failure is preventing an LDSF unit from restoring active, refer to applicable procedure to resolve the problem.

Procedure 6.9: DNU-S DUPLEX FAILURE

OVERVIEW

The intent of this procedure is to resolve Switching Module-2000 (SM-2000) Digital Network Unit-Sonet (DNU-S) duplex failures and Transmission Multiplexer failures (TMUX). This procedure assumes that call processing has been lost because one or more of the subunits within the DNU-S has duplex failed, or because there are multiple TMUX failures.

CAUTION: A duplex failure of the DNU-S Common Data (CD) or Sonet Facility Interface (SFI) circuits will cause service to be interrupted to the customers served by the affected circuits. Multiple Transmission Multiplexers (TMUX) failures will also interrupt service. While a DNU-S Common Control (CC) duplex failure will not affect service, DNU-S subunits can not be restored until one CC circuit is active.

NOTE 1: The steps in this procedure should only be initiated after it is evident that the automatic fault recovery actions have failed to restore a duplex unit to the active state.

NOTE 2: During this procedure the subunits that have duplex failed will be unconditionally restored to the operational state. If a subunit fails to restore active, the SM-2000 Modular Control Time Slot Interchange (MCTSI) will be reconfigured and when needed, the DNU-S circuits diagnosed.

```
DNU-S Unit Status Page:    1510,x,y
                           Where x = SM-2000 Number
                           Where y = DNU-S Number
```

PROCEDURE

1. Determine the status of the DNU-S. If call processing is affected, proceed based on the following substeps. Otherwise, refer to the applicable procedure to resolve DNU-S operational problems.

```
Where:  x = DNU-S number
        y = SM-2000 number
```

• At MCC/STLWS, enter poke: **1510,x,y** (DNU-S Display Page)

(a) If CCs are duplex failed, go to Step 2.

(b) If the CDs in a DNU-S Data Group are duplex failed, go to Step 6.

(c) If the SFIs in a DNU-S Data Group are duplex failed, go to Step 11.

(d) If there are multiple TMUXs OOS, go to Step 16.

(e) If there are multiple SFEFACs OOS, go to Step 21.

2. Enter the input message or the DNU-S display page poke command to **unconditionally restore** (without diagnostics) DNU-S **CC 0** and **CC 1** to the active state.

```
Where:  x = SM-2000 number
        y = DNU-S number
        z = CC number
•  At MCC/STLWS,enter:              rst:dnuscc=x-y-z,ucl;
•  On 1510,x,y page,enter poke:     300,ucl  (restore CC 0)
```

`301,ucl (restore CC 1)`

3. Did at least one CC restore and remain active ?

   If **YES**, return to Step 1.

   If **NO**, and if the mate MCTSI side has not been reconfigured active, continue with Step 4. If the mate MCTSI has been reconfigured active, proceed to Step 5.

4. Enter the input message or the MCTSI display page poke command to switch MCTSI sides, then return to Step 2.

```
Where:  x = SM-2000 number
• At MCC/STLWS,enter:          sw:mctsi=x
• On 1190,x page,enter poke:   403
```

5. Determine the reliability of the DNU-S hardware by **conditionally restoring** (diagnose then restore) affected DNU-S CCs, then proceed based on the applicable substep.

```
Where:  x = SM-2000 number
        y = DNU-S number
        z = CC number
•  At MCC/STLWS,enter:            rst:dnuscc=x-y-z
•  On 1510,x,y page,enter poke:   300 (restore CC 0)
                                  301  (restore CC 1)
```

   (a) If at least one CC is diagnosed ATP, then restores and remains active, return to Step 1.

   (b) If CC 0 and CC 1 fail to diagnose ATP, utilize the Trouble Locating Procedure (TLP) list when replacing circuit packs. If the diagnostics continue to fail, or at least one CC is not upgraded to the active state, escalate to the next support level.

6. Enter the input message or the DNU-S display page poke command to **unconditionally restore** (without diagnostics) the duplex failed **CDs** in the affected DNU-S data group.

```
Where:  w = SM-2000 number
        x = DNU-S number
        y = DG number
        z = CD number
• At MCC/STLWS,enter:           rst:dnuscd=w-x-y-z,ucl
• On 1510,x,y page,enter poke:   3100,ucl (restore CD 0)
                                 3101,ucl (restore CD 1)
```

7. Did at least one DNU-S CD in the affected data group restore and remain active ?

   If **YES**, return to Step 1.
   If **NO**, continue with Step 8.

8. Enter the input command or DNU-S display page command to switch the DNU-S CCs, then return to Step 6. If the CCs have already been switched, continue with Step 9.

```
Where:  x = SM-2000 Number
        y = DNU-S Number
• At MCC/STLWS,enter:           sw:dnuscc=x-y
```

- `On` **1510,x,y** `page,enter poke:` **403**

9. Enter the input command or MCTSI display page poke command to switch MCTSI sides, then return to Step 6. If the MCTSI has already been switched, continue with Step 10.

```
Where:  x = SM-2000 Number
```

- At MCC/STLWS, enter: **sw:mctsi=x**
- On **1190,x** page, enter poke: **403**

10. Determine the reliability of the DNU-S hardware by **conditionally restoring** (diagnose then restore) the CDs in the affected DNU-S data group, then proceed based on the applicable substep.

```
Where: w = SM-2000 number
       x = DNU-S number
       y = DG number
       z = CD number
•  At MCC/STLWS,enter:           rst:dnuscd=w-x-y-z
•  On 1510,x,y page,enter poke:  3100 (restore CD 0)
                                 3101 (restore CD 1)
```

(a) If at least one CD in the affected data group diagnoses ATP, then restores and remains active, return to Step 2.

(b) If CD 0 or CD 1 fail to diagnose ATP and restore active, utilize the Trouble Locating Procedure (TLP) list when replacing circuit packs. If the diagnostics continue to fail, or at least one CD in the affected data group is not upgraded to the active state, escalate to the next support level.

11. Enter the input message or the DNU-S display page poke command to **unconditionally restore** (without diagnostics) the SFIs in the affected DNU-S data group.

```
Where:  w = SM-2000 Number
        x = DNU-S Number
        y = DG Number
        z = SFI Number
•  At MCC/STLWS,enter:           rst:sfi=w-x-y-z,ucl;
•  On 1510,x,y page,enter poke:  3200,ucl  (restore SFI 0)
                                 3201,ucl  (restore SFI 1)
```

12. Did at least one SFI in a DNU-S data group restore and remain active ?

If **YES**, return to Step 1.
If **NO**, continue with Step 13.

13. Enter the input command or DNU-S display page command to switch the DNU-S CCs, then return to Step 11. If the CCs have already been switched, continue with Step 14.

```
Where:  x = SM-2000 Number
        y = DNU-S Number
• At MCC/STLWS,enter:           sw:dnuscc=x-y
• On 1510,x,y page,enter poke:  403
```

14. Enter the input command or MCTSI display page poke command to switch MCTSI sides, then return to Step 11. If the MCTSI has already been switched, continue with Step 15.

```
Where:  x = SM-2000 Number
• At MCC/STLWS,enter:            sw:mctsi=x
• On 1190,x page,enter poke:     403
```

15. Determine the reliability of the DNU-S hardware by **conditionally restoring** (diagnose then restore) the SFIs in the affected DNU-S data group, then proceed based on the applicable substep.

```
Where:  w = SM-2000 number
        x = DNU-S number
        y = DG number
        z = SFI number
•  At MCC/STLWS,enter:              rst:sfi=w-x-y-z
•  On 1510,x,y page,enter poke:     3200  (restore SFI 0)
                                    3201  (restore SFI 1)
```

(a) If at least one SFI diagnoses ATP, then restores and remains active, return to Step 1.

(b) If SFI 0 and SFI 1 of the affected data group fail to diagnose ATP and restore active, utilize the Trouble Locating Procedure (TLP) list when replacing circuit packs. If the diagnostics continue to fail, escalate to the next support level.

16. Enter the input message or the DNU-S display page poke command to **unconditionally restore** (without diagnostics) the out-of-service **TMUXs** in the affected DNU-S data group(s).

NOTE: For each DNU-S data group, attempt to restore TMUXs 0 through 5 first, then restore the spare TMUXs.

```
Where:  w = SM-2000 number
        x = DNU-S number
        y = DG number
        z = TMUX number
• At MCC/STLWS,enter:              rst:tmux=w-x-y-z,ucl
• On 1510,y,x page,enter poke:     33yz
```

17. Did the TMUXs restore and remain active ?

If **YES**, return to Step 1.
If **NO**, continue with Step 18.

18. Enter the input command or DNU-S display page command to switch the DNU-S CCs, then return to Step 16. If the CCs have already been switched, continue with Step 19.

```
Where:  x = SM-2000 Number
        y = DNU-S Number
• At MCC/STLWS,enter:              sw:dnuscc=x-y
• On 1510,x,y page,enter poke:     403
```

19. Enter the input command or MCTSI display page poke command to switch MCTSI sides, then return to Step 16. If the MCTSI has already been switched, continue with Step 20.

```
Where:  x = SM-2000 Number
• At MCC/STLWS,enter:            sw:mctsi=x
• On 1190,x page,enter poke:     403
```

20. Determine the reliability of the DNU-S hardware by **conditionally restoring** (diagnose then restore) the TMUXs in the affected DNU-S data group, then proceed based on the applicable substep.

```
Where:  w = SM-2000 Number
        x = DNU-S Number
        y = DG Number
        z = TMUX Number
• At MCC/STLWS,enter:              rst:tmux=w-x-y-z
• On 1510,x,y page,enter poke:     33yz (restore TMUXs)
```

(a) If the TMUXs diagnose ATP, then restores and remains active, return to Step 2.

(b) If TMUXs fail to diagnose ATP and restore active, utilize the Trouble Locating Procedure (TLP) list when replacing circuit packs. If the diagnostics continue to fail, escalate to the next support level.

21. Enter the input command or the DNU-S display page poke command to **unconditional restore** the OOS **EC1STE** (Electrical Carrier Level 1 SONET Termination Equipment).

```
Where:  w = SM-2000 (switching module-2000) number (1-192)
        x = DNU-S (digital networking unit) number (0-7)
        y = DG (data group) number (0-1)
        z = STE (SONET termination equipment) number (1-6)
• At MCC/STLWS page,enter:         rst:ec1ste=w-x-y-z,ucl
• On 1510,x,y page,enter poke:     34yz
```

NOTE: For software releases 5E12 through 5E10, the term **STEFAC** is used instead of **EC1STE**.

22. Did the OOS EC1STE restore and remain active ?

If **YES**, return to Step 2.
If **NO**, proceed based on the following substeps.

(a) If the CGA is still present on the STE facility after the unconditional restoral, then verify the integrity of the STE facility by looping the STSX-1 interface onto itself at the SONET facility patch panel.

(b) If the CGA alarm clears and the EC1STE auto restores, then the problem is in the transmission equipment. Consult with the local transmission maintenance organization and determine if the SONET facilities are experiencing difficulty.

(c) If the EC1STE fails to restore, **seek technical assistance.**

Procedure 6.10: ESTABLISH QLPS COMMUNICATION WITH SM-2000

OVERVIEW

This procedure is used to reestablish communication through the quad-link packet switch (QLPS) networks to a switching module-2000 (SM-2000) equipped with QLPS connectivity. If QLPS gateway processors (QGPs) are equipped, an SM-2000 equipped with QLPS connectivity must lose communication to the administrative module (AM) through both the QLPS networks and the communication links (CLNKs) to become totally isolated from the AM. If this occurs (as indicated by an SM-2000 status of COMM LOST, INIT ISOL, STNDALONE, or ISOLATED), this procedure should be invoked by Procedure 6.3 to attempt to reestablish communication through the QLPS networks. To simplify this procedure, the previous status indications reporting total SM-2000 isolation will all be referred to as ISOLATED.

The QLPS and CLNK communication can fail (and be recovered) independently. If an SM-2000 loses only QLPS communication (as indicated by an SM-2000 status of QLPS ISOL or QLNK LOST), this procedure should be used to reestablish it. If only CLNKs are lost (as indicated by an SM-2000 status of CLNK LOST), use Procedure 6.3 to recover the CLNKs. To clear QLPS-related off-normal conditions that are not causing any SM-2000 to lose QLPS connectivity, refer to 235-105-220, *Corrective Maintenance Procedures*.

This procedure assumes that QLPS connectivity was previously established to the SM-2000 for which recovery is necessary. It does not attempt to recover from static ODD problems or an inability to establish communication through QLPS following QGP or MH QPIPE growth.

Following each recovery action specified by this procedure, pause briefly (15-30 seconds) to allow the SM-2000 to reestablish communication (if possible) and update the MCC display.

BACKGROUND INFORMATION

The QLPS networks provide an optional high bandwidth path for transporting messages to and from SM-2000s. If an SM-2000 is equipped with QLPS connectivity, it can communicate with other QLPS equipped SM-2000s through the QLPS networks without using CLNKs. If QGPs are also equipped, it can communicate through the QLPS networks with the AM, communication module processor (CMP), foundation peripheral controller (FPC), direct link node (DLN), and switching modules (SMs) or SM-2000s that do not have direct QLPS connectivity. If an SM-2000 is not QLPS equipped, or QLPS connectivity has been lost, the SM-2000 uses the lower bandwidth CLNKs for messaging. If an SM-2000 has QLPS connectivity, but QGPs are unequipped or QGP connectivity has been lost, the QLPS networks can only be used for messages to other QLPS-equipped SM-2000s.

Supporting communication module (CM) hardware units for the QLPS networks include the QLPS, QTMSLNK, QGP, and QLPS gateway link (QGL). Four QLPS units support two independent QLPS communication networks. Each network is supported by a pair of QLPS units (one on each office network and timing complex [ONTC] side) that normally run in active/standby mode. Each QLPS has four child QTMSLNKs that provide an interface to the time multiplexed switch (TMS) hardware.

When an SM-2000 is equipped with QLPS connectivity, a logical unit called an MH QPIPE must be grown. An MH QPIPE is a path between an SM-2000s message handler (MH) 0 and a specific QLPS unit. Physically, it passes from the MH to one of the SM-2000s primary network link interfaces (NLIs), over a TMSLNK into the TMS, and then through a QTMSLNK to the QLPS. From the SM-2000 perspective, an MH QPIPE is considered to be "active" if a "loopback test" has verified that frames can successfully be transported to/from the active QLPS of the network.

Optional QGPs can be equipped in the message switch (MSGS) to provide additional capacity for messages that are not being sent from one QLPS equipped SM-2000 to another. Either one or two QGPs per MSGS may be equipped. A QGL physically connects a QGP to a QLPS. Each equipped QGL is associated with a logical QGP QPIPE. As with an MH QPIPE, a QGP QPIPE (with an active parent QGL) is considered active if a loopback test has verified that frames can successfully be transported to/from the associated active QLPS. A QPIPE to a standby

QLPS is assumed to be capable of supporting message transport if all parent hardware is in-service, unless that QPIPE was removed from service due to errors that occurred while the parent QLPS was active (before a QLPS switch).

A QLPS communication path between the AM and an SM-2000 is referred to as a QLPS communication link (QLNK). If QGPs and MH QPIPEs are equipped, eight physical QLNKs (four per network) exist between the AM and an SM-2000. In a fault-free environment, there will be four active QLNKs (which pass through an active QLPS) and four standby QLNKs. When faults occur or parent hardware is removed from service, an SM-2000 may have fewer than four active QLNKs. Message traffic is distributed across all of the active QLNKs by dynamically mapping four QLPS "logical links" to the set of active physical QLNKs. Figure 6.10-1 illustrates the relationships between QLNKs, QPIPEs, and supporting CM hardware for QLPS network 0 (in a single QGP per MSGS configuration).

A QLPS communication path between two SM-2000s is called an inter-SM QLPS communication link (ISMQLNK). There are two ISMQLNKs (one per network using the active QLPS) between each pair of QLPS equipped SM-2000s. Message traffic from one SM-2000 to another is normally distributed across the available ISMQLNKs. If both ISMQLNKs are out-of-service, the messages are routed over the QLNKs (if available) or CLNKs (if QLNKs are not available).

If all supporting hardware for a QLNK or ISMQLNK is in-service, and the parent QPIPEs are active, the QGP and/or SM-2000s will automatically invoke a link establishment protocol to verify that round-trip message transport is possible. If so, they enable routing through the QLNK/ISMQLNK, and it is then considered to be "active". When faults occur in a QLPS network, the AM and SM-2000s can initiate recovery actions to correct the problem or minimize its impact on system operation.

If a QLPS network problem cannot be corrected, an off-normal indication will be displayed on MCC Display Pages **1380** (for network 0) or **1381** (for network 1). In addition, the **OP:QNETSTAT** input message can be used to obtain status information about the QPIPEs, QLNKs, and ISMQLNKs. The **OP:CFGSTAT** input message can be used to obtain the status of parent hardware units. The identification parameters shown in Table 6.10-1 for each QLPS related unit (as reported in the **OP QNETSTAT**, **OP CFGSTAT**, **REPT TRBL**, and **REPT POST MORTEM** output messages) help identify the supporting CM hardware units.

Table 6.10-1 QLPS Identification Parameters

UNIT	ID PARAMETERS
QGP	= A-B
QGL	= A-B-C
QLPS	= D-E
QTMSLNK	= D-E-F
MHQPIPE	=G-H-E-D
QGPQPIPE	= A-B-E-D
QLNK	= G-H-E-D-B-A
ISMQLNK	= G-H-E-D-I-J

Where:

A = Message switch control unit (MSCU) side.
B = QGP number.
C = QGL number.
D = ONTC side.
E = QLPS network number.
F = QTMSLNK number.
G = SM-2000 number.
H = SM-2000s active module controller time slot interchanger (MCTSI) side.
I = Far-end SM-2000 number.
J = Far-end SM-2000s active MCTSI side.

When an SM-2000 experiences QLPS connectivity problems, an appropriate SM-2000 communication status phrase is reported in the **OP SYSSTAT** output message and, unless more severe problems exist, on the MCC terminal. Table 6.10-2 lists the QLPS-related SM-2000 status phrases. This procedure is used to resolve problems that result in an SM-2000 communication status of **QLPS ISOL** or **QLNK LOST**. To resolve problems that result in a status of **QPIPE OOS** or **QLNK OFFN**, refer to 235-105-220, *Corrective Maintenance Procedures*.

Table 6.10-2 SM-2000 Status Phrases for MH QPIPES, QLNKS, and ISMQLNKS

STATUS PHRASE	DESCRIPTION
QLPS ISOL	SM-2000 lost MH QPIPEs to the active QLPS for both networks.
QPIPE OOS	SM-2000 lost MH QPIPE to the active QLPS for one network.
QLNK LOST	SM-2000 lost all QLNKs (if QGPs are equipped) or ISMQLNKs (if QGPs are not equipped).
QLNK OFFN	SM-2000 lost some but not all QLNKs or ISMQLNKS for one or both networks.

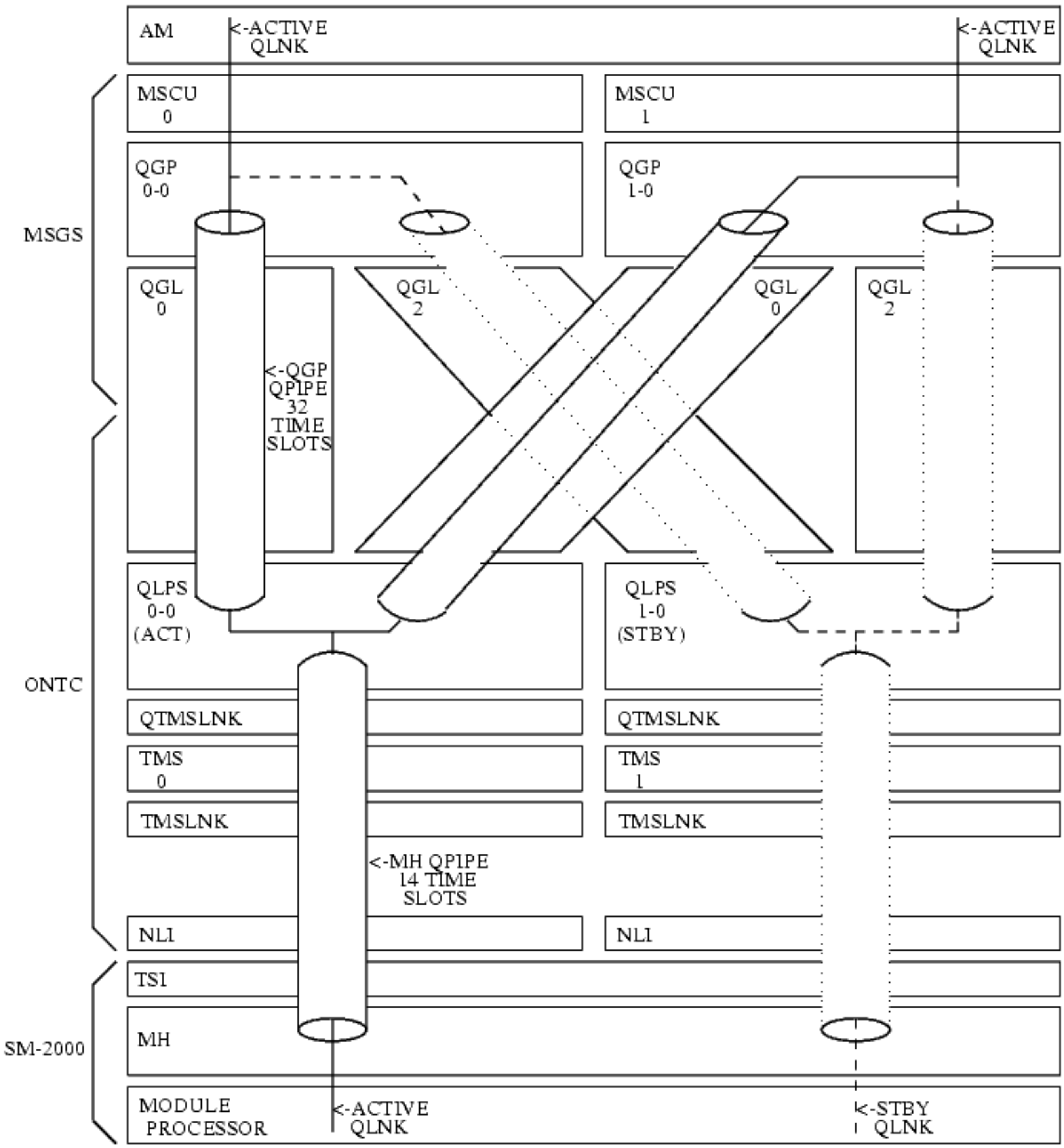


Figure 6.10-1 QLNK and QPIPE Relationships for QLPS Network 0 (2-QGP Configuration)

PROCEDURE

1. Determine whether this SM-2000 is equipped with MH QPIPEs by entering the **OP:QNETSTAT,SRCSM=***G***,ALL** input message (where *G* is the SM-2000 number). If MH QPIPEs are equipped, their status is reported in an **OP QNETSTAT** output message.

2. Are MH QPIPEs equipped?

   If **YES**, continue with Step 3.
   If **NO, STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3. Determine the communication status of the SM-2000 by entering the **OP:SYSSTAT,SM=***G* input message (where *G* = SM-2000).

   Did the SM-2000 status reported by the **OP SYSSTAT** output message include any of the phrases COMM LOST, INIT ISOL, STNDALONE, or ISOLATED?

   NOTE: To simplify this procedure, these SM/SM-2000 status indications are referred to as **ISOLATED**.

   If **YES**, continue with Step 4.
   If **NO**, go to Step 8.

   NOTE: This procedure should have been called by Procedure 6.3 in order to attempt to reestablish communication through the QLPS networks to an SM-2000 that has become totally isolated from the AM. At this point, most recovery actions performed by Procedure 6.3 should already have been attempted. If this has not been done, execute Procedure 6.3 before continuing with this procedure.

4. On MCC Display Page **1209**, are hardware checks inhibited for either ONTC?

   If **YES**, continue with Step 5.
   If **NO**, go to Step 6.

5. Allow hardware checks for each inhibited ONTC using the **ALW:HDWCHK,ONTC=***D* input message (where *D* is the ONTC side).

   NOTE: While ONTC hardware checks are inhibited, faults that would normally cause hardware to be removed from service may be masked. Such faults, if they exist, *may* affect the ability of an in-service ONTC, NLI, TMSLNK, QLPS, or QTMSLNK to support message traffic. If ONTC hardware checks were manually inhibited in an effort to keep hardware in service, it may be beneficial to leave the ONTC inhibited. However, this might make it difficult to determine the actual cause of a communication problem.

6. On MCC Display Page **1380**, are QLPS gateway processors (QGPs) equipped?

   If **YES**, go to Step 33.
   If **NO**, AM/SM-2000 communication must be established through the CLNKs. Return Procedure 6.3 .

7. Did the SM-2000 status reported by the **OP SYSSTAT** output message in the previous Step 3 include a communication status of **QLNK LOST** or **QLPS ISOL**?

   If **YES**, continue with Step 8.
   If **NO**, go to Step 116.

8. Did the SM-2000 status reported by the **OP SYSSTAT** output message in the previous Step 3 include the phrase **MH DGRD**?

   If **YES**, continue with Step 9.
   If **NO**, go to Step 10.

9. The SM-2000 message handler (MH) is running in a degraded mode of operation that prevents QLPS communication from being established. Verify that a correct version of the MH operational image is available

on disk, and then use Procedure 6.6 to recover from this state.

10. On MCC Display Page **1209**, is *any* active QLPS shown for either network?

    If **YES**, go to Step 12.
    If **NO**, continue with Step 11.

11. The QLPS quadruplex failure recovery should be in progress. At least one QLPS unit must be restored to service before QLPS communication can be established. If automatic recovery actions fail to restore a QLPS to the active state, refer to Procedure 5.4.7 to diagnose/repair QLPS hardware. If QLPS communication still cannot be established after supporting hardware has been restored, return to Step 1.

12. On MCC Display Pages **1380** and **1381**, is *any* active QGP shown for either network?

    If **YES**, go to Step 14.
    If **NO**, continue with Step 13.

13. The QGP duplex/quadruplex failure recovery should be in progress. At least one QGP unit must be restored to service before communication can be established through QLNKs. If automatic recovery actions fail to restore a QGP to the active state, refer to Procedure 5.4.1 to diagnose/repair QGP hardware. If QLNK communication still cannot be established after supporting hardware has been restored, return to Step 1.

14. Determine whether there are any active ISMQLNKs to this SM-2000 by entering the **OP:QNETSTAT,SRCSM=***G***,ALL** input message (where *G* = SM-2000). Are any ISMQLNKs shown as **ACTIVE** in the **OP QNETSTAT** output message?

    If **YES**, go to Step 18.
    If **NO,** continue with Step 15.

15. On MCC Display Page **1800,***G* (where *G* = SM-2000), enter command **403,QLPS** to manually isolate the SM-2000 from the QLPS networks.

    Response: **SET** and **QLPS** present in box 03. SM-2000 status changes to **QMAN ISOL**.

16. On MCC Display Page **1800,***G* (where *G* = SM-2000), enter command **503** to clear manual SM-2000 isolation from the QLPS networks.

    Response: **SET** and **QLPS** cleared from box 03. SM-2000 status is no longer **QMAN ISOL**.

17. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL**?

    If **YES**, continue with Step 18.
    If **NO**, go to Step 116.

18. On MCC Display Page **1209**, are hardware checks inhibited for either ONTC?

    If **YES**, continue with Step 19.
    If **NO**, go to Step 20.

19. Allow hardware checks for each inhibited ONTC using the **ALW:HDWCHK,ONTC=***D* input message (where *D* is the ONTC side).

    NOTE: While ONTC hardware checks are inhibited, faults that would normally cause hardware to be removed from service may be masked. Such faults, if they exist, *may* affect the ability of an in-service ONTC, NLI, TMSLNK, QLPS, or QTMSLNK to support message traffic. If ONTC hardware checks were manually inhibited in an effort to keep hardware in service, it may be beneficial to leave the ONTC inhibited. However, this might make it difficult to determine the actual cause of a communication problem.

20. On MCC Display Page **1209**, are the office network and timing complexes (ONTCCOMs) shown as active major **(ACT MAJOR)** and active minor **(ACT MINOR)**?

    If **YES**, go to Step 29.
    If **NO**, continue with Step 21.

21. Is an ONTCCOM out-of-service or unavailable and capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 22.
    If **NO**, go to Step 23.

22. Attempt to restore the out-of-service or unavailable ONTCCOM.

    If the ONTCCOM has lost power, restore power to it.

    If the ONTCCOM is forced unavailable, clear the ONTCCOM force using the **CLR:FRC,ONTCCOM** input message.

    Enter the **RST:ONTCCOM=***D***,UCL** input message (where *D* is the ONTCCOM side to restore).

    If the ONTCCOM does not restore successfully, continue with this procedure in order to reestablish communication to the SM-2000 through the QLPS networks. After completing this procedure, diagnose/repair the ONTCCOM problem as described in Procedures 5.4.2 and 5.4.3 .

23. Enter poke **1201,1,***G* (*G* = SM-2000) to display the status of the primary network link interfaces (NLIs) and TMSLNKs.

    NOTE: The first set of NLIs equipped on an SM-2000 are called the *primary* NLIs. Only the first TMSLNK associated with each primary NLI is used to support CLNK/QLPS communication to the SM-2000.

24. Is any primary NLI out-of-service **(OOS)** but capable of being restored successfully (no known problems and parent ONTCCOM is in-service)?

    If **YES**, go to Step 26.
    If **NO**, continue with Step 25.

25. Is the first TMSLNK associated with any active primary NLI out-of-service?

    If **YES**, continue with Step 26.
    If **NO**, go to Step 27.

26. Enter commands **30XX,UCL** (for ONTC side 0 NLIs) and/or **31XX,UCL** (for ONTC side 1 NLIs) (where XX is the NLI number) to unconditionally restore each OOS primary NLI and each primary NLI for which the first TMSLNK is OOS.

    If any NLI or TMSLNK does not restore successfully, continue with this procedure in order to reestablish communication to the SM-2000 through the QLPS networks. After completing this procedure, diagnose/repair the NLI or TMSLNK problem as described in Procedure 5.4.5 .

27. Is the first TMSLNK associated with any primary NLI active?

If **YES**, continue with Step 28.
If **NO**, then ONTCs/NLIs/TMSLNKs must be repaired and restored to service before communication can be established to this SM-2000 through either CLNKs or the QLPS networks. Refer to Procedures 5.4.2 , 5.4.3 , and 5.4.5 to diagnose and repair the necessary communication module hardware. If QLPS communication still cannot be established after supporting hardware has been restored, return to Step 1.

28. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL**?

    If **YES**, continue with Step 29.
    If **NO**, go to Step 116.

29. Are QGPs equipped?

    If **YES**, continue with Step 30.
    If **NO**, go to Step 36.

30. On MCC Display Pages **1240** and **1250**, is either message switch control unit (MSCU) shown as out-of-service or unavailable and capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 31.
    If **NO**, go to Step 33.

31. Attempt to restore the out-of-service or unavailable MSCU.

    If the MSCU has lost power, restore power to it.

    If the MSCU is forced unavailable, clear the MSCU force using the **CLR:FRC,MSCU** input message.

    Enter the **RST:MSCU=***A*,UCL input message (where *A* is the MSCU side to restore).

    If the MSCU does not restore successfully, continue with this procedure in order to reestablish communication to the SM-2000 through the QLPS networks. After completing this procedure, diagnose/repair the MSCU problem as described in Procedure 5.4.1 .

32. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL**?

    If **YES**, continue with Step 33.
    If **NO**, go to Step 116.

33. On MCC Display Pages **1380** and **1381**, are hardware checks inhibited for any QGP?

    If **YES**, continue with Step 34.
    If **NO**, go to Step 35.

34. Allow hardware checks for each inhibited QGP using the **ALW:HDWCHK,QGP=***A***-***B* input message (where *A* is the MSCU side and *B* is the QGP number).

    NOTE: While QGP hardware checks are inhibited, faults that would normally cause a QGP or QGL to be removed from service may be masked. If such faults exist, an active QGP *may* not be capable of supporting message traffic. If QGP hardware checks were manually inhibited in an effort to keep a QGP in service, and the output from **OP:QNETSTAT,SRCQGP=A-B,ALL** shows at least one active QLNK, it may be beneficial to leave the QGP inhibited unless/until QLNKs can be established through another QGP.

35. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL** or **ISOLATED**?

If **YES**, continue with Step 36.
If **NO**, go to Step 116.

36. Enter poke **1380** to display the QLPS network 0 status page on the MCC.

37. Is either QLPS out-of-service **(OOS)** but capable of being restored successfully (no known problems and parent ONTCCOM is in-service)?

    If **YES**, continue with Step 38.
    If **NO**, go to Step 39.

38. Enter the input message **RST:QLPS=***D***-***E***,UCL** (where *D* is the ONTC side and *E* is the QLPS network) to unconditionally restore the OOS QLPS(s).

    If any QLPS does not restore successfully, continue with this procedure in order to reestablish QLPS communication to the SM-2000. After completing this procedure, diagnose/repair the QLPS problem as described in Procedure 5.4.7 .

39. Is any QTMSLNK OOS with an active parent QLPS?

    If **YES**, continue with Step 40.
    If **NO**, go to Step 41.

40. Enter the input message **RST:QTMSLNK=***D***-***E***-***F* (where *D* is the ONTC side, *E* is the QLPS network, and *F* is the QTMSLNK number) to restore the OOS QTMSLNK(s). Note that QTMSLNKs with an STBY parent QLPS should *not* be restored at this point.

    If any QTMSLNK does not restore successfully, continue with this procedure in order to reestablish QLPS communication to the SM-2000. After completing this procedure, diagnose/repair the QTMSLNK problem as described in Procedure 5.4.7 .

41. Are QGPs equipped?

    If **YES**, continue with Step 42.
    If **NO**, go to Step 56.

42. On MCC Display Pages **1380** and **1381**, is any QGP powered down **(UNVP)** but capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 43.
    If **NO**, go to Step 44.

43. Power up the QGP community containing the UNVP QGP.

44. On MCC Display Pages **1380** and **1381**, are any QGPs OOS but capable of being restored successfully (no known problems and parent MSCU is active)?

    If **YES**, continue with Step 45.
    If **NO**, go to Step 47.

45. Enter the input message **RST:QGP=***A***-***B***,UCL** (where *A* is the MSCU side and *B* is the QGP number) to unconditionally restore the OOS QGP(s).

    If any QGP does not restore successfully, continue with this procedure in order to reestablish QLPS communication to the SM-2000. After completing this procedure, diagnose/repair the QGP problem as described in Procedure 5.4.1 .

46. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL** or **ISOLATED**?

    If **YES**, continue with Step 47.
    If **NO**, go to Step 116.

47. On MCC Display Pages **1380** and **1381**, is any QGP shown as out-of-service family of equipment (OOSF)?

    If **YES**, continue with Step 48.
    If **NO**, go to Step 51.

48. Power down the QGP community on the out-of-service MSCU side.

49. Power up the QGP community powered down in the previous step.

50. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL** or **ISOLATED**?

    If **YES**, continue with Step 51.
    If **NO**, go to Step 116.

51. Are there any OOS QGLs connected to an active QLPS with an active parent QGP and QTMSLNK?

    If **YES**, continue with Step 52.
    If **NO**, go to Step 53.

52. Enter the input message **RST:QGL=***A***-***B***-***C* (where *A* is the MSCU side, *B* is the QGP number, and *C* is the QGL number) to restore the OOS QGL(s). Note that QGLs associated with an STBY QLPS should *not* be restored at this time.

    If any QGL does not restore successfully, continue with this procedure in order to reestablish QLPS communication to the SM-2000. After completing this procedure, diagnose/repair the QGL problem as described in Procedure 5.4.7 .

53. Are there any OOS QGP QPIPEs (**QPIPE OOS** indicator backlighted) with an active parent QGL?

    If **YES**, continue with Step 54.
    If **NO**, go to Step 55.

54. Enter the input message **RST:QGL=***A***-***B***-***C* to re-restore the parent QGL of the OOS QGP QPIPE (where *A* is the MSCU side, *B* is the QGP number, and *C* is the QGL number). Note that OOS QGP QPIPEs associated with STBY QGLs should *not* be restored at this time.

    If any QGP QPIPE does not restore successfully, continue with this procedure in order to reestablish QLPS communication to the SM-2000. After completing this procedure, diagnose/repair the QGP QPIPE problem as described in Procedure 5.4.7 .

55. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL** or **ISOLATED**?

    If **YES**, continue with Step 56.
    If **NO**, go to Step 116.

56. Are there any out-of-service QTMSLNKs, QGLs, or QGP QPIPEs associated with an STBY QLPS for this network?

    If **YES**, continue with Step 57.
    If **NO**, go to Step 61.

57. Has a conditional QLPS switch of this network already been attempted by a previous step in this procedure?

    If **YES**, go to Step 61.
    If **NO**, continue with Step 58.

58. Enter the **42E** poke on MCC Display Page **138E** (where E is the QLPS network number) to conditionally switch the QLPS network. If the switch is successful, the ACT/STBY status of the QLPS units displayed on the MCC should be switched.

59. Was the QLPS switch successfully completed?

    If **YES**, continue with Step 60.
    If **NO**, go to Step 61.

60. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL** or **ISOLATED**?

    If **YES**, return to Step 39 to attempt to restore out-of-service QTMSLNKs, QGLs, and QGP QPIPEs associated with the new active QLPS.
    If **NO**, go to Step 116.

61. Has an attempt been made to restore all out-of-service supporting hardware for *both* QLPS networks?

    If **YES**, go to Step 63.
    If **NO**, continue with Step 62.

62. Enter MCC poke **1381** to display the QLPS network 1 status page. Then return to Step 37 to attempt to restore any out-of-service hardware associated with QLPS network 1.

63. Determine whether MH QPIPE supporting hardware is available by entering the **OP:QNETSTAT,SRCSM=*G*,ALL** input message (where *G* is the SM-2000 number). Are *all four* MH QPIPEs shown as **OOS FE** (OOS family-of-equipment) in the **OP QNETSTAT** output message?

    If **YES**, continue with Step 64.
    If **NO**, go to Step 65.

64. The SM-2000 is unable to establish communication through the QLPS networks due to out-of-service communication module (CM) hardware (ONTC, QLPS, QTMSLNK, NLI, or TMSLNK). Refer to Procedures 5.4.2 , 5.4.3 , 5.4.5 , and 5.4.7 to diagnose and repair the necessary CM hardware. If QLPS communication still cannot be established after supporting hardware has been restored, return to Step 1.

65. Are QGPs equipped?

    If **YES**, continue with Step 66.
    If **NO**, go to Step 68.

66. On MCC Display Pages **1380** and **1381**, is there *any* **ACTIVE** QGL for which the **QPIPE OOS** indicator is not backlighted?

    If **YES**, go to Step 68.
    If **NO**, continue with Step 67.

67. The SM-2000 is unable to establish QLNK communication due to out-of-service communication module (CM) hardware (MSCU, QGP, QGL, QGP QPIPE, or QTMSLNK). Refer to Procedures 5.4.1 and 5.4.7 to diagnose and repair the necessary CM hardware. If QLNK communication still cannot be established after supporting hardware has been restored, return to Step 1.

68. Is the SM-2000 communication status **ISOLATED**?

    If **YES**, continue with Step 69.
    If **NO**, go to Step 70.

69. Since both CLNK and QLPS connectivity has been lost, additional QLPS-specific recovery actions are unlikely to be able to reestablish communication to the isolated SM-2000. Return to Procedure 6.3 in order to perform additional recovery actions.

70. Obtain the status of all the SM-2000s MH QPIPEs by entering the **OP:QNETSTAT,SRCSM=*G*,ALL** input message (where *G* = SM-2000).

71. Is the status of any of the SM-2000s MH QPIPEs (reported in the **OP QNETSTAT** output message) **OOS NEARLBK** or **OOS NEARFLT**?

    If **YES**, these MH QPIPEs are probably OOS due to a problem within the SM-2000. Continue with Step 72 to attempt SM-2000-specific recovery actions.
    If **NO**, go to Step 78.

72. On MCC Display Page **1190,*G*** (where *G* = SM-2000), is either module controller time slot interchanger (MCTSI) side shown as out-of-service or unavailable and capable of being restored successfully (no known problems)?

    If **YES**, continue with Step 73.
    If **NO**, go to Step 75.

73. Attempt to restore the out-of-service or unavailable MCTSI.

    If the MCTSI has lost power, restore power to it.

    If the MCTSI is forced unavailable, clear the MCTSI force using the **ORD:CPI=*G*,CMD=CLR,UCL** input message (where *G* is the SM-2000 number).

    Enter the **RST:MCTSI=*G-H*,UCL** input message (where *G* is the SM-2000 and *H* is the MCTSI side to restore). The restored MCTSI should first become STBY and then, after a small delay, be automatically switched to the ACTIVE state.

    If the MCTSI does not restore successfully, continue with this procedure in order to reestablish communication to the SM-2000 through the QLPS networks. In parallel, diagnose/repair the MCTSI problem as described in 235-105-220, *Corrective Maintenance Procedures*.

74. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL**?

    If **YES**, continue with Step 75.
    If **NO**, go to Step 116.

75. On MCC Display Page **1190,*G*** (where *G* = SM-2000), are the MCTSIs duplex (ACTIVE/STBY)?

    If **YES**, continue with Step 76.
    If **NO**, go to Step 78.

76. Enter the **403** poke to switch MCTSIs. If the switch is successful, the ACT/STBY status of the MCTSI sides displayed on the MCC should be switched.

77. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL**?

If **YES**, continue with Step 78.
If **NO**, go to Step 116.

78. Enter poke **1380** to display the QLPS network 0 status page on the MCC.

79. Obtain the status of the SM-2000s MH QPIPEs for this network by entering the **OP:QNETSTAT,SRCSM=***G***,QLPSNW=***E***,ALL** input message (where *G* is the SM-2000 number and *E* is the QLPS network).

80. Is the status of either of the SM-2000s MH QPIPEs on this network (reported in the **OP QNETSTAT** output message) **OOS FAR**?

    If **YES**, continue with Step 81.
    If **NO**, go to Step 87.

81. A status of **OOS FAR** indicates that errors occurred on the MH QPIPE associated with the QLPS that is currently STBY. The suspected location of the problem is in the communication module.

    NOTE: A status of **OOS FARLBK** or **OOS FARFLT** indicates the MH QPIPE associated with the active QLPS has failed. Recovery actions are performed later in this procedure for MH QPIPEs in these states.

82. Has a conditional QLPS switch of this network already been attempted by a previous step in this procedure?

    If **YES**, go to Step 87.
    If **NO**, continue with Step 83.

83. Enter the **42E** poke on MCC Display Page **138E** (where E is the QLPS network number) to conditionally switch the QLPS network. If the switch is successful, the ACT/STBY status of the QLPS units displayed on the MCC should be switched.

84. Was the QLPS switch successfully completed?

    If **YES**, continue with Step 85.
    If **NO**, go to Step 86.

85. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL**?

    If **YES**, go to Step 87.
    If **NO**, go to Step 116.

86. Was the QLPS switch request *denied* due to the possibility of connectivity problems on the QLPS network (check the **SW QLPS** output message printed in response to the request)?

    If **YES**, go to Step 95.
    If **NO**, continue with Step 87.

87. Are the QLPSs for this network both in service (ACTIVE/STBY)?

    If **YES**, continue with Step 88.
    If **NO**, go to Step 91.

88. Manually remove the STBY QLPS using the **RMV:QLPS=***D***-***E* input message (where *D* is the ONTC side supporting the **STBY** QLPS and *E* is the QLPS network).

89. Unconditionally restore the previous QLPS using the **RST:QLPS=***D***-***E***,UCL** input message.

90. Did the QLPS restored in the previous step become **ACTIVE**?

    If **YES**, go to Step 94.
    If **NO**, continue with Step 91.

91. Manually remove the ACTIVE QLPS using the **RMV:QLPS=***D***-***E* input message (where *D* is the ONTC side supporting the **ACTIVE** QLPS and *E* is the QLPS network).

92. Was the QLPS successfully removed from service?

    NOTE: The request may be denied if severe connectivity problems would result if the QLPS was removed from service.

    If **YES**, continue with Step 93.
    If **NO**, go to Step 94.

93. Unconditionally restore the previous QLPS using the **RST:QLPS=***D***-***E,UCL* input message.

94. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL**?

    If **YES**, continue with Step 95.
    If **NO**, go to Step 116.

95. Have the MH QPIPE recovery actions in Steps 79 through 94 been attempted for *both* QLPS networks?

    If **YES**, go to Step 97.
    If **NO**, continue with Step 96.

96. Enter MCC poke **1381** to display the QLPS network 1 status page. Then return to Step 79 in order to attempt additional recovery actions for QLPS network 1.

97. Are QGPs equipped?

    If **YES**, continue with Step 98.
    If **NO**, go to Step 108.

98. Determine whether all QLNKs to this SM-2000 are OOS due to parent hardware and/or QPIPE problems by entering the **OP:QNETSTAT,SRCSM=***G***,ALL** input message (where *G* = SM-2000). Are all QLNKs shown as **OOS FE** in the **OP QNETSTAT** output message?

    If **YES**, continue with Step 99.
    If **NO**, go to Step 100.

99. Communication to the SM-2000 through the QLPS networks cannot be established due to OOS communication module hardware and/or QPIPEs. Refer to Procedure 5.4 to diagnose and repair any OOS MSCUs, QGPs, QGLs, QGP QPIPEs, ONTCCOMs, QLPSs, QTMSLNKs, NLIs, or TMSLNKs.

    If none of the previous units (associated with the SM-2000 that has lost QLPS connectivity) are OOS, collect all available data and **seek technical assistance**.

    NOTE: Additional data that is likely to be helpful in resolving this problem includes **REPT TRBL**, **REPT POST MORTEM**, and assert/audit output messages printed on the ROP.

    STOP. YOU HAVE COMPLETED THIS PROCEDURE.

100. On MCC Display Page **1380**, is QGP 0-0 shown as **ACTIVE**?

If **YES**, continue with Step 101.
If **NO**, go to Step 105.

101. Manually remove QGP 0-0 using the **RMV:QGP=0-0** input message.

102. Was QGP 0-0 successfully removed from service?

NOTE: The request may be denied if severe connectivity problems would result if the QGP was removed from service.

If **YES**, continue with Step 103.
If **NO**, go to Step 105.

103. Unconditionally restore QGP 0-0 using the **RST:QGP=0-0,UCL** input message.

104. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL**?

If **YES**, continue with Step 105.
If **NO**, go to Step 116.

105. Has an attempt been made to remove and unconditionally restore all active QGPs?

If **YES**, go to Step 107.
If **NO**, continue with Step 106.

106. Repeat Steps 100 through 104 for all remaining active QGPs. Note that in an office equipped with four QGPs, the status of QGPs 0-1 and 1-1 is only shown on MCC Display Page **1381**.

107. Determine whether any QLNKs to this SM-2000 are OOS due to loss of the level 2 communication protocol by entering the **OP:QNETSTAT,SRCSM=*G*,ALL** input message (where *G* = SM-2000). Are any QLNKs shown as **OOS L2** in the **OP QNETSTAT** output message?

If **YES**, go to Step 113.
If **NO**, go to Step 115.

108. Determine whether all ISMQLNKs to this SM-2000 are OOS due to parent hardware and/or MH QPIPE problems by entering the **OP:QNETSTAT,SRCSM=*G*,ALL** (where *G* = SM-2000) input message. Are all ISMQLNKs shown as **OOS FE** in the **OP QNETSTAT** output message?

If **YES**, continue with Step 109.
If **NO**, go to Step 110.

109. Communication to the SM-2000 through ISMQLNKs cannot be established due to OOS communication module hardware and/or MH QPIPEs. Refer to Procedure 5.4 to diagnose and repair any OOS ONTCCOMs, QLPSs, QTMSLNKs, NLIs, or TMSLNKs.

If none of the previous units are OOS, collect all available data and **seek technical assistance**.

NOTE: Additional data that is likely to be helpful in resolving this problem includes **REPT TRBL**, **REPT POST MORTEM**, and assert/audit output messages printed on the ROP.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

110. Determine whether all ISMQLNKs to this SM-2000 are OOS due to far-end problems by entering the

OP:SYSSTAT,ALL input message. For each other SM-2000 to which ISMQLNKs are OOS, is one of the phrases **INITIALIZING**, **ISOLATED**, **COMM LOST**, **STNDALONE**, **INIT ISOL**, **QLPS ISOL**, **MAN ISOL**, **QMAN ISOL**, or **MH DGRD** shown?

If **YES**, continue with Step 111.
If **NO**, go to Step 112.

111. The SM-2000 has lost QLPS connectivity due to problems with all other QLPS-equipped SM-2000s. Those problems must be cleared before QLPS communication can be reestablished.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

112. Determine whether any ISMQLNKs to this SM-2000 are OOS due to loss of the level 2 communication protocol by entering the **OP:QNETSTAT,SRCSM=*G*,ALL** input message (where *G* = SM-2000). Are any ISMQLNKs shown as **OOS L2** in the **OP QNETSTAT** output message?

If **YES**, go to Step 113.
If **NO**, go to Step 115.

113. Wait 15 minutes to allow all automatic recovery actions to be exhausted. During this interval, use the **AUD:*X*,ENV=SMKP** input message (where *X* is QLPS, QGP, QPIPE, and QLNK) to execute audits of QLPS-related dynamic data.

114. Is the SM-2000 status still **QLNK LOST** or **QLPS ISOL**?

If **YES**, continue with Step 115.
If **NO**, go to Step 116.

115. The SM-2000 is unable to establish or maintain communication through the QLPS networks. Collect all available data and **seek technical assistance.**

NOTE: Additional data that is likely to be helpful in resolving this problem includes **REPT TRBL**, **REPT POST MORTEM**, and assert/audit output messages printed on the ROP.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

116. Communication between the AM and SM-2000 is established. Enter the **OP:QNETSTAT,SRCSM=*G*,ALL** input message (where *G* = SM-2000) to verify that QLNKs and/or ISMQLNKs are **ACTIVE**.

117. Are any QLNKs shown in the **ACTIVE** state?

If **YES**, go to Step 122.
If **NO**, continue with Step 118.

118. Are any ISMQLNKs shown in the **ACTIVE** state?

If **YES**, go to Step 122.
If **NO**, continue with Step 119.

119. Enter the **OP:SYSSTAT,SM=*G*** input message (where *G* = SM-2000) to determine the SM-2000 status. Is the phrase **INITIALIZING** shown?

If **YES**, continue with Step 120.
If **NO**, go to Step 121.

120. An SM-2000 cannot communicate through the QLPS networks during an initialization. Allow the SM-2000

initialization to complete and then recheck the SM-2000 status to determine whether QLPS communication was established.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

121. The SM-2000 is unable to establish or maintain communication through the QLPS networks. Collect all available data and **seek technical assistance.**

NOTE: Additional data that is likely to be helpful in resolving this problem includes **REPT TRBL**, **REPT POST MORTEM**, and assert/audit output messages printed on the ROP.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

122. The SM-2000 has established communication through the QLPS networks.

If the SM-2000 status is not **NORMAL**, or if other SMs/SM-2000s have an off-normal communication status, take appropriate corrective actions. Refer to 235-105-220, *Corrective Maintenance Procedures*.

123. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 6.11: PSU DUPLEX FAILURE

OVERVIEW

The intent of this procedure is to help resolve Packet Switch Unit (PSU) duplex failures. This procedure may require maintenance personnel to diagnose the following PSU related hardware:

- Packet Interface (PI) which is part of the MCTSI.
- PSU Common Controller (PSUCOMs)
- Packet Handler (PHs).

When working to resolve PSU functionality problems, support personnel should execute the following commands from the Master Control Center (MCC) or Trunk Line Work Station:

- Set the verbose flag on the switching module under test by entering the following poke commands:

  1800,sm# (The SM Inhibit and Recovery Control Page)
  412 (Set verbose).

- Allow the printing of PHs/PIs messages by turning on the "printmode" flag.

  chg:prntmode=on,sm=sm#,pp;

PROCEDURE

1. Before running diagnostics, verify the inhibit status of the SM. If hardware and software checks are inhibited allow them.

   Go to the SM Inhibit and Recovery Control Page (**1800,sm#**), and verify that hardware and software checks are allowed (poke **708** and **704** will allow hardware and software checks).

2. Run diagnostics on one side of the PSUCOM.

   Go to the PSU Network Page (**1186,sm#**) and poke **50X** (where **X** is the PSUCOM number).

3. If the diagnostics fail, look at the Trouble Location Procedure (TLP) list to determine what hardware is at fault. Replace items on the list as necessary and re-run Step 2 of this procedure.

4. If the diagnostics pass unconditionally, restore the PSUCOM to service.

   Go to the PSU Network Page (**1186,sm#**) and poke **30X,ucl** (where **X** is the PSUCOM number).

5. If the restore fails, switch PSUCOM sides and repeat Steps 2 through 4 on the other PSUCOM.

6. If the restore fails on both PSUCOMs, switch MCTSI sides and repeat Steps 2 through 4.

   Go to the MCTSI page (poke **1190,sm#**). If the mate MCTSI is in-service standby, enter a **403** poke to switch MCTSIs. If the mate MCTSI is out of service (OOS), conditionally restore the MCTSI **30X** (where **X** is the MCTSI side).

7. If the PSUCOM restores successfully, verify that all equipped PHs are in service.

Go to the PSU Network Page (**1186,sm**#). For each shelf status indicator box that shows degraded or OOS, go to the PSU Shelf Page (**118X** - where **X** is the shelf number).

For each PH that is OOS, run diagnostics and replace suspected faulty items as indicated on the TLP.

8. If the PSU is still in a duplex failure state, save the ROP and **seek technical support**.

7. COMMON NETWORK INTERFACE RING

GENERAL

This section has one procedure (7.1 — Analyze and Control Repair of CNI Failures). This procedure is used in the recovery of the *5ESS*®-2000 switch when the Administrative Module (AM) has been taken down by the Common Network Interface (CNI). When the CNI ring needs to be repaired and the AM is sane, the craft personnel should reference 235-190-120, *Common Channel Signaling Service Features*, for the appropriate recovery steps.

Procedure 7.1: ANALYZE AND CONTROL THE REPAIR OF CNI FAILURES

OVERVIEW

This procedure attempts to recover the common network interface (CNI) ring by fully initializing the CNI-related hardware and software. If CNI recovery is not successful, this procedure then attempts to isolate the CNI from the Administrative Module (AM) to aid AM recovery. In this case, this procedure does not restore the CNI to service. After the AM has recovered, to repair the CNI, maintenance personnel should refer to 235-190-120, *Common Channel Signaling Service Features*.

The following preconditions should be met before using this procedure:

(a) Check that the system is not in a disk independent operation (DIOP) or craft lockout condition. Recovery from either of these conditions should be accomplished prior to an attempt to recover the CNI.

(b) The AM has been rolling in initializations caused by failures in the CNI. This determination has been made through analysis of processor recovery messages (PRM) that has been performed in other procedures.

(c) Automatic recovery escalations have been exhausted, and manual intervention is required to recover the switch.

(d) The effects of the CNI Software and Hardware Inhibits feature on AM/CNI initializations must be understood. See Section 9.2.1.9 , CNI Escalation Strategy, in this document for additional information.

PROCEDURE

1. Observe the information provided in Note:

   NOTE: This procedure is associated with a service outage, therefore, the craft person should contact the Electronic Switching Action Center (ESAC), or equivalent, and Lucent Technologies support, [either the Regional Technical Assistance Center (RTAC) (1-800-225-RTAC) or Customer Technical Support (CTS) (1-800-225-4672)], while continuing to follow this procedure. Lucent Technologies support (RTAC or CTS) can provide additional support, if necessary, to resolve the problem. Lucent Technologies support should be contacted no later than 10 minutes after the start of a service outage triggered by an CNI initialization failure.

2. At the master control center (MCC) receive-only printer (ROP), locate the most recent printout of the failure processor recovery message (PRM) having the following format:
   PRM_a **F**cde ffgg gggg gggg xx xx xx

3. Is the field "de" equal to **33**? (RTR and application level 3 init)

   If **YES**, continue with Step 6.

   If **NO**, continue with the next step.

4. Allow automatic recovery actions to continue until field "de" is equal to **33** or until automatic recovery is successful.

5. Are AM initialization failures still occurring (repeated new initializations and/or failing PRMs)?

   If **YES**, continue with the next step.

If **NO**, continue with Step 20.

6. Inhibit AM hardware and software checks using application commands **34** and **36** on the emergency action interface (**EAI**) page of the MCC terminal. Use Section 4.7.2 to perform an AM selective initialization (D3) with a CNI level of C4 (application parameter **P**), this initialization (1) kills all CNI processes, (2) clears all CNI data in memory, (3) reloads CNI text and data from the Moving Head Disks (MHDs), and (4) pumps all the nodes on the ring with new text.

   NOTE: The inhibits do not become active until a manual RTR initialization level is applied per Table 4.6-1 . If automatic initializations are in progress, a manual initialization of at least the level of the automatic initialization level is required.

7. Monitor the ROP for a PRM of the following format, and note the value of field "ffff":

   PRM_a **EE**de ffff **047A 6**ggg xx xx xx

8. Is field "ffff" equal to **FF2D**?

   If **YES**, continue with the next step.

   If **NO**, continue with Step 20.

9. Is the communications module (CM) a "CM2"?

   If **YES**, continue with the next step.

   If **NO**, continue with Step 15.

10. Review the ROP and find the most recent printout of the "EE-40vv" PRM which has the following format:

    PRM_a **EE**de **40**fg hijj kkkk xx xx xx

11. Was the "EE-40vv" PRM printed with field `g' having a value of **3** or higher?

    If **YES**, continue with Step 15.

    If **NO**, continue with the next step.

12. Use Section 4.7.1 to perform an AM initialization (D4, S7, H0, C4) with AM/CM isolation (application parameter **O**).

13. Monitor the ROP for a PRM of the following format, and note the value of field "ffff":

    PRM_a **EE**de ffff **047A 6**ggg xx xx xx

14. Is field "ffff" equal to **FF2D**?

    If **YES**, continue with the next step.

    If **NO**, continue with Step 18.

15. Use Section 4.7.1 to perform an AM initialization (D4) with CNI minimum mode (application parameter **L**).

16. Monitor the ROP for a PRM of the following format, and note the value of field "ffff":

    PRM_a **EE**de ffff **047A 6**ggg xx xx xx

17. Is field "ffff" equal to **FF2D**?

    If **YES**, contact your next higher level of support immediately. Also return to the previous procedure for possible additional recovery actions.

    If **NO**, continue with Step 19.

18. Since AM/CM isolation was invoked in Step 12, the AM and CM must now be resynchronized. Use Procedure 5.1 to resynchronize the AM and CM and continue with Step 20.

19. The AM has recovered with CNI minimum mode in effect.

    CAUTION: The CCS call processing is disabled while CNI is in minimum mode.

    Escalate to your next higher level of support at this time. If repairs of the CNI are to be performed at this level, refer to 235-190-120, *Common Channel Signaling Service Features*, for further troubleshooting procedures.

    After CNI repairs have been made, CNI minimum mode must be cleared with the following MML command:

    CLR:MINMODE,CNI,LVL4

    Continue with Step 12.

20. Use Procedure 8.1 to determine whether common channel signaling (CCS) and non-CCS call processing have been restored.

21. Has CCS and non-CCS call processing been restored?

    If **YES**, continue with the next step.

    If **NO**, contact your next higher level of support immediately.

22. Monitor call processing and do not proceed any further unless call processing has been lost again or unless directed by your next higher level of support. When needed, go to Procedure 8.2 .

23. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8. MISCELLANEOUS PROCEDURES

GENERAL

This section contains miscellaneous descriptions and procedures pertaining to system recovery.

Procedure 8.1: DETERMINE IF CALL PROCESSING HAS BEEN RESTORED

PROCEDURE

1. At receive-only printer (ROP), has an **SMKP ESSENTIAL JOBS OPERATIONAL** processor recovery message (PRM) of the format **PRM_a EExx 60xx 0410 0500 hh hh hh** been printed out since the last administrative module (AM) full initialization?

   If **YES**, go to Step 4.

   If **NO**, continue with Step 2.

2. At ROP, has **START OF CU RECOVERY** message been printed more than five times since the last AM full initialization?

   If **YES**, go to Step 4.

   If **NO**, continue with Step 3.

3. Wait for either the **SMKP ESSENTIAL JOBS OPERATIONAL** PRM to be printed or for at least five occurrences of the **START OF CU RECOVERY** message, but no longer than 10 minutes.

4. Use the applicable substeps to verify call processing has been restored!

   (a) Check for dial tone at the subscriber line Main Distribution Frame (MDF). The dial tone check should be made on the Line Units and/or Integrated Service Line Units in the affected switching module/switching module-2000 (SM/SM-2000s).

   (b) Verify call processing has been restored to the affected SM/SM-2000(s) by making at least one intraswitch and one interswitch test call. This includes verifying that the test call can be originated from and terminated to the affected SM/SM-2000(s).

   (c) Verify Common Channel Signaling (CCS) functionality has been restored by making an outgoing CCS7/ISUP trunk call and/or by making a Transaction Capability Part (TCAP) call, any toll free call is sufficient (1-800- or 1-888).

5. Has call processing been restored (applicable units have dial tone and/or test calls complete) to all of the affected customers?

   If **NO**, escalate the problem to the next Customer Technical Support (CTS) level. Be prepared to provide the results of the call processing verification tests.

   If **YES**, inform CTS that the call processing verification tests have completed successfully.

6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 8.2: MONITOR CALL PROCESSING

PROCEDURE

1. Obtain all pertinent information associated with this initialization for analysis by Customer Technical Support (CTS).

   Reference: **Procedure 8.3**

2. At subscriber loop test frame, make an intermodule and intramodule test call for each switching module/switching module-2000 (SM/SM-2000).

3. Do any test calls complete?

   If **YES**, continue with Step 4.

   If **NO**, go to Step 6.

4. Observe the following ***Caution.***

   CAUTION: The system is operating in an abnormal state and should be closely monitored until this state can be cleared.

   All attempts should be made to contact CTS immediately.

   Continue making test calls every 2 to 5 minutes until CTS support is obtained.

5. Repeat from Step 3.

6. As soon as CTS support is obtained, alert CTS that call processing has been lost.

7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 8.3: COLLECT ALL INFORMATION ASSOCIATED WITH AUTOMATIC SYSTEM INITIALIZATION

OVERVIEW

If you reach this state, you have reestablished call processing to the *5ESS*®-2000 switch. It is now important that you gather all pertinent information associated with this initialization for analysis by the Electronic Switching Assistance Center (ESAC), the Regional Technical Assistance Center (RTAC), or the Customer Technical Support (CTS). If you are in an off-normal state, wait for technical assistance before trying to clear it.

PROCEDURE

1. At master control center (MCC) receive-only printer (ROP), obtain all ROP output that was generated from the time that the initialization occurred to the present time.
2. Compile all pertinent information in the following areas:
   - Recent change (RC) types that were entered prior to the initialization
   - Maintenance activities that were performed prior to the initialization.
3. At MCC video terminal, dump the information contained in the DAYLOG file to the ROP. This can be accomplished by one of the following input message.

   DUMP:DAYLOG,PRINT,DATE=mm-dd-yy,FROM=f,TO=g;

   Where: mm = month

   dd = day

   yy = year

   f = Time (military) approximately 2 hours before the initialization occurred

   g = Current time (military).
4. At MCC ROP, obtain printout of **DAYLOG** file.
5. Is the office CNI equipped?

   If **YES**, continue with Step 6.

   If **NO**, continue with Step 7.
6. At MCC video terminal, dump the information contained in the RPTERR file to the ROP. This can be accomplished by one of the following input message.

   DUMP:RPTERR,PRINT,DATE=mm-dd-yy,FROM=f,TO=g;

   Where: mm = month

   dd = day

yy = year

f = Time (military) approximately 2 hours before the initialization occurred

g = Current time (military).

7. If the recovery steps included an AM initialization, the *UNIX*® RTR system postmortem log file should also be dumped. This can be accomplished by using the following message.

   OP:LOG:LG=PMLOG,DATE=mmddyy,TIME=f&&g;

   The message variables are the same as indicated above.

8. At MCC ROP, obtain printout of **PMLOG** file.

9. Turn over all of the information collected to CTS.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 8.4: DATA COLLECTION FOR POST RECOVERY ANALYSIS

OVERVIEW

The intent of this procedure is to identify the type of information that allow *5ESS*®-2000 switch Customer Technical Support (CTS) to effectively investigate service interruptions and craft terminal lockouts.

PROCEDURE

1. Make a ***COPY*** of Figure 8.4-1 and enter specified information.
2. Use the following command to make a tape of all log and daylog files:

   exc:envir:uproc,fn="/bin/sh",args="-c"-"find /log/log -print | cpio -ocv > /dev/mt00";
3. Secure ROP data (2 hours before and after the incident).
4. Send tapes, ROP printout, and report to CTS in ***ONE*** package. If tapes are to be returned, put return address on the tape reels and not on the covers (or rings).

OFFICE INFORMATION

1. Office Name: ______________________
2. City and State: ______________________
3. Name, Number, and Title of person to contact:
4. Date and Time of Incident: ______________________

a. Name: ______________________

5. Software Release and Software Update Level: ______________________

b. Phone Number: ______________________

c. Title: ______________________

6. Temporary or Unofficial Updates: ______________________

d. Company/Org.: ______________________

OFFICE EQUIPAGE

7. AM Hardware (3B20D, 3B21D, 340-SMD, SCSI): ______________________
8. CM Hardware (CM1, CM2, CM2C): ______________________
9. Number of SMs/SM-2000s: ______________________
10. Number of RSMs/ORMs: ______________________

DESCRIPTION OF INCIDENT (AM, CMP, SM/SM-2000, CNI, Peripheral)

11. Type of Incident: ______________________
12. General Description of Events: ______________________
13. Describe any problems or interrupts that occurred before or during the incident: ______________________
14. Describe what manual action was taken, if any, in response to the problem (if applicable, identify procedure): ______________________
15. Describe growth activity prior to the incident: ______________________

Figure 8.4-1 Post Recovery Analysis Data Colection Form

9. SYSTEM RECOVERY DESCRIPTION

OVERVIEW

This section provides a description of the software and hardware recovery capabilities of the *5ESS*®-2000 switch. Both automatic and manual recovery capabilities are covered.

9.1 GUIDE TO DOCUMENT

9.1.1 GENERAL

The use of the word "system" is an attempt to define the heart of the *5ESS*®-2000 Switch. This set of essential components includes the administrative module (AM), communication module (CM) [including the communication module processor (CMP)] and the switching module/switching module-2000s (SM/SM-2000s). In conjunction with the CMP, enhancements that reduce the amount of coupling between the AM and CM allow some call processing to be preserved during AM recovery actions. Most recovery actions which occur in the AM do not impact the CM units.

9.1.2 RECOVERY DESCRIPTION

This section provides a description of the software and hardware recovery capabilities of the *5ESS*®-2000 switch. Both automatic and manual recovery capabilities are covered. The recovery strategy used to support a multiple SM/SM-2000 office is one of singling out initializations that provide a stand-alone processor recovery. The recovery design determines which specific processor initializations can occur without extending errors to other processors. This means an SM/SM-2000 can initialize and escalate to higher levels of initialization within its own processing complex, without causing initializations in the AM or any other SM/SM-2000. Similarly, the AM can initialize and escalate to higher levels of initialization without causing the CM or any of the SM/SM-2000s to initialize. Resynchronization of central resource data is provided via an interprocessor data synchronization capability which updates the AM to be consistent with any initialized SM/SM-2000. This decoupled approach to initialization is designed to increase reliability and performance by reducing the number of customer lines affected by a single initialization.

The Disk Independent Operation (DIOP) allows call processing even with duplex system disk failures. This is a critical alarm condition, and the disk subsystem should be restored as soon as possible (See Procedure 2.1).

The CMP processor increases the reliability of *5ESS*®-2000 switch non-Common Channel Signaling (non-CCS) call processing. The CMP is a required processor designed to provide recent change and call processing improvements, while providing real-time and memory relief for the AM. The decoupling of the system has been improved by the movement of most of the non-CCS call processing to the CMP and the addition of a manual option used to isolate the AM from the rest of the switch. These enhancements introduce new strategies and levels of initialization in both autonomous and manual recoveries of the system while providing greater flexibility for recovering the system without affecting call processing.

The intent of this section is to provide an understanding of the various levels of automatic and manual processor initializations that are used by the switch (automatically) or the maintenance person (manually) to recover the *5ESS*®-2000 switch. Any recovery procedures described in this section (Section 9) are intended for use by personnel who are familiar with system recovery procedures. Detailed (step-by-step) recovery procedures are provided in Sections 2 through 8 of this document.

9.1.3 SYSTEM RECOVERY PRINCIPLES

9.1.3.1 SYSTEM RECOVERY DEFINITION

In the *5ESS*®-2000 switch, system recovery supports the concept of a network of independent processors. This list of processors includes the AM, each SM/SM-2000, and the CMP. Therefore, processor initialization during recovery provides a self-contained recovery within each processor without affecting other processors. The processor initialization is the mechanism used to recover from errors, faults, and failures by performing a deterministic sequence of software and hardware actions that bring the processor to an operable (sane) state.

The operational status of other processors in the network should not be affected by an initializing processor. Similarly, an initialization in one processor should not trigger recovery actions in other processors in the network. However, due to the presence of related data distributed among different processors, supplementary actions to resynchronize this data is required following some initializations.

Each processor has several predefined levels of initialization which may be triggered manually and/or automatically. The lowest levels have minimal impact on call processing while the highest completely initialize the processor, which can clear all stable calls. The determination of what calls are lost depends on the processor being initialized, the software release being used, and vintage of the CM units. It is possible that no transient calls are lost when an initialization is performed on the AM.

NOTE: The appropriate level for a particular problem or system condition has two boundary conditions that govern the escalation strategy. First, it should have the minimum impact on the system; and second, it should be high enough to clear the problem.

The goal of the escalation strategy is to recover the system in the shortest possible time without requiring further levels of initialization. However, the escalation strategy must also guarantee forward progress toward recovery by requesting higher levels of initialization when lower levels prove to be inadequate. As a backup to automatic initializations, manual initializations are provided. The manual initializations allow the initialization of a single-processor (that is, AM, SM/SM-2000, or CMP) or the entire system. They are intended for use only when automatic initializations fail.

9.1.3.2 POWER SUPPORTING INFORMATION

The following is supporting information for service personnel to use when responding to power-related service interruptions:

- Table 3.9-1 — BUS A1 Fuse Assignment Label
- Table 3.9-2 — BUS A2 Fuse Assignment Label
- Figure 3.9-1 — PCFD Bus Panel and Control Panel Components
- Figure 3.9-2 — GPDF Bus Panel and Alarm Status Panel Components
- Figure 3.9-3 — LU Cabinet Fuse Assignments
- Figure 3.9-4 — ISLU Cabinet Fuse Assignments
- Figure 9.1-1 — PCFD Power Plant Circuit Tripped/Opened
- Figure 9.1-2 — Replace PCFD Filter Fuse
- Figure 9.1-3 — Replace PCFD Load Fuse - for All Units (Except LUs, PSUs, and ISLUs/RISLUs)
- Figure 9.1-4 — Replace PCFD Load Fuse - for LUs Equipped with all APR Grids
- Figure 9.1-5 — Replace PCFD Load Fuse - for Model 1 and 2 LUs that are not equipped with all APR Grids
- Figure 9.1-6 — Flow Diagram, Replace PCFD Load Fuse - for PSUs
- Figure 9.1-7 — Replace PCFD Load Fuse - for ISLUs/RISLUs
- Figure 3.9-5 — Modular Fuse Filter Unit (MFFU).

9.1.3.3 INITIALIZATION OVERVIEW

The objective of a single-processor initialization or system initialization is to set the processor or system to a known state from which it can resume service. Automatic initializations are requested by system integrity control programs which are part of the system integrity software subsystem. Manual AM or system (AM, CM, and all SM/SM-2000s) initializations can be requested by maintenance personnel from the emergency action interface (EAI) (refer to 235-105-110, *System Maintenance Requirements and Tools*). The EAI page is available at the master control center (MCC). The SM/SM-2000 initializations can be requested by entering an input command or by selecting MCC Display Page 1800,x and entering the desired poke (command) to start the initialization (refer to 235-105-110, *System Maintenance Requirements and Tools*). The CMP initializations can be requested by entering an input command or by selecting MCC Display Page 1850 or 1851 and entering the desired poke (command) to start the initialization (Table 9.1-1).

There are generally three stages in a level of initialization. They are as follows:

- Initialization analysis stage, performed by software recovery control (SRC), and switch maintenance
- Software initialization stage
- Post-recovery stage.

Basically, the initialization analysis stage gathers information from several sources to determine what autonomous steps should be taken to bring this processor back to a sane state. The source for this information can be status from hardware units crucial to the initializing processor, the checks which test the correctness of software programs, the permanent data, the previous escalation levels, the inhibit control which can mask interrupts, and the hashsum checks on programs and translation data. After the information is gathered, analysis is performed using all of the historical data (for example, error counts), initialization triggers, and the previous information to determine which level of initialization should be invoked. As part of this step, some information is stored for reporting purposes (for example, post-mortem dumps) and for future analysis. Hardware selections can also be made during this step, informing the software initialization stage that the recovery actions should be performed on specified units.

After the initialization analysis stage has been completed, the corresponding software initialization runs using the hardware units which the switch maintenance subsystem determined to be reliable, or more suitable to initialization than other hardware units. The software initialization stage reloads programs, if needed, to guarantee that the permanent data and programs are correct. Ensuring the consistency of transient data for calls also belongs to the software initialization stage. Any calls that have inconsistent data are torn down in a selective initialization. Depending on the processor involved, a full initialization can tear down all calls in the processor(s).

The post-recovery stage deals with the resumption of call processing after the system is brought to a sane state. The tasks involved include (post-mortem) dumps.

Initializations may be triggered by the following mechanisms:

- Hardware interrupts
- Hardware resets
- Duplex hardware failures
- Program defensive check failures (ASSERTS)
- Audits
- Integrity monitor checks
- Initialization failures
- Manual request by maintenance personnel.

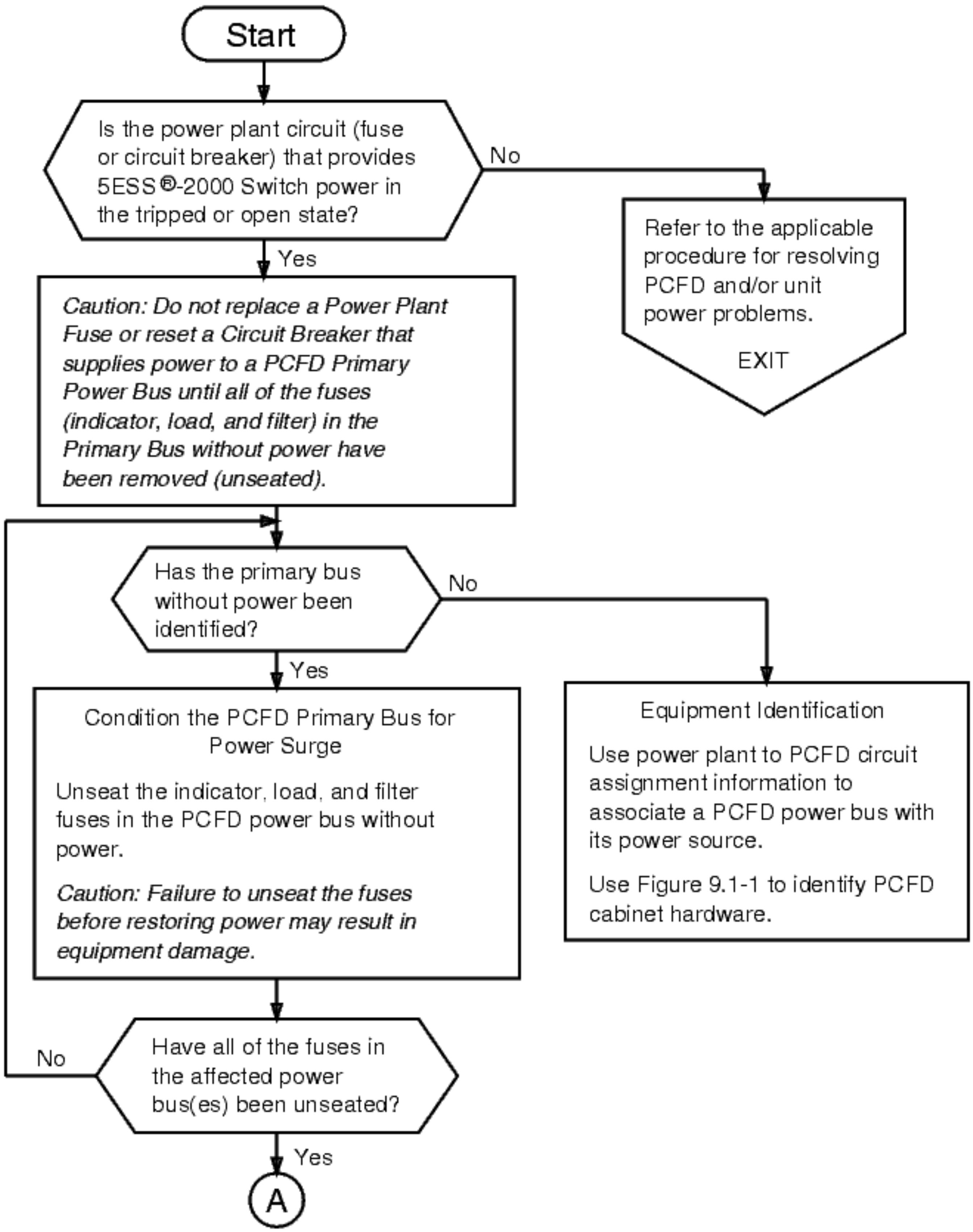
The *5ESS*®-2000 switch initialization plan separates the various initializations into the following categories:

- AM-only recovery
- AM and communication module (CM) only recovery
- CMP-only recovery
- Common Network Interface (CNI)-only recovery
- SM/SM-2000-only recovery
- System recovery (AM, CM, and all SM/SM-2000s).

Each category consists of various levels of initializations. The different categories and levels of initializations are covered in detail in Sections 9.2 , 9.2.2 , and 9.2.3 .

Table 9.1-1 Communication Module Processor (CMP) Initializations in Order of Severity

INITIALIZATION TYPE	MCC COMMAND	PAGE 1850 or 1851 (POKE)
Single Process-Purge (SPP)	INIT:CMP=0,B,D; B is {PRIM|MATE} D is SPP,PID=Y Y is process number.	—
Purging Initialization (PGI)	INIT:CMP=0,B,PGI; B is {PRIM|MATE}	919
Selective Initialization (SI)	INIT:CMP=0,B,SI; B is {PRIM|MATE}	920
Full Initialization (FI)	INIT:CMP=0,B,FI; B is {PRIM|MATE}	922
FI with Pump	INIT:CMP=0,B,D; B is {PRIM|MATE} D is FI,PUMP	923


Start
Is the power plant circuit (fuse or circuit breaker) that provides 5ESS®-2000 Switch power in the tripped or open state?
No
Refer to the applicable procedure for resolving PCFD and/or unit power problems.
EXIT
Yes
Caution: Do not replace a Power Plant Fuse or reset a Circuit Breaker that supplies power to a PCFD Primary Power Bus until all of the fuses (indicator, load, and filter) in the Primary Bus without power have been removed (unseated).
Has the primary bus without power been identified?
No
Equipment Identification
Use power plant to PCFD circuit assignment information to associate a PCFD power bus with its power source.
Use Figure 9.1-1 to identify PCFD cabinet hardware.
Yes
Condition the PCFD Primary Bus for Power Surge
Unseat the indicator, load, and filter fuses in the PCFD power bus without power.
Caution: Failure to unseat the fuses before restoring power may result in equipment damage.
Have all of the fuses in the affected power bus(es) been unseated?
No
Yes
A

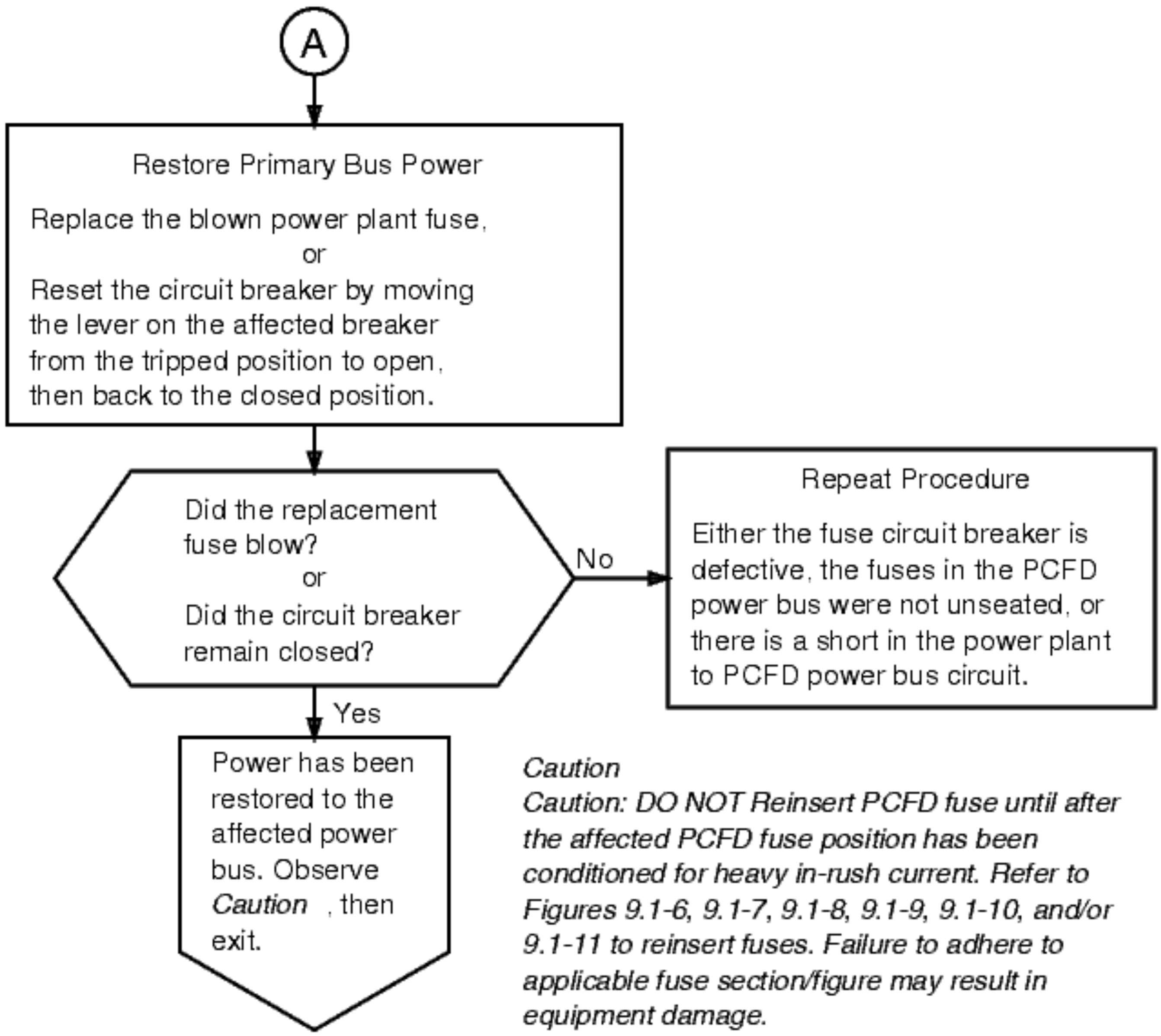
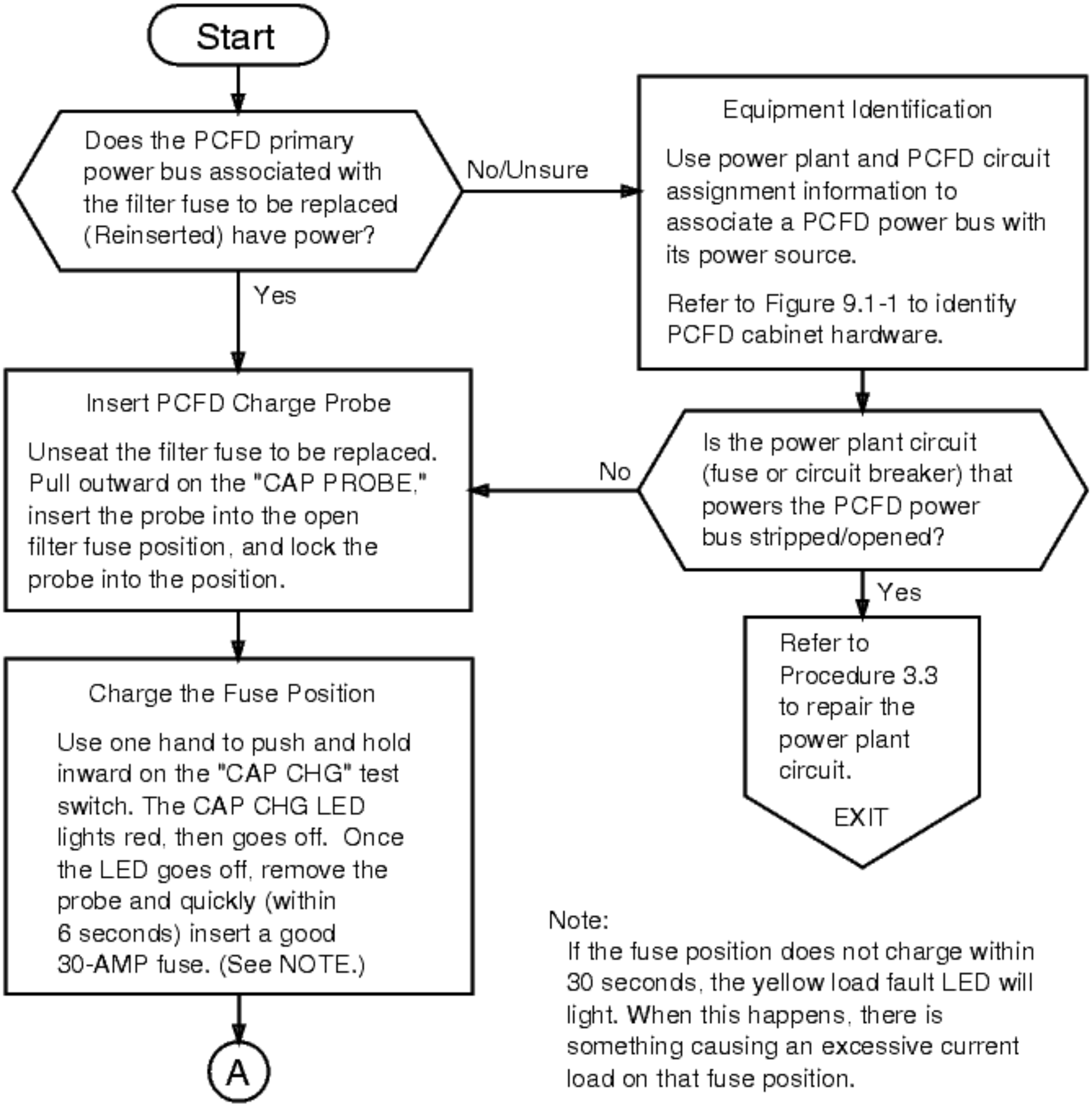


Figure 9.1-1 PCFD Power Plant Circuit Tripped/Opened


Start
Does the PCFD primary power bus associated with the filter fuse to be replaced (Reinserted) have power?
No/Unsure
Equipment Identification
Use power plant and PCFD circuit assignment information to associate a PCFD power bus with its power source.
Refer to Figure 9.1-1 to identify PCFD cabinet hardware.
Yes
Insert PCFD Charge Probe
Unseat the filter fuse to be replaced. Pull outward on the "CAP PROBE," insert the probe into the open filter fuse position, and lock the probe into the position.
No
Is the power plant circuit (fuse or circuit breaker) that powers the PCFD power bus stripped/opened?
Yes
Refer to Procedure 3.3 to repair the power plant circuit.
EXIT
Charge the Fuse Position
Use one hand to push and hold inward on the "CAP CHG" test switch. The CAP CHG LED lights red, then goes off. Once the LED goes off, remove the probe and quickly (within 6 seconds) insert a good 30-AMP fuse. (See NOTE.)
A
Note:
If the fuse position does not charge within 30 seconds, the yellow load fault LED will light. When this happens, there is something causing an excessive current load on that fuse position.

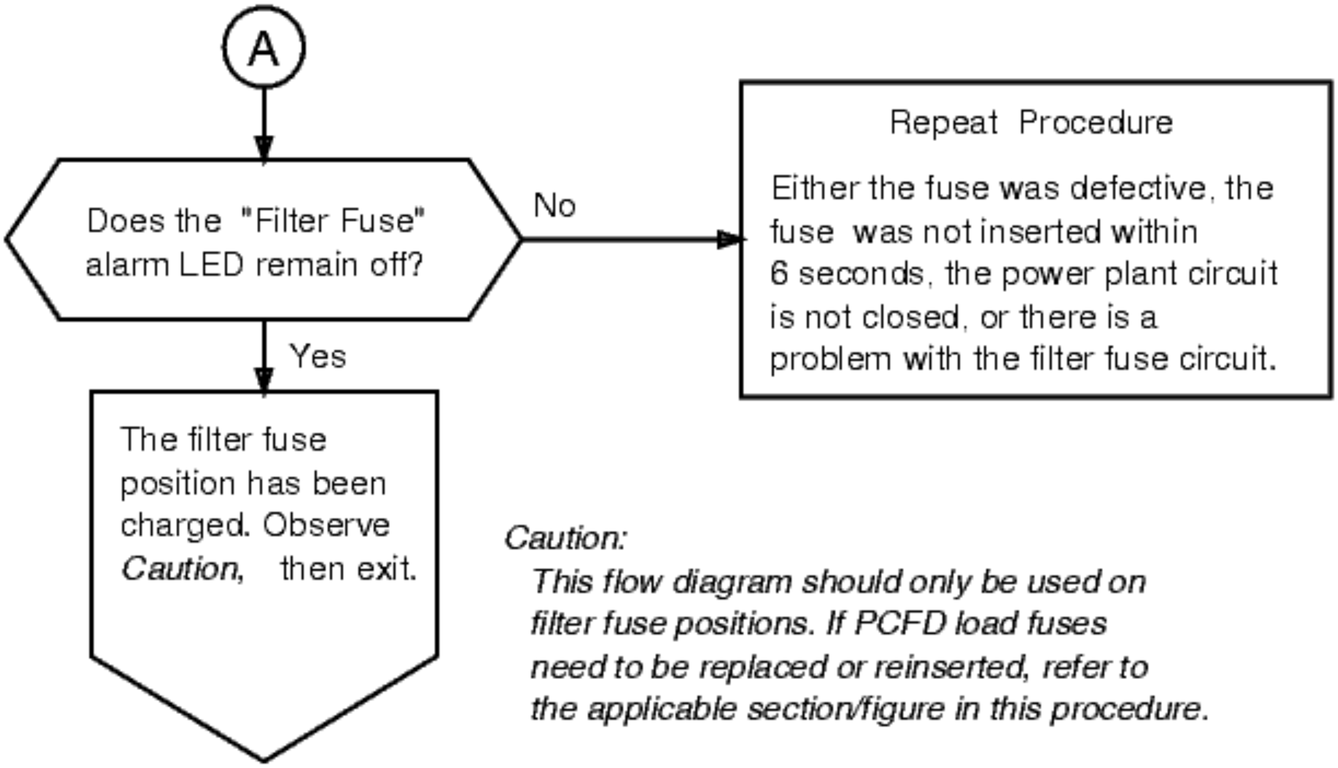
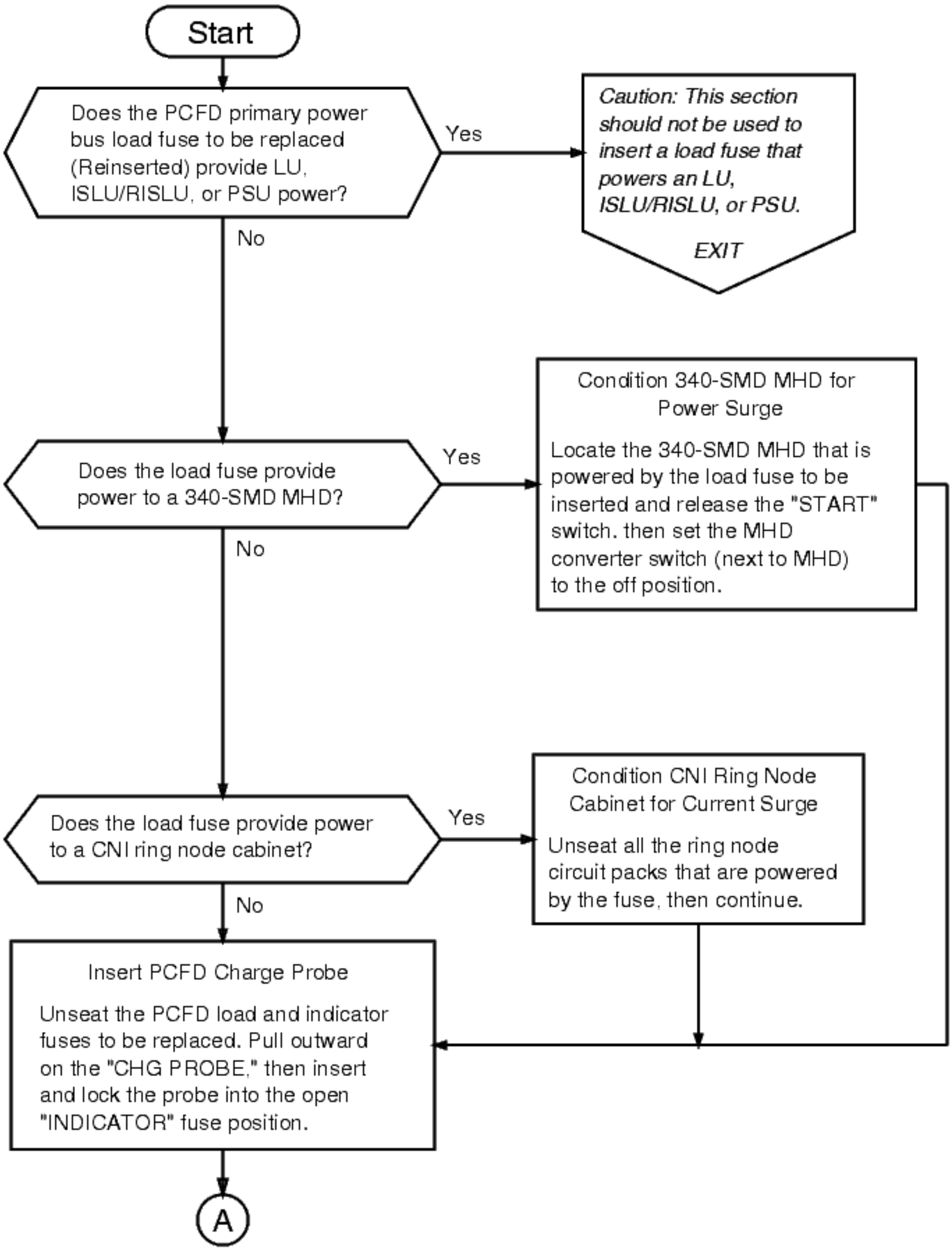
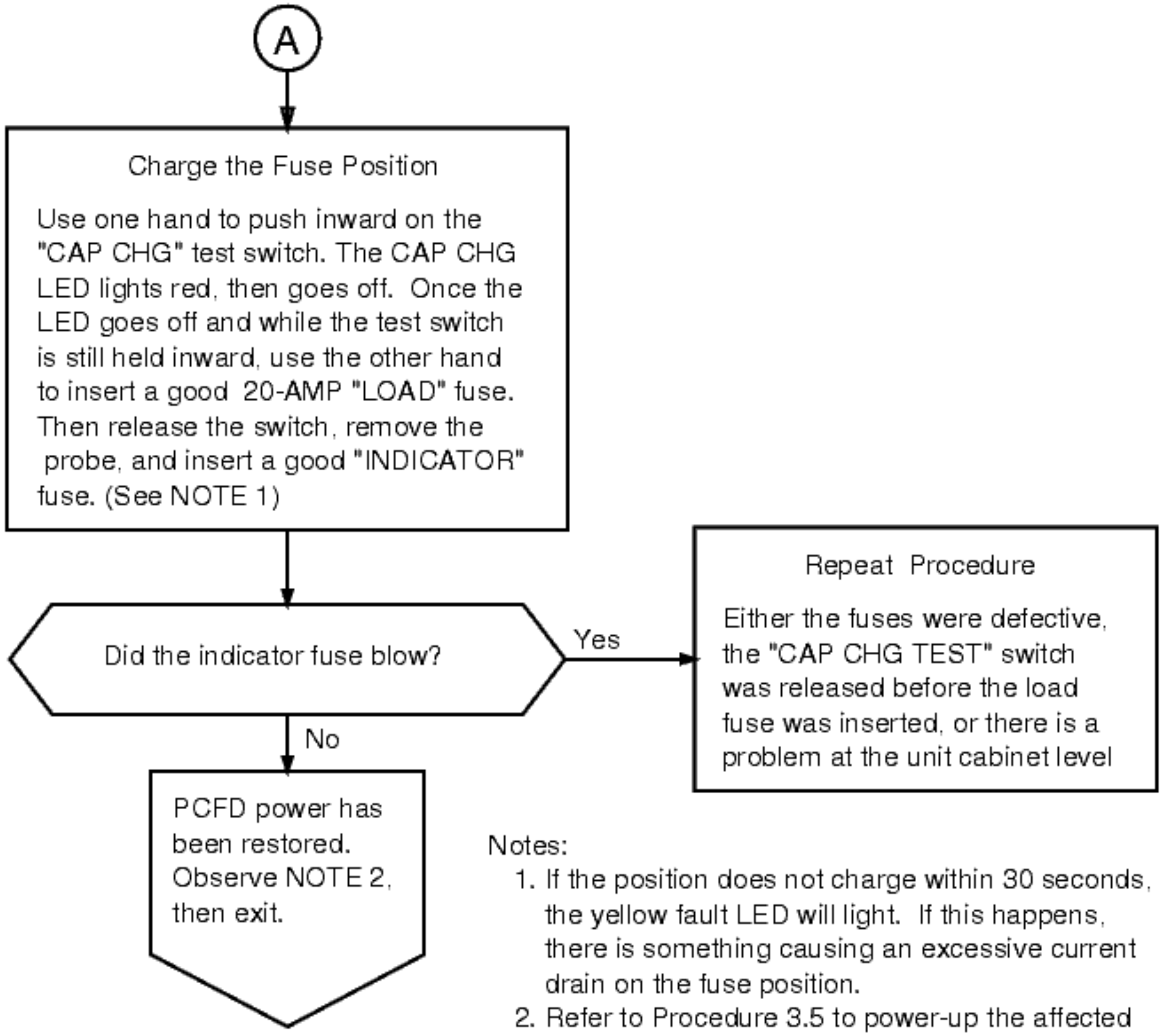


Figure 9.1-2 Replace PCFD Filter Fuse

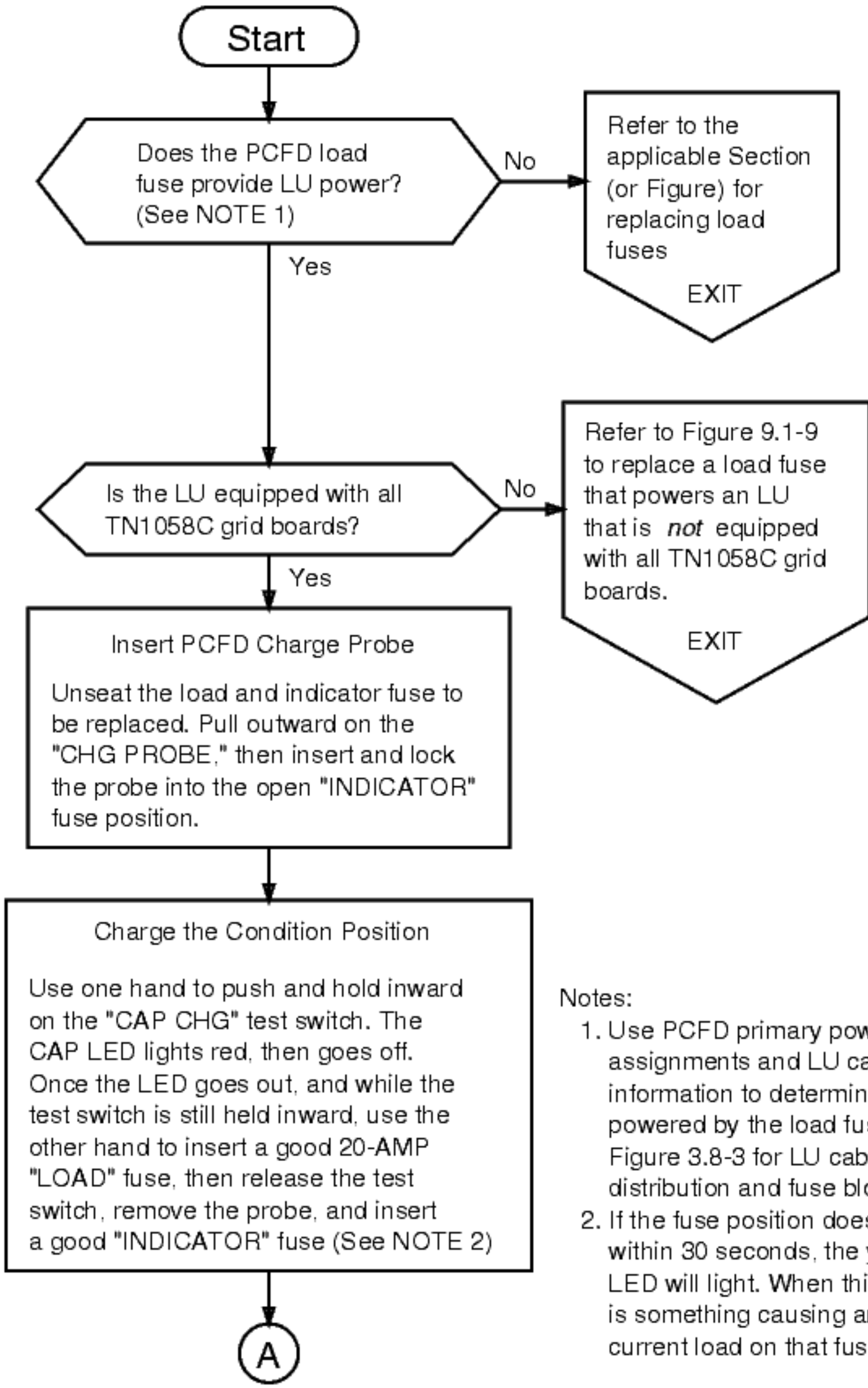

Start
Does the PCFD primary power bus load fuse to be replaced (Reinserted) provide LU, ISLU/RISLU, or PSU power?
Yes
Caution: This section should not be used to insert a load fuse that powers an LU, ISLU/RISLU, or PSU.
EXIT
No
Does the load fuse provide power to a 340-SMD MHD?
Yes
Condition 340-SMD MHD for Power Surge
Locate the 340-SMD MHD that is powered by the load fuse to be inserted and release the "START" switch. then set the MHD converter switch (next to MHD) to the off position.
No
Does the load fuse provide power to a CNI ring node cabinet?
Yes
Condition CNI Ring Node Cabinet for Current Surge
Unseat all the ring node circuit packs that are powered by the fuse, then continue.
No
Insert PCFD Charge Probe
Unseat the PCFD load and indicator fuses to be replaced. Pull outward on the "CHG PROBE," then insert and lock the probe into the open "INDICATOR" fuse position.
A



Notes:

1. If the position does not charge within 30 seconds, the yellow fault LED will light. If this happens, there is something causing an excessive current drain on the fuse position.
2. Refer to Procedure 3.5 to power-up the affected unit and to return the unit to the operation state.

Figure 9.1-3 Replace PCFD Load Fuse for All Units (Except LUs, PSUs, and ISLUs/RISLUs)



Notes:

1. Use PCFD primary power bus fuse assignments and LU cabinet fuse information to determine what LU is powered by the load fuse. Refer to Figure 3.8-3 for LU cabinet power distribution and fuse blocks.
2. If the fuse position does not charge within 30 seconds, the yellow load fault LED will light. When this happens, there is something causing an excessive current load on that fuse position.

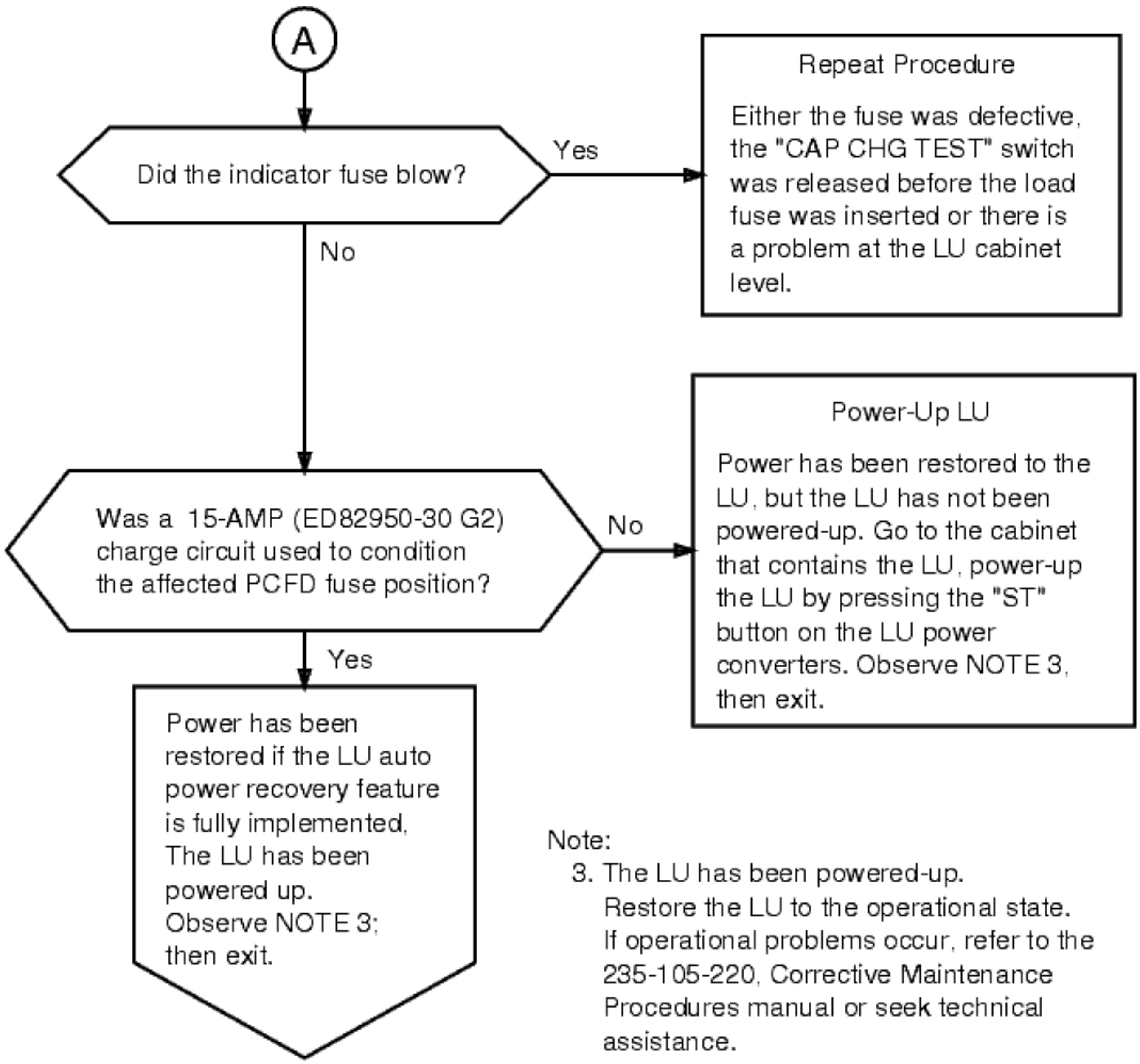
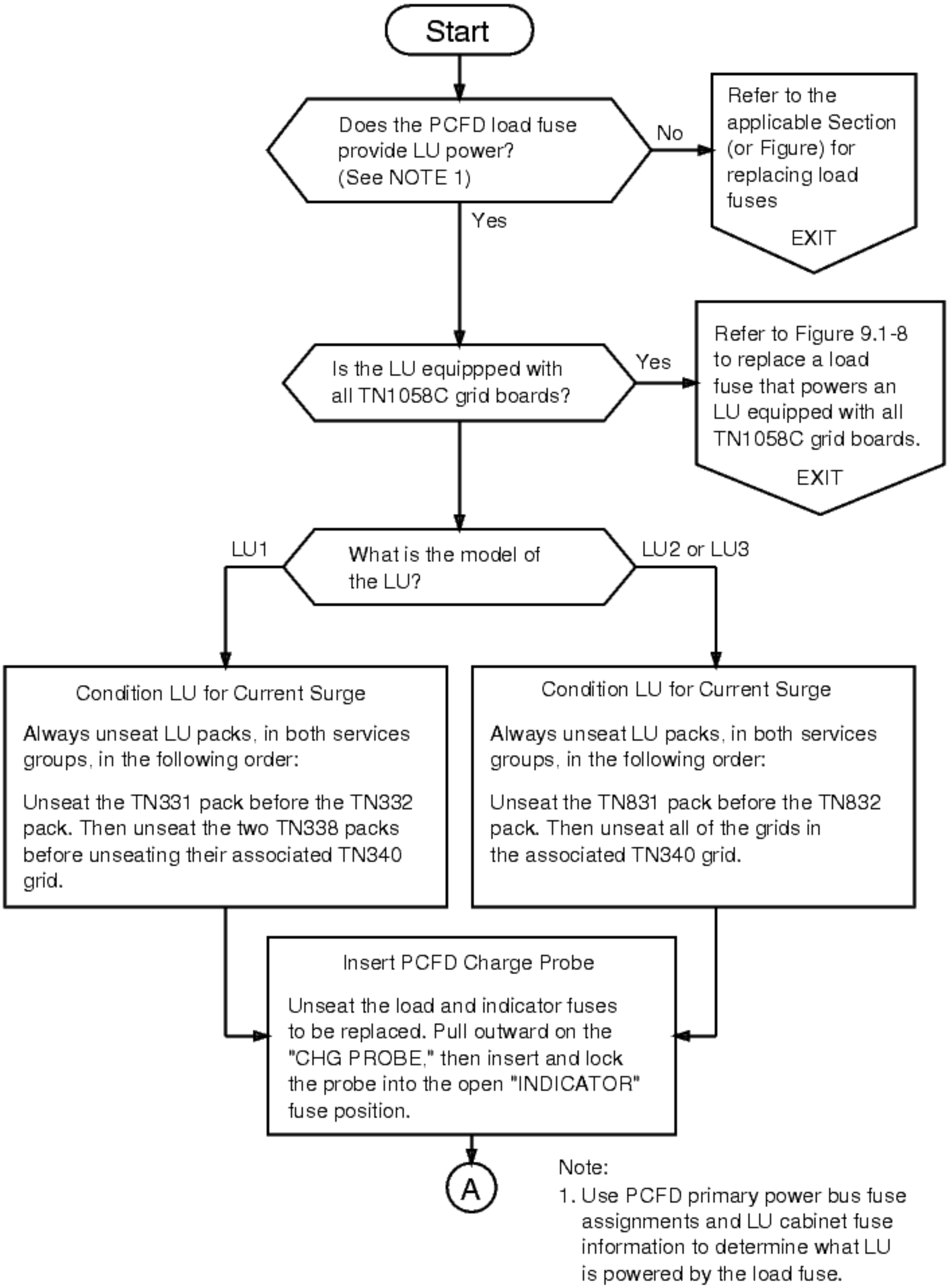


Figure 9.1-4 Replace PCFD Load Fuse for LUs Equipped with All APR Grids


Start
Does the PCFD load fuse provide LU power? (See NOTE 1)
No
Refer to the applicable Section (or Figure) for replacing load fuses
EXIT
Yes
Is the LU equippped with all TN1058C grid boards?
Yes
Refer to Figure 9.1-8 to replace a load fuse that powers an LU equipped with all TN1058C grid boards.
EXIT
LU1
What is the model of the LU?
LU2 or LU3
Condition LU for Current Surge
Always unseat LU packs, in both services groups, in the following order:
Unseat the TN331 pack before the TN332 pack. Then unseat the two TN338 packs before unseating their associated TN340 grid.
Condition LU for Current Surge
Always unseat LU packs, in both services groups, in the following order:
Unseat the TN831 pack before the TN832 pack. Then unseat all of the grids in the associated TN340 grid.
Insert PCFD Charge Probe
Unseat the load and indicator fuses to be replaced. Pull outward on the "CHG PROBE," then insert and lock the probe into the open "INDICATOR" fuse position.
A
Note:
1. Use PCFD primary power bus fuse assignments and LU cabinet fuse information to determine what LU is powered by the load fuse.

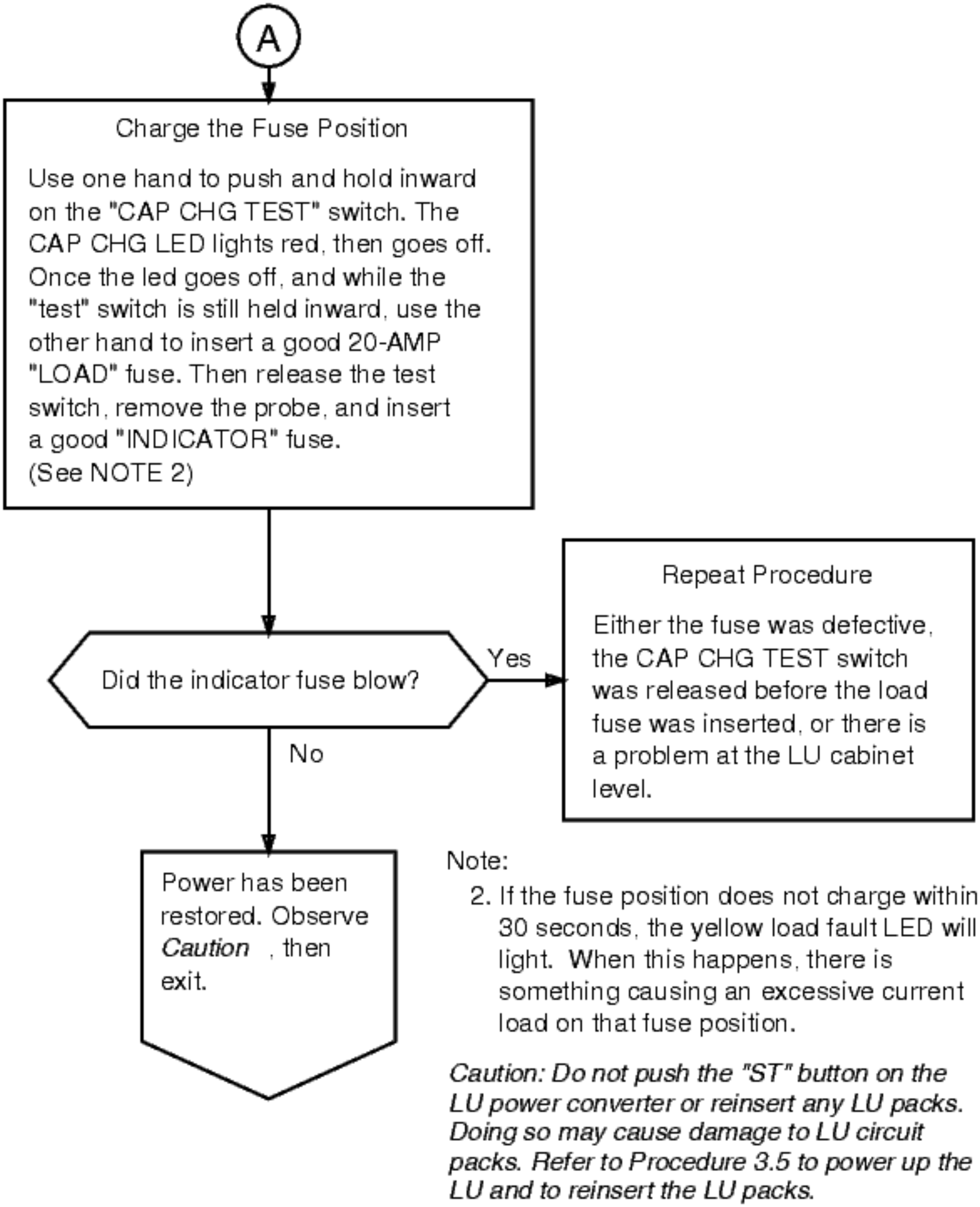
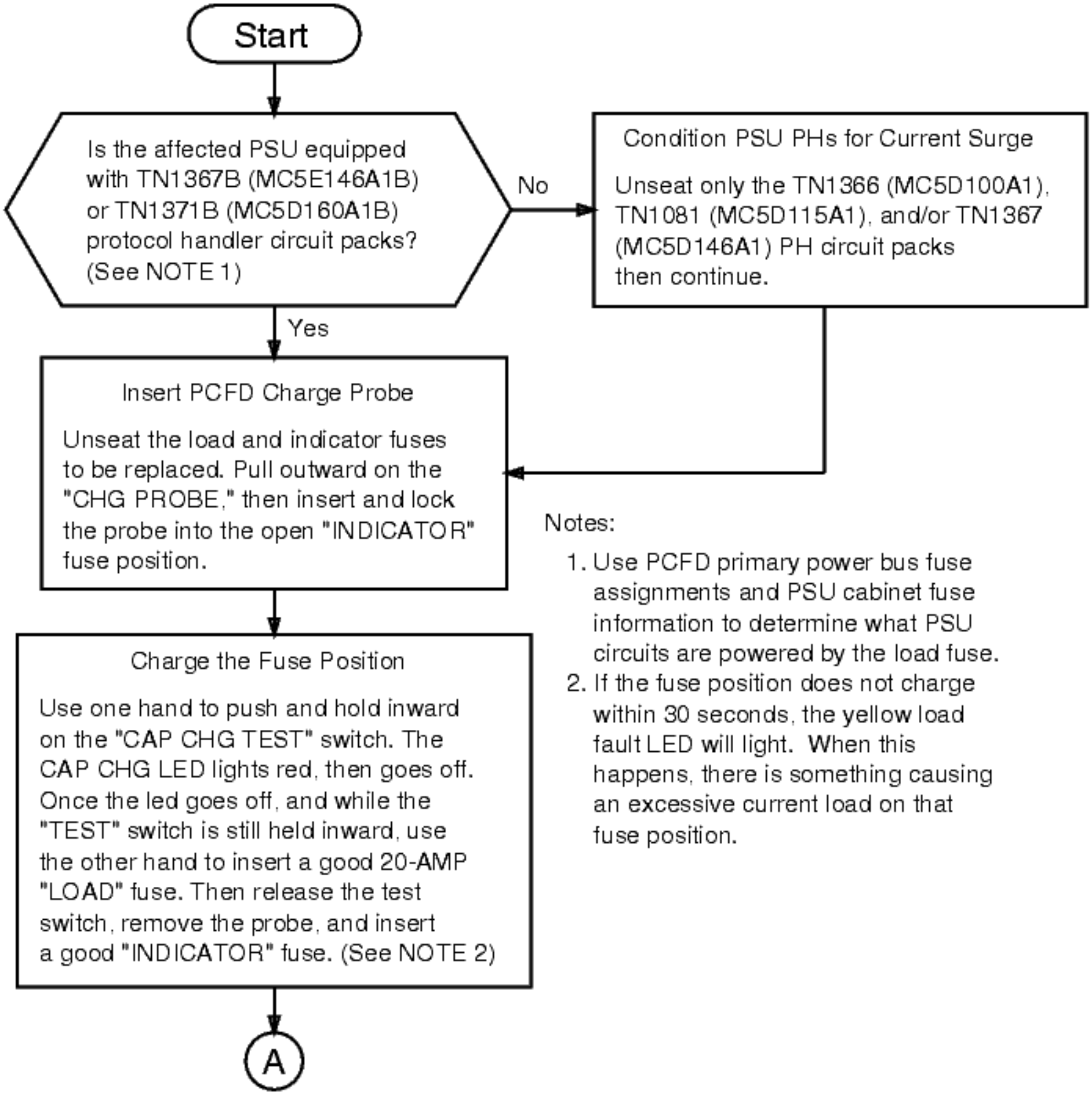


Figure 9.1-5 Replace PCFD Load Fuse for LUs Not Equipped with All APR Grids



Notes:

1. Use PCFD primary power bus fuse assignments and PSU cabinet fuse information to determine what PSU circuits are powered by the load fuse.
2. If the fuse position does not charge within 30 seconds, the yellow load fault LED will light. When this happens, there is something causing an excessive current load on that fuse position.

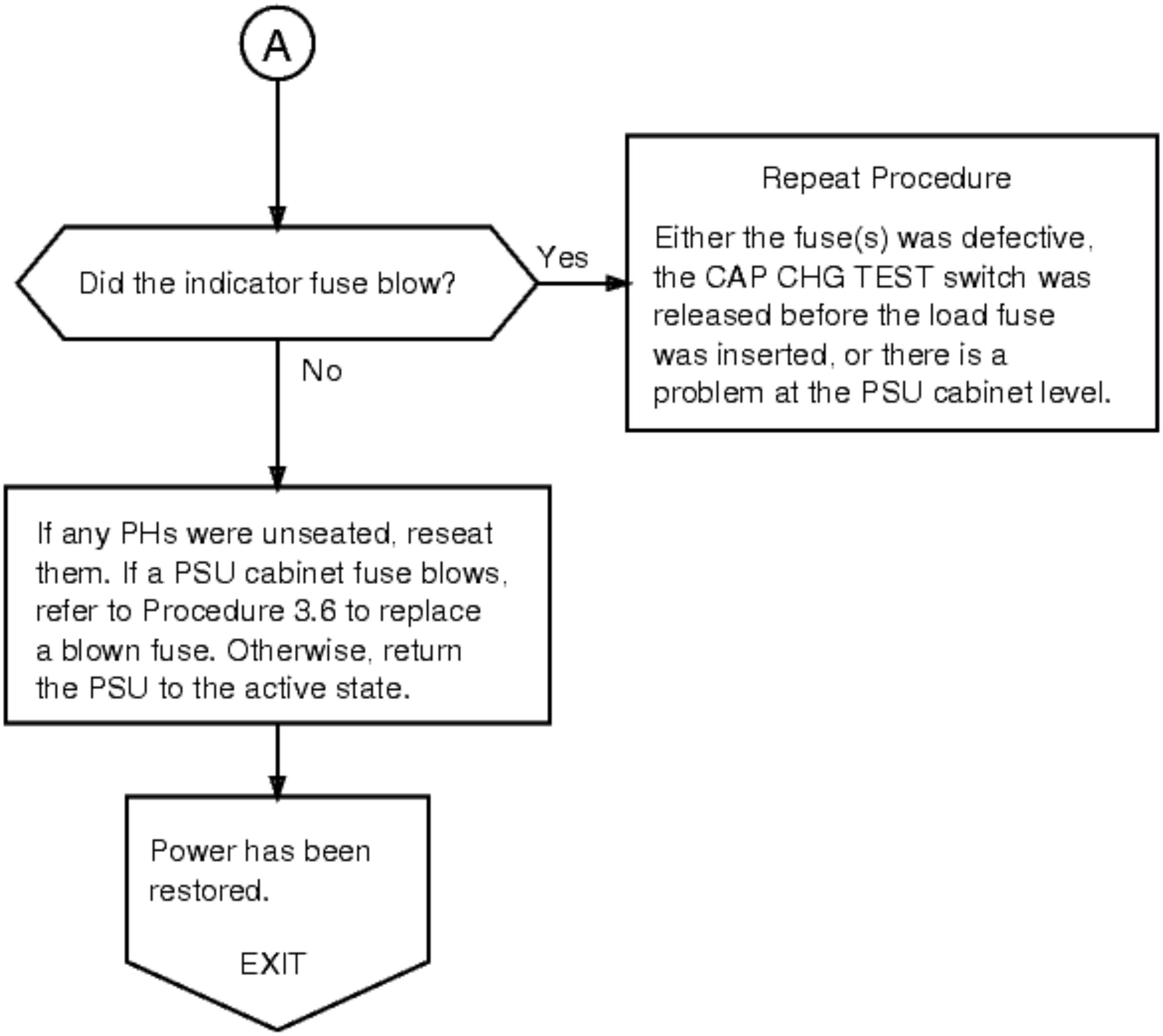
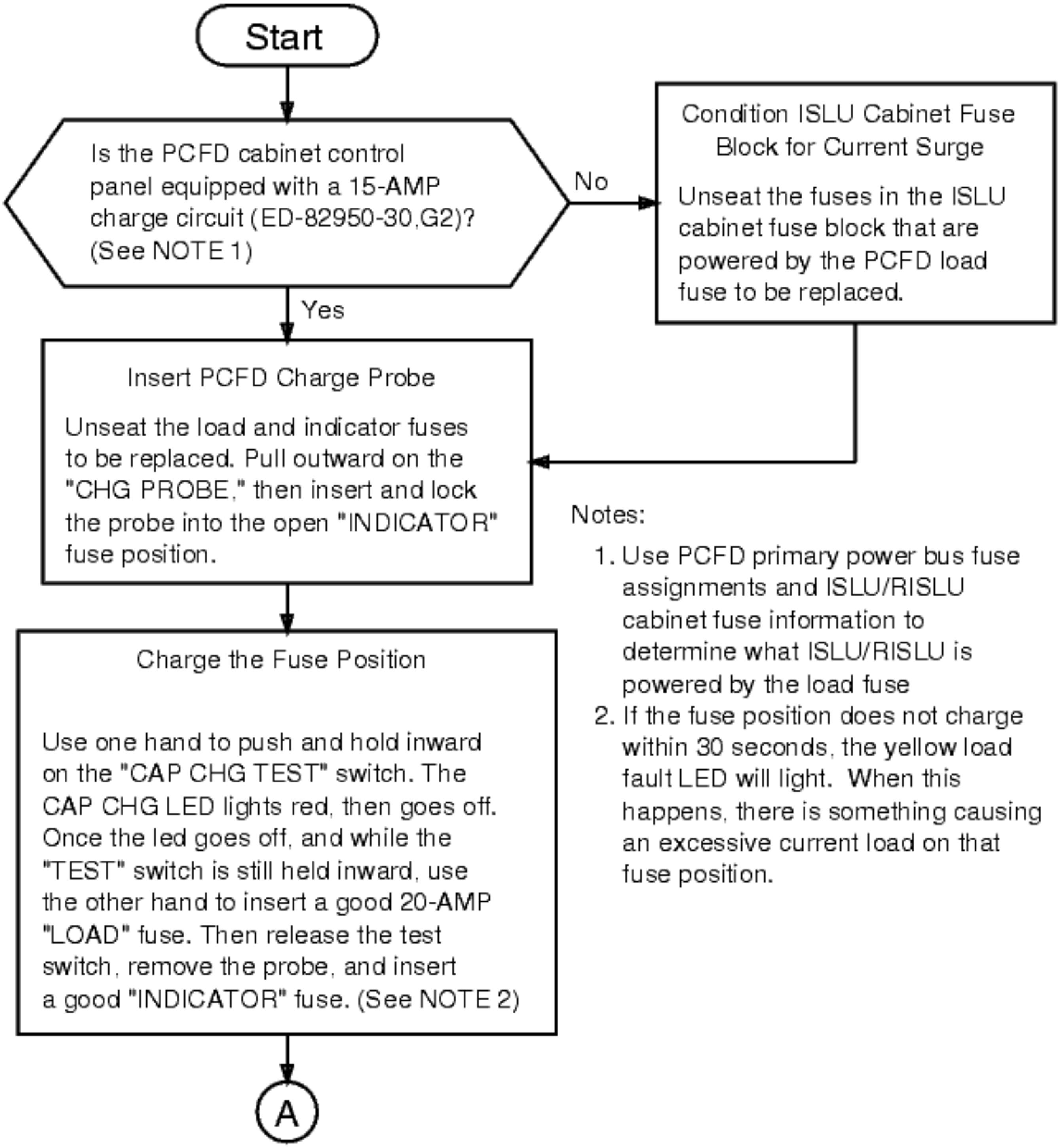


Figure 9.1-6 Replace PCFD Load Fuse for PSUs



Notes:

1. Use PCFD primary power bus fuse assignments and ISLU/RISLU cabinet fuse information to determine what ISLU/RISLU is powered by the load fuse
2. If the fuse position does not charge within 30 seconds, the yellow load fault LED will light. When this happens, there is something causing an excessive current load on that fuse position.

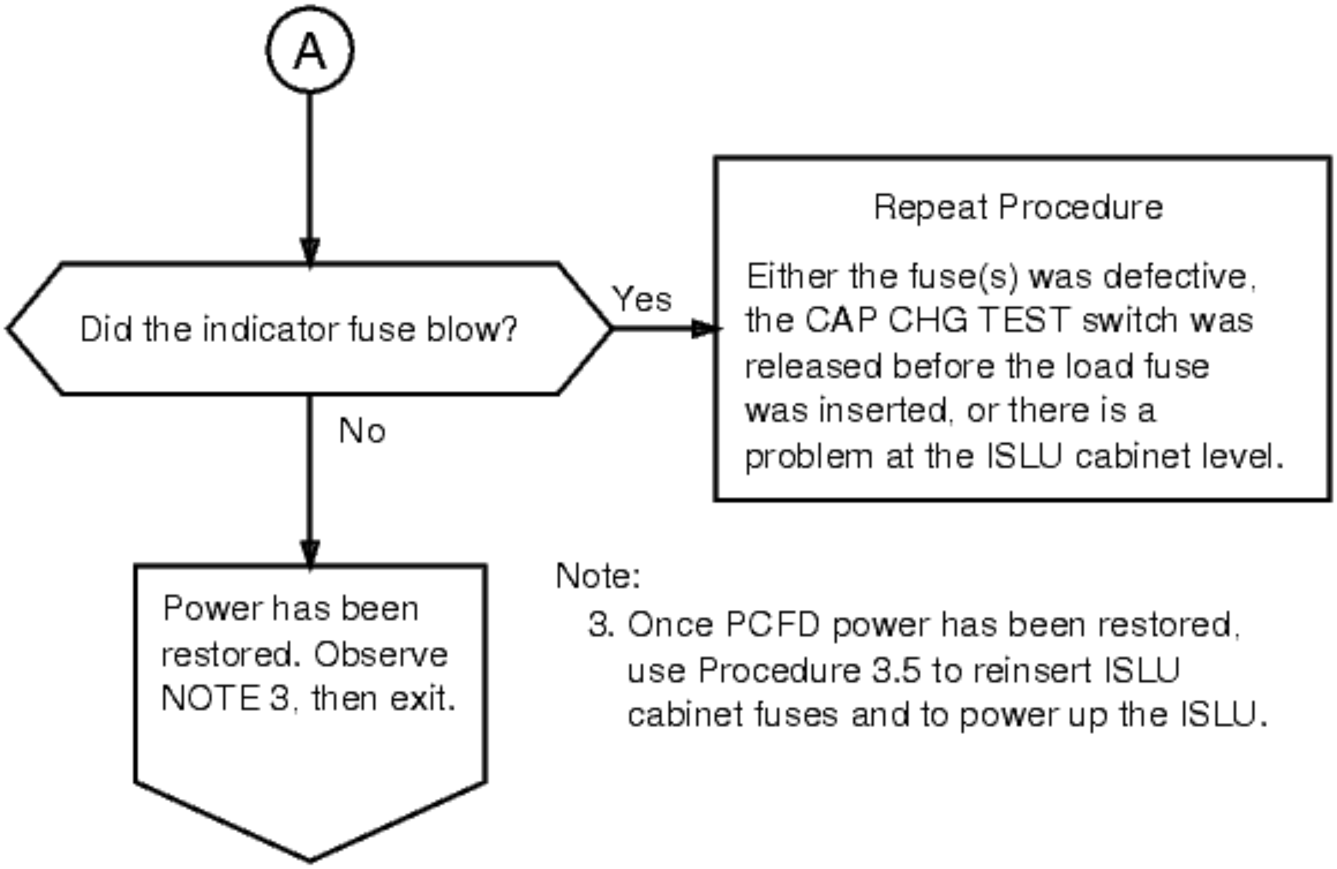


Figure 9.1-7 Replace PCFD Load Fuse - for ISLUs/RISLUs

9.2 EQUIPMENT RECOVERY LEVELS

9.2.1 ADMINISTRATIVE MODULE RECOVERY LEVELS

9.2.1.1 COMPONENTS OF AM INITIALIZATION

The administrative module initialization plan consists of the following components of initializations:

- AM *UNIX*® real-time reliable (RTR) system levels
- AM application software levels
- AM application hardware levels
- Common network interface (CNI) levels
- Interprocessor message switch (IMS) levels.

Each previous category consists of various initialization levels. The categories and levels are discussed in detail in the following text.

9.2.1.2 *UNIX*® RTR SYSTEM LEVELS

9.2.1.2.1 Overview

There are five initialization levels defined in the *UNIX*® RTR system. The *UNIX*® RTR system initializations are designated D0 through D4 with D4 being the most severe. The *UNIX*® RTR system levels D2, D3, and D4 perform a bootstrap of the AM. The successive running of these levels within the initialization interval cause the 3B20D/3B21D computer recovery software escalation levels to switch the AM and the disk file controller (DFC) in such a way that all four combinations of these units are tried. Figure 9.2-1 shows a breakdown of the different components of *UNIX*® RTR system initializations.

9.2.1.2.2 D0 Level 0

Level D0 is not really an initialization of the *UNIX*® RTR operating system. This level is used by the application as a means to pass parameters to the application integrity monitor (AIM) kernel process. All application parameters are shown in Table 9.2-1 and Table 9.2-2 .

9.2.1.2.3 D1 Level 1

Level D1 is the lowest level of a true *UNIX*® RTR system initialization. This level can be performed if a maintenance interrupt occurs on the AM or low-level software problems are encountered. If this level is run successively during the initialization interval, a processor switch is attempted each subsequent time. The software effect is that the kernel stack is initialized and all the kernel processes and the running supervisor process are informed via their fault entry. The intent of this level is for each affected process to initialize the current task being processed and roll back to a safe point.

9.2.1.2.4 D2 Level 2

Level D2 performs the functions of a D1 with the addition of performing a bootstrap of the AM.

Two data areas are ***unaltered*** through this level of initialization, the equipment configuration data (ECD) and the protected application segment (PAS). The ECD reflects the current hardware configuration of the system. The PAS contains the office dependent data (ODD) that describes the customers and the equipment serving the customers, as well as other data which must be protected during initialization (for example, billing data, CM hardware configuration data).

9.2.1.2.5 D3 Level 3

Level D3 performs the same actions as D2 with the addition of reloading the ECD and the ODD. This is the highest level of *UNIX*® RTR system initialization that can be performed as part of automatic recovery.

9.2.1.2.6 D4 Level 4

The *UNIX*® RTR system level 4 initialization, D4, is a complete bootstrap of the AM which clears all memory including the PAS and reloads the ECD and ODD. This level can only be initiated manually from the EAI page.

9.2.1.3 AM APPLICATION SOFTWARE LEVELS

9.2.1.3.1 General

Six application software initialization levels exist for Duplex Multi-Environment Real-Time [(DMERT) application processes (DAP)] (*UNIX*® RTR system application processes). These six application levels are designated S1 through S7, with S7 being the most severe. The following is a brief description of each application software initialization level.

9.2.1.3.2 S1 - Return to Point of Interrupt

This is the lowest level of application software initialization with the least severe degree of action. An error has been detected within a process by an explicit validation test or an implicit test performed by the underlying operating system. The fault causing the error is considered nonfatal to the process and can be transient. The error may be logged and the count compared with a threshold. Control is returned to the running process at the point of interrupt (for example, the point where the error was detected). For a repeating error, more severe actions may be taken.

9.2.1.3.3 S2 - Single-Process Purge (SPP)

A single-process purge (SPP) is used when a more severe error is detected which makes it unsafe to return to the point of interrupt. An S2 may kill a task that is not currently running, in which case, control can return to the point of interrupt. This level may be run on a single-kernel process or on all the application processes together with a D1 initialization.

9.2.1.3.4 S3 - Directed Audits

A directed audit is used to find and correct inconsistencies in critical data structures that cannot be corrected by the error-detecting routine and, at the same time, cannot be deferred to be corrected by routine audits. Sufficient information is available to call a given set of audits, directing error correction to a particular area.

9.2.1.3.5 S5 - Full-Process Initialization

Level S5 is the initialization of a single kernel process (KP). During a full-process initialization (FPI), all internal nonshared data is initialized or audited. Shared data owned by the initializing KP is initialized or audited. Shared data not owned by the KP is assumed to be valid. If a KP contains an operating system, such as the operational kernel process (OKP) or the switch maintenance kernel process (SMKP), all internal processes are effectively purged. For killable processes [for example, user level automatic restart processes (ULARP)], this can be done by killing and restarting the process. Nonkillable processes must have code in their kernel fault entries to restart the operating system and all subprocesses on any S5 level or higher.

9.2.1.3.6 S6 - Processor-Wide Full-Process Initialization

Level S6 is an AM-wide initialization coupled with at least a D2 initialization. It includes a bootstrap of the 3B computer, which reloads program text and data for both *UNIX*® RTR operating system and the *5ESS*®-2000 the United States and other countries, licensed exclusively through X/Open Company Limited.-2000 switch application processes from secondary storage (disks). All AM processes running under the *UNIX*® RTR operating system (including OKP and SMKP, and their subprocesses) are re-created and must reinitialize. One area of AM memory used by the *5ESS*®-2000 switch application processes is not affected by automatic 3B computer bootstraps. This area is known as the protected application segment (PAS) and is used to store S6 and S7 protected data.

If software level S6 is accompanied by a communication module hardware initialization (see Section 9.2.1.4 on AM application hardware levels), all hardware that is out of service at the time of this initialization is normally left out of service. Hardware is only brought back into service to avoid a duplex failure, such as a duplex office network and timing complex (ONTC) failure. At the conclusion of all autonomous S6 initializations, some hardware is simplex [for example, moving head disks (MHD) and control units (CU)].

9.2.1.3.7 S7 - Processor-Wide Full-Process Initialization

Level S7 is the highest automatic or manual level of AM software initialization. It performs all of the actions of S6, plus the following additional actions:

(1) If the level S7 is accompanied by a CM hardware initialization, all units (even those that have been removed from service by fault recovery programs) are used in attempting to construct a working hardware configuration. For offices equipped with communication module model 2 (CM2), an automatic level S7 only initialize the CM hardware if the CM is determined to be a potential cause of the AM initialization. In all non-CM2 offices, level S7 always result in a CM hardware initialization. See Section 9.2.1.4 on AM application hardware levels for additional details.

(2) Most phase-protected information (in the PAS) which is used for making decisions regarding initialization and maintenance actions, other than manual inhibits and forces, is initialized to a null or cleared state. If the S7 is accompanied by a CM hardware initialization, all hardware status data is also reinitialized. Phase-protected information which is just data [for example, automatic message accounting (AMA), plant measurements, post-mortem information] is retained.

In addition, if the level S7 was the result of an automatic escalation from a previous initialization which failed to recover the system, the following occurs:

(1) Certain inhibits are automatically set to decrease the likelihood of further escalation. The AM software and hardware error checks are inhibited and, if the level S7 is accompanied by a CM hardware initialization, CM hardware error checks are inhibited as well. With these inhibits set, some noncritical checks that could cause the initialization to escalate are avoided.

(2) If a CM hardware initialization is performed together with an automatic level S7, all duplicated hardware units may come up in a simplex configuration. Automatic diagnostics and restoring of out-of-service units are not initiated; it is up to maintenance personnel to initiate the restoration of duplex configurations.

9.2.1.4 AM APPLICATION HARDWARE LEVELS

9.2.1.4.1 General

Five application hardware initialization levels exist in the *5ESS*®-2000 switch. The five levels are H0 to H4 with H4 being the most severe. In addition to hardware initializations, two hardware maintenance interrupt inhibit options are provided. Application hardware initializations follow application software initializations. They assume that the hardware status information stored in PAS reflects the desired communication module hardware configuration. Hardware initialization functions initialize hardware units as indicated by the software status. The following is a brief description of each application hardware initialization level. Table 9.2-3 provides a list of the AM application initializations and the worst case attributes associated with each type.

9.2.1.4.2 H0 - No CM Initialization

Level H0 initializations are used in low-level AM-only initializations, which result in no actions being performed on CM hardware. A level H0 initialization performs a Full Processor Initialization (FPI) on Switch Maintenance Kernel Process (SMKP).

The H0 initializations also occur when the software level is S6 or higher (AM-wide initializations) and CM isolation is requested. When CM isolation is requested, the CM initialization which would be performed is changed to the H0 level. The CM isolation is discussed in greater detail in Section 9.3.2.2 , and is valid in CM2 offices.

9.2.1.4.3 H1 - Single-Circuit Level

Level H1, single-circuit level is not used.

9.2.1.4.4 H2 - AM/CM Resynchronization

Level H2 initializations reestablish communication between the AM and CM without initializing the CM hardware. Level H2 can only be performed in CM2 offices, since the CM2 hardware is able to operate in a stand-alone mode when communication with the AM is lost.

The H2 initializations can be performed together with either S6 or S7 initializations. In order to minimize the impact of AM initializations on call processing, any automatic S6 or S7 is coupled with an H2 unless the CM is implicated as a possible cause of the initialization.

If a CM-related error (for example, inconsistent hardware status data) is detected during a level H2 initialization, or if the initialization fails to reestablish AM/CM communication, the hardware level is escalated from level H2 to facilitate recovery. Any AM faults which do not implicate the CM as a possible error source do not result in automatic escalation from level H2.

9.2.1.4.5 H3 - Partial Hardware Level

Level H3 is a hardware initialization level that does not affect stable calls. Level H3 actually initializes the CM hardware and communication links (CLNKs); however, it ***does not*** initialize Time Multiplexed Switch (TMS) hardware since doing so would cause stable calls to be dropped.

NOTE: An automatic AM-wide initialization normally attempts a *lower* level hardware initialization, unless there is reason to believe that a CM initialization is necessary to recover the system.

9.2.1.4.6 H4 - Full Hardware Level

Level H4, performs a complete initialization of the hardware (that is, a level H3 plus the full initialization of all TMS hardware). This level fully initializes the TMS fabric, opening up all connections (stable calls are dropped). This level is only run by manual command ***except*** in extreme situations such as an ONTC duplex failure.

9.2.1.5 SINGLE- AND MULTIPLE-CIRCUIT INTERRUPT INHIBITS

During hardware initializations, maintenance interrupts are handled to prevent interference with executing hardware initialization programs. The single- and multiple-circuit interrupt inhibit options are used to inhibit the maintenance interrupts. The inhibits may be implemented manually via craft action(s) or automatically by the initialization program before and during execution. After hardware initialization, interrupts may be enabled automatically, but manual inhibits must be removed manually. Single-circuit interrupt inhibiting is limited to a particular error stimulus, hardware type, or service group. Multiple-circuit interrupt inhibiting applies to all hardware circuits.

9.2.1.6 AM-WIDE INITIALIZATION ESCALATION STRATEGY

9.2.1.6.1 General

The AM *UNIX*® RTR system and AM application initializations are merged into a single software escalation strategy. The software escalation strategy is accompanied by hardware initializations to provide an AM-wide initialization escalation strategy.

Escalation mechanisms are provided by the application integrity monitor (AIM) and system integrity monitor (SIM) programs for *UNIX*® RTR system application processes. A single application process with an operating system (that is, OKP or SMKP) provides its own internal escalation strategy for initialization levels below S6. Escalation from one level to the next higher level is provided when one or more attempts at a given level (or at the same level with different hardware configuration) fails to recover the faulty process. The escalation scheme is sequential in most cases, but it can skip a level to speed up the recovery of the system if necessary. The overall strategy is to recover from any fault as quickly as possible with the lowest level of initialization necessary.

Various mechanisms are involved in administering the AM software escalation strategy. These mechanisms are as follows:

- Initialization sequence counter (ISC)
- Initialization level counter (INITLVL)
- *UNIX*® RTR system escalation timer
- Application initialization level counter (APPLVL)
- Application escalation timer.

9.2.1.6.2 Initialization Sequence Counter (ISC)

The ISC bits control the configuration of the processor complex hardware (control unit and disk) during initialization. The ISC bits allow automatic recovery to try all four combinations of processor-disk configuration before manual intervention is required to recover the system.

9.2.1.6.3 Initialization Level Counter (INITLVL) and *UNIX*® RTR System Escalation Timer

The INITLVL and the *UNIX*® RTR system escalation timers work together to control the *UNIX*® RTR system automatic recovery. The *UNIX*® RTR system level of initialization is based on the count maintained by INITLVL. If the *UNIX*® RTR system escalation timer times out before the initialization phase recovers the system, INITLVL is incremented, and the next *UNIX*® RTR system initialization level is initiated to recover the system. This sequence continues until the highest automatic *UNIX*® RTR system initialization level (D3) is reached or the system recovers. Upon recovery, the ISC, INITLVL, and timer are cleared to prevent undue escalation if another initialization is requested.

9.2.1.6.4 Application Initialization Level Counter (APPLVL) and Application Escalation Timer

The APPLVL and the application escalation timers are maintained by AIM and manage the application initialization strategy. The APPLVL and the application escalation timer coordinate the application initialization escalation using the same strategy as the *UNIX*® RTR system.

9.2.1.6.5 Initialization Level Counter and Application Initialization Level Counter

The *UNIX*® RTR system and application software initializations are coordinated such that either the INITLVL counter or the APPLVL counter may cause the other to increment. For each *UNIX*® RTR system initialization level, there is a specific level and maximum number of application software initializations that can occur before the INITLVL counter is automatically incremented to the next highest level. Likewise, if a *UNIX*® RTR system initialization is requested while a low-level application initialization (for example, S3) is in progress, the lower level application initialization is preempted by the application level that corresponds to the requested *UNIX*® United States and other countries, licensed exclusively through X/Open Company Limited. RTR system initialization level.

9.2.1.6.6 Detailed AM-Wide Initialization Escalation Strategy

The AM-wide initialization escalation strategy is dependent on the *UNIX*® RTR system sequence of activity. The *UNIX*® RTR system automatic initialization escalation strategy calls for two initializations at D1, two at D2, and then on to repeated D3 initializations. The D1 initializations are accompanied by S2 application initializations. The D2s and the first two D3 initializations are accompanied by S6 application initializations. If the system fails to recover after two D3 initializations accompanied by S6 application initializations, then the system repeatedly performs D3-S7 initializations unless manual intervention occurs.

In addition to D level and S level software initializations, hardware initialization levels are also merged into the strategy. In general, the hardware level selected is the lowest level considered necessary to recover the system.

A level H2 is required together with an S6 or S7 initialization. A high-level AM initialization coupled with an H2 or H3 is referred to as an *AM selective initialization*. These initializations do not tear down stable calls routed through the TMS. An S6/S7 coupled with an H2 is also referred to as an AM initialization with AM/CM resynchronization.

If the switch maintenance kernel process (SMKP) determines during an H2 or H3 initialization that there is a duplex failure of the office network and timing complex (ONTC), or it is unable to determine the correct active major ONTC or time multiplexed switch (TMS), the hardware initialization is automatically escalated to level H4. An S6 or S7 initialization accompanied by an H4 hardware initialization is referred to as an *AM full initialization*. The AM full initializations initialize the TMS random access memory (RAM), and all talking paths associated with intermodule calls are taken down. However, H4 initializations do not affect intramodule stable calls. The *5ESS*®-2000 switch automatic initialization escalation strategy is shown in Figure 9.2-2 .

A duplex failure of the foundation peripheral controllers (FPCs) requires the use of MIN-MODE to diagnose and recover one of the PFCs. The AM and CM are initialized repeatedly until an FPC is recovered or manual intervention (to enter MIN-MODE) occurs.

If four automatic AM/CM initializations fail to recover an FPC, the initialization is allowed to complete and limited call processing is reestablished. To manually recover an FPC (and restore complete call processing), maintenance personnel should perform Procedure 5.3 — Repair Failures in a CM Unit. This procedure covers recovery from an FPC duplex failure. While the *5ESS*®-2000 switch is operating with the FPCs duplex failed, an unconditional remove and restore is automatically attempted every 15 minutes, and four more AM/CM initializations are attempted every 4 hours until an FPC recovers.

9.2.1.7 CNI LEVELS

9.2.1.7.1 General

Five levels of Common Network Interface (CNI) initializations exist in the *5ESS*®-2000 switch. The levels are C0 to C4 with C4 being the most severe. The CNI initialization levels are closely coupled to the interprocessor message switch (IMS) initialization levels. The *UNIX*® RTR system "D" levels of initialization always trigger one of the CNI levels of initialization, but the CNI levels only trigger a "D" level initialization through escalations. For example, level

C2 may execute during a *UNIX*® RTR system AM-wide initialization or as a full-process initialization (FPI).

A detailed description for the CNI is located in the 235-190-120, *Common Channel Signaling Service Features*. The following is a brief description of each CNI initialization level and the input command for each can be found in Table 9.2-4 .

9.2.1.7.2 C0 - Run All CNI Audits

Level C0 is the lowest level of CNI initialization, but it is not really an initialization. This level sequences through the CNI audits checking for inconsistent data to correct, there is no effect on Common Channel Signaling (CCS) call processing. The CNI audits are run automatically by CNI or IMS processes, and they can also be requested manually using the **INIT:CNI** input message. Escalation to the next CNI level can occur if too many noncorrectable errors are found by critical audits.

9.2.1.7.3 C1 - CNI Recovery

Level C1 causes all CNI data tables to be rebuilt from information in the CNI ring and AM as required. After the tables have been built, synchronization between the hardware and software takes place which results in the loss of CCS transient calls during this level. This level can be invoked automatically due to software escalation, manually via the **INIT:CNI** input message, or as part of a *UNIX*® RTR system level D1 initialization.

9.2.1.7.4 C2 - CNI-Wide Full-Process Initialization (FPI) or Boot of CNI

Level C2 can be performed independently of a *UNIX*® RTR system "D" level or together with the "D" level. Depending on the reason for the initialization, two different forms of level C2 can be performed.

The "C2" level which may run independently of the "D" level performs a full process initialization of the CNI software. This level interrupts transient CCS calls, but the critical CNI processes are not re-created. As part of this FPI, the critical CNI processes are rolled back to a known safe point and all noncritical processes are killed and restarted. The IMS communication channels are closed during the initialization and then are reopened allowing CNI ring synchronization to take place. This level of initialization normally occurs as a result of an internal CNI software recovery due to escalation strategies. This level can also be invoked manually by use of a craft input command.

The "C2" level (which is performed as part of a *UNIX*® RTR system "D" level), performs a boot of the CNI processes. As part of the boot, the CNI subsystem causes all CNI processes to abort and be recreated and the CNI ring is resynchronized as described in the previous paragraph. The CCS call processing is lost during this initialization. The actions performed at this level cannot be invoked manually, but they are automatically performed when a C2 FPI fails and escalates (unless escalation proceeds past the C2 level) or during *UNIX*® RTR system D2 initialization. The CNI boot is also performed when CNI internal escalation determines the need to re-create the critical CNI processes. This is also an automatic process.

9.2.1.7.5 C3 - CCS-Wide AM Boot and Initialize In-Service Ring Nodes

Level C3 performs the equivalent of a C2 (boot) level initialization plus zeroing the CNI protected application segment (PAS) area and restoring the information from the disk. The AM then downloads routing information to the CNI nodes. The CCS call processing is lost during this initialization. Level C3 can be initiated manually by a craft input command, automatically by CNI, or by a *UNIX*® RTR system D3 or D4 level initialization.

9.2.1.7.6 C4 - C3 Plus Full Pump CNI Ring Using All Nodes

Level C4 is the most severe action which can be performed on the CNI ring. The C4 level aborts all CNI processes, re-creates the processes, reinitializes the CNIs PAS, and downloads all text and data to the CNI nodes. The CCS call processing is lost during this level of initialization. This level can occur manually as a result of a craft input command. This level can occur automatically or as part of a *UNIX*® RTR system D4 level if any of the application parameters (p, r, s, or 9), are present.

9.2.1.7.7 Other CNI Initialization States

The three other types of initializations that are recorded on the "AM INIT SUMMARY" output message are CLVL 5, 6, or 7. The CLVL 5 and 6 are reporting initialization of specific portions of the CNI, and CLVL 7 is reporting no initialization. The initialization of the Direct Link Node Direct Memory Access (DLN DMA) tables as a result of the input command **INIT:CNI,DLNTBL** results in CLVL=5.

The full process initialization of the Common Channel Signaling ring monitor (RINGMON) process, which can occur from a manual request or be triggered as the result of a failure in the RINGMON process, results in CLVL=6 on the AM INIT SUMMARY. The input command to FPI RINGMON is **INIT:RINGMON,FPI,AM**.

When an AM activity occurs that does not perform a CNI initialization, the CLVL is recorded as 7. This indicates there has been no affect on the CNI. One example is writing AMA data to tape. An AM INIT SUMMARY message prints, indicating CLVL=7.

9.2.1.8 IMS LEVELS

9.2.1.8.1 General

Five levels of IMS initializations exist in the *5ESS*®-2000 switch. The levels are 0, 1A, 1B, 3, and 4 with IMS level 4 being the most severe. These initialization levels cannot be performed manually, but they are included here for information. The IMS levels are closely coupled to the CNI initialization levels. If a CNI level initialization is occurring, an IMS level is always present. The IMS initialization levels 0, 1A, and 1B are usually invoked via input from the CNI, but the IMS levels can also be invoked internally by the IMS without input from these CNI. The following is a brief description of each IMS initialization level.

9.2.1.8.2 IMS Level 0

The IMS level 0 initialization performs selected audits in the IMS. The audits take corrective action if problems are found. The access to the message switch is maintained, allowing CCS call processing to continue.

9.2.1.8.3 IMS Level 1A

The IMS level 1A initialization causes an initialization between the AM and the ring peripheral controllers (RPC). Audits are performed on the IMS, but CCS call processing is maintained because the IMS in the AM is still available. The IMS level 1A is invoked automatically whenever a *UNIX*® RTR system D1 level occurs and the IMS driver process does not find itself on the kernel stack. However if the IMS driver was running at the time of the *UNIX*® RTR system D1 level initialization, the IMS level is changed. The new level is IMS 1B and runs together with a CNI C1 level initialization.

9.2.1.8.4 IMS Level 1B

The IMS level 1B occurs when a manual CNI level 1 is requested. The IMS level 1B initialization stops the interprocessor message switch process and reinitializes it, which causes the loss of messages. The DMA communication between the AM and the RPCs is initialized, as is the DMA communication between the AM and the direct link nodes (DLN). The IMS user processes must close and then reopen channels to reestablish communication.

9.2.1.8.5 IMS Level 3

The IMS level 3 occurs during any CNI level 2 boot or CNI level 3 initializations. The IMS level 3 aborts and re-creates all IMS AM processes. The IMS then determines the usable ring configuration, but the CNI can request the downloading of operational code to selected ring nodes.

9.2.1.8.6 IMS Level 4

The IMS level 4 occurs during any automatic or manual CNI level 4 initialization. The IMS level 4 initializes the entire IMS subsystem. The usable ring configuration is determined by the IMS after performing functional tests. Text and data are downloaded to all nodes.

9.2.1.9 CNI ESCALATION STRATEGY

Localized recovery in the CNI involves the combination of the CNI and IMS initialization levels. The major tools used for localized recovery are audits and single-process purges (SPPs). When failures occur, recovery actions escalate to more severe initialization levels. When recovery escalates to the highest level, initializations occur repeatedly until recovery is achieved or manual recovery actions are taken. As part of this strategy, AM initializations occur after sufficient CNI initializations have been attempted. Hardware and software inhibits have incorporated the following controls:

(1) If software checks are inhibited, recovery actions are still performed in response to failures, but escalation to more severe recovery actions does not occur. Recovery actions taken due to repeated or non-critical errors are scheduled based on the 1-5-15 rule to avoid system thrashing (that is, interference with critical operations.)

    NOTE: The 1-5-15 rule is a mechanism for progressively delaying recovery actions within the *5ESS*®-2000 switch upon repeated failures. When a problem is detected, a recovery is attempted immediately. If unsuccessful, successive retries are scheduled at intervals of 1 minute, 5 minutes, 15 minutes, and every 15 minutes thereafter.

(2) If hardware checks are inhibited, most hardware errors are not detected. Hardware errors that are detected indirectly via software checks can still trigger recovery actions. If software checks are also inhibited, these recovery actions are subject to the constraints for software checks and the 1-5-15 rule.

9.2.2 COMMUNICATION MODULE PROCESSOR RECOVERY LEVELS

9.2.2.1 GENERAL

9.2.2.1.1 Overview

There are seven levels of initializations defined in the CMP. The levels are as follows:

(1) Return to Point of Interrupt

(2) Single-Process Purge

(3) Directed Audits

(4) Purging Initialization

(5) Selective Initialization without Full Pump

(6) Full Initialization without Full Pump

(7) Full Initialization with Full Pump.

The levels of return to point of interrupt, single-process purge, directed audits, and purging initializations are considered low-level initializations. Selective initialization and full initializations (without and with full pump) are considered high-level initializations. The CMP initializations closely parallel AM and SM/SM-2000 initializations, especially at the lower levels.

Low-level initializations deal with a specific problem but can have different affects on call processing in the system. The effects on call processing depends on the following factors:

(a) Return to point of interrupt affects at most one call.

(b) When the initialization takes place, does the process or data which is being acted on deal with call processing? There are processes which have no connection with the completion of calls.

(c) The majority of call processing in the CMP is done during interject; purging of interject affects (at most) one call.

(d) Terminal and system processes can also be purged in the CMP. Terminal processes are created to handle one specific task, which would, if purged, affect only one call. System processes control more (for example, several terminal processes), and therefore can affect more than one call.

(e) Directed audits are performed on stored data in the system. If corruption is found in a data structure, the audit indicates the problem and may reset the table. This situation, being the worst possible case, ensures the regeneration of the table. The table being audited may or may not have any effect on call processing.

(f) The type and amount of CMP resources used to connect a specific call type can increase the chances of losing calls during low-level initializations.

High-level initializations cause the loss of all transient calls being handled by the initializing CMP during the time of the initialization. Call processing actions are restored when the CMP restarts all system processes.

The CMP does not affect stable calls in the system. The CCS call processing reacts the same as normal call processing during CMP initializations. All of the CMP initialization levels except return to point of interrupt and directed audits can be activated manually, but all can be run autonomously.

The following sections describe the actions taken by each of the CMP initializations. Table 9.2-5 provides a list of the CMP initializations and the worst case attributes associated with each type.

9.2.2.1.2 Return to Point of Interrupt

Return to point of interrupt is performed automatically and consists of the following actions:

(a) Take localized recovery (which may include the initialization of user-owned global data).

(b) Trigger different recovery actions if necessary (for example, schedule elevated audits).

(c) Output failure information as a deferred action.

9.2.2.1.3 Single-Process Purge (SPP)

An SPP can be invoked manually in a given CMP by an input message, or automatically via an assert, an audit, an interrupt, or a reset. The actions taken by a CMP SPP are as follows:

(a) Kill the faulty process and resume execution at a safe point.

(b) Recover software and hardware resources associated with the process directly or by scheduling elevated audits.

(c) Output failure information.

9.2.2.1.4 Directed Audits (DA)

Directed audits are directed to a particular area to recover from a specific problem. They can be invoked by a user program (via an assert), or by a routine or elevated audit. A directed audit cannot be invoked manually, but most audits in the CMP can be run as an elevated audit through a manual command. Specific directed audit characteristics are as follows:

(a) Takes the minimum audit actions necessary to ensure sanity of the data structure (for example, only audits the idle link list head cell and some entries, not the entire idle link list).

(b) Runs the audit immediately and unsegmented.

(c) Restarts the operation of the running process via the CMP SPP mechanism.

9.2.2.1.5 Purging Initialization (PGI)

A purging initialization is executed automatically after a reset from the AM, or manually due to an input message. The specific actions taken by a PGI are as follows:

(a) Read-only memory (ROM) initialization of the CMP

(b) Hardware initialization of the CMP

(c) Purge both foreground and background processing and restart via the CMP SPP mechanism

(d) Synchronize interprocessor data with the AM and SM/SM-2000s.

9.2.2.1.6 Selective Initialization (SI) Without Full Pump

An SI can be invoked manually in a given CMP by an input message or automatically by the escalation program as a result of accumulated error counts. No hashsum checking or pumping is performed as part of an SI. The specific actions taken by an SI are as follows:

(a) All memory in the CMP is selectively initialized and audited.

(b) All terminal processes are killed.

(c) All system processes are restarted with a selective initialization indicated.

(d) Interprocessor data with the AM and SM/SM-2000s are synchronized.

(e) Failure information and post-mortems are output.

9.2.2.1.7 Full Initialization (FI) Without Full Pump

With a CMP full initialization of the processor, only the portion of the CMP memory that failed the hashsum check is pumped to the CMP. The specific actions taken are as follows:

(a) All terminal processes are killed.

(b) All system processes are restarted.

(c) All the memory in a given CMP is initialized to a known (idle) state.

(d) Interprocessor data with the AM and SM/SM-2000s is synchronized.

(e) Failure information and post-mortems are output.

9.2.2.1.8 Full Initialization (FI) With Full Pump

The recovery actions for this initialization level are the same as those in an FI, but it is also accompanied by an unconditional full pump of the CMP memory.

9.2.2.2 COMMUNICATION MODULE PROCESSOR ESCALATION STRATEGY

The two major tools for autonomous recovery within the *5ESS*®-2000 switch CMP are audits and single-process purges (SPPs). When these low-level initializations fail to restore the processor to normal operation, recovery actions automatically escalate to more severe levels. Escalation occurs whenever a recovery action fails to complete within a predetermined time interval or when failure events recur during the post-recovery time interval.

The highest level of CMP autonomous recovery is a selective initialization. When a CMP cannot recover from a problem autonomously, the CMP requests intervention from CMP fault recovery software in the AM. Since the CMP is a duplex unit, an active CMP failure normally results in a switch to the mate CMP. If the mate CMP is not available, an AM-directed CMP full initialization is attempted. If this does not successfully recover the CMP, duplex failure recovery strategies are invoked. As part of these strategies, an attempt may be made to restore the mate CMP to service, hardware and software check inhibits may be applied, and ultimately a high-level AM/CM initialization may be attempted.

9.2.3 SWITCHING MODULE/SWITCHING MODULE-2000 RECOVERY LEVELS

9.2.3.1 GENERAL

9.2.3.1.1 Overview

There are seven levels of initializations defined in the SM/SM-2000. The levels are as follows:

(1) Return to Point of Interrupt (also referred to as level M1)

(2) Single-Process Purge (also referred to as level M2)

(3) Directed Audits (also referred to as level M3)

(4) Selective Initialization without Full Pump (also referred to as level M5)

(5) Selective Initialization with Full Pump (also referred to as level M6)

(6) Full Initialization without Full Pump (also referred to as level M7)

(7) Full Initialization with Full Pump (also referred to as level M8). There are three types of this initialization; normal, power-up, and broadcast.

NOTE: Only level M7 and M8 are recognized or controlled by the AM.

The SM/SM-2000 initializations closely parallel AM initializations, especially at the lower levels. The levels of return to point of interrupt, single-process purge, and directed audit deal with a specific problem and do not directly affect more than one call. Levels of selective initialization and full initialization may potentially impact all the calls in the SM/SM-2000 undergoing initialization.

The following sections describe the actions taken by each of the SM/SM-2000 initializations. Table 9.2-6 provides a list of the SM/SM-2000 initializations and the worst case attributes associated with each type.

9.2.3.1.2 M1 - Return to Point of Interrupt

Return to point of interrupt is performed automatically and consists of the following actions:

(a) Take localized recovery (including the initialization of user-owned global data).

(b) Trigger different recovery actions if necessary (for example, schedule elevated audits).

(c) Output failure information as a deferred action.

9.2.3.1.3 M2 - Single-Process Purge (SPP)

The SPP affects at most one call. It can be invoked automatically via an assert, an audit, an interrupt, or a reset, or manually by an initialization command specifying a process-id. Refer to 235-700-600, *Input Message Manual* for information on the INIT:SM-SPP input message description. The actions taken by an SM SPP are as follows:

(a) Kill the faulty process and resume execution at a safe point.

(b) Recover software and hardware resources associated with the process directly or by scheduling elevated audits.

(c) Output failure information.

NOTE: One call can involve several trunks on a wideband call. An SPP affects a wideband call if a process associated with the call is purged.

9.2.3.1.4 M3 - Directed Audits (DA)

Directed audits are directed to a particular area to recover from a specific problem. They can be invoked by a user program (via an assert), or by a routine or elevated audit. A directed audit cannot be invoked manually. Specific directed audit actions are as follows:

(a) Takes the minimum audit actions necessary to ensure sanity of the data structure (for example, only audits the idle link list head cell and some entries, not the entire idle link list).

(b) Runs the audit immediately and unsegmented.

(c) Restarts the operation of the running process via the SM SPP mechanism.

9.2.3.1.5 M5 - Selective Initialization (SI) Without Full Pump

An SI can be invoked manually in a given SM/SM-2000 by an input message or automatically by the escalation program as a result of accumulated error counts. No hashsum checking or pumping is performed. The specific actions taken by an SI are as follows:

(a) Selectively initialize and audit all memory and peripherals, disconnecting all transient calls originated from or terminating to this SM/SM-2000. Stable calls and maintenance states are preserved with a few exceptions: if a maintenance activity was in progress or if the call has activated complex features.

(b) Synchronize interprocessor data with the AM and CMP.

(c) Output failure information and post mortems.

(d) Wideband stable calls are preserved.

9.2.3.1.6 M6 - Selective Initialization with Full Pump

The recovery actions of an SI with full pump include all of the actions of an SI without full pump but also include an unconditional pump of all the static memory (text and data) in the SM/SM-2000. After the full pump has completed, hashsum checks are performed and communication is reestablished with the peripherals. The peripherals have not been unconditionally pumped as part of this initialization. Some stable calls may be disconnected due to the SM/SM-2000 pump preempting the time slot. This level is manual only.

9.2.3.1.7 M7 - Full Initialization (FI) Without Full Pump

A full initialization is a stable clear of the entire module. In this level, only that portion of the SM/SM-2000 memory or peripheral memory on which the hashsum check fails is pumped to the SM/SM-2000 or to that peripheral. The specific actions taken are as follows:

(a) Initialize all the memory and peripherals in a given SM/SM-2000 to a known (idle) state. This disconnects all calls (including stable calls) originated from or terminated to this SM/SM-2000.

(b) Synchronize interprocessor data with the AM and CMP.

(c) Output failure information and post-mortems.

9.2.3.1.8 M8 - Full Initialization (FI) With Full Pump

The recovery actions for this initialization level are the same as those in an FI without pump, but it is also accompanied by an unconditional full pump of the SM/SM-2000 memory and the peripherals. This initialization level is manual only.

9.2.3.1.9 M8 - Power-Up Full Initialization (FI) With Full Pump

The recovery actions for this initialization level are the same as those in an FI with full pump, but the power-up option also clears the FI protected memory range. The FI protected memory range includes customer-originated recent changes (CORC).

9.2.3.1.10 M8 - Full Initialization (FI) With Broadcast Pump

The recovery actions for this initialization level are the same as those in an FI with full pump and power-up FI with full pump except that the pump mechanism pumps the common program and data portions of the SM/SM-2000s image to multiple SM/SM-2000s simultaneously.

9.2.3.2 SM/SM-2000 ESCALATION STRATEGY

The two major tools used for localized recovery in the *5ESS*®-2000 switch SM/SM-2000 are the audits and the SPPs. When low-level initializations fail to recover normal operation to the failed processor, recovery actions automatically escalate to more severe levels. The escalation occurs whenever a recovery action fails to complete within a predetermined time interval or when failure events recur during the post-recovery time interval. As levels of software recovery escalate, the processor hardware is forced through all of its configurations to ensure that recovery is attempted on all hardware arrangements and that the hardware is properly initialized. After each new configuration is established, a verification of check sums over program text and static office data is performed. Any failing blocks are reloaded from the backup copy on the system disk. The appropriate high-level software initialization is then performed. When recovery escalates to its highest level, initializations occur repeatedly until recovery is achieved or manual recovery actions are taken. As part of this strategy, high-level inhibits are automatically applied after sufficient repeated initializations.

Table 9.2-1 Emergency Action Interface Maintenance Parameters

COMMAND [a]	DESCRIPTION	*UNIX*® RTR SYSTEM LEVEL
B,b	Isolate all switching modules.	50 and up
C,c	Unisolate all SM/SM-2000s.	50 and up
D,d	Inhibit all administrative module (AM) routine audits.	50 and up
E,e	Allow all AM routine audits.	50 and up
F,f	Inhibits CM hardware checks.	50 and up
G,g	Allows CM hardware checks.	50 and up
H,h	Backout AM recent changes on a boot.	50 and up
I,i	Restore AM recent changes on a boot.	50 and up
J,j	Turn on optional PRMs.	50 and up
K,k	Turn off optional PRMs.	50 and up
L,l	CNI min mode.	50 and up
M,m	Enter AM min mode and CNI min mode w/C4.	53 and up
N,n	Exit AM min mode. Exit CNI min mode w/C4.	53 and up 52 and up
O,o	Isolate AM from CM.	50 and up
P,p	Full CNI Ring pump (C4).	52 and up
Q,q	Cancel current system full initialization (see parameter 8-9, Table 9.2-2).	50 and up
R,r	Software release retrofit full initialization.	54 only
S,s	Software release retrofit selective initialization.	54 only
T,t	Unisolate AM from CM.	50 and up
U,u	Force message switch control unit 0 (MSCU 0) active and MSCU 1 unavailable.	50 and up
V,v	Force MSCU 1 active and MSCU 0 unavailable.	50 and up
W,w	Clear MSCU forces.	50 and up
X,x	Force ONTCCOM 0 active and ONTCCOM 1 unavailable.	50 and up
Y,y	Force ONTCCOM 1 active and ONTCCOM 0 unavailable.	50 and up
Z,z	Clear ONTCCOM forces.	50 and up

Notes:

a. Command 42 must be entered first to allow the setting of a parameter.

Table 9.2-2 Emergency Action Interface Maintenance Commands

COMMAND [a]	DESCRIPTION	*UNIX*® RTR SYSTEM LEVEL
0	Spare.	N/A
1	Spare.	N/A
2	Spare.	N/A
3	Spare.	N/A
4	Perform AM selective initialization. (S6/H3)	52 and 53 only
5	Perform AM selective initialization with selective restoral on communication module (CM) out of service (OOS) hardware. (S7/H3)	53 only
6	Perform AM full initialization. (S6/H4)	52 and 53 only
7	Perform AM full initialization with restoral of CM OOS hardware. (S7/H4)	53 and up
8	Perform AM and CMP full initialization with restoral of CM OOS hardware; plus if within 30 minutes a 42:8:50 command is given, a full initialization system stable clear of all SM/SM-2000s will be executed. (S7/H4)	53 and up
9	Perform AM, CMP, and CNI full initialization with restoral of CM OOS hardware; plus if within 30 minutes a 42:9:50 is given, a full initialization with full pump of all SM/SM-2000s will be executed (system stable clear with full pump).	53 and up

Notes:

a. Command 42 must be entered first to allow the setting of a parameter.

Table 9.2-3 Worst Case Attributes of Administrative Module (AM) Initializations

AM INITIALIZATION TYPE	WORST CASE ATTRIBUTE
AM single-process purge (SPP)	Single call lost.
AM directed audit (DA)	Multiple calls lost.
AM full-process initialization (FPI)	All new CCS calls routed to reorder [a] , all stable calls saved. Not all call types require the AM and FPI varies depending on the process being initialized.
AM selective initialization (SI) with AM/CM resynchronization	All new CCS calls routed to reorder [a] , all stable calls saved. Not all call types require the AM and varies depending on the process being initialized.
AM selective initialization (SI) H3	All new CCS calls routed to reorder [a] , all stable calls saved. Not all call types require the AM and varies depending on the process being initialized.
AM full initialization (FI) H4	Intermodule calls cleared (intramodule calls preserved), new CCS calls routed to reorder [a] . Not all call types require the AM and varies depending on the process being initialized.

Notes:

a. Switching Module/Switching Module-2000s that have the stand-alone option can complete local calls.

Table 9.2-4 CNI/IMS Initializations Levels in Order of Severity

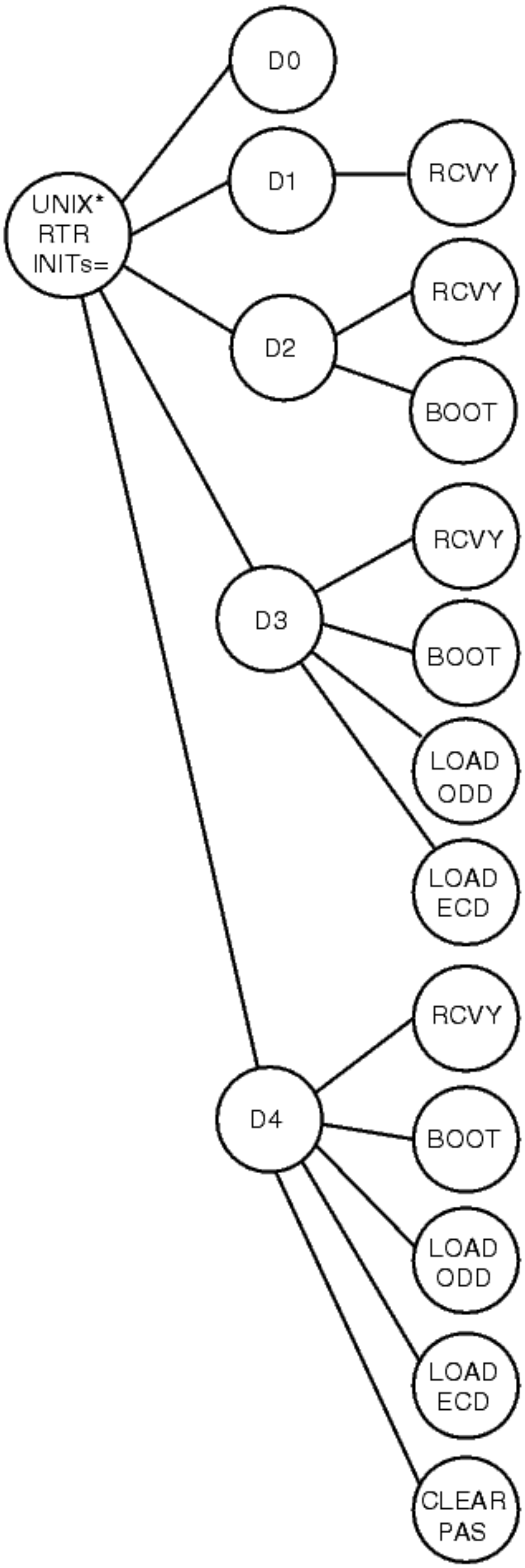
INPUT COMMAND	CNI/IMS LEVELS	WORST CASE ATTRIBUTE
INIT:CNI,LVL0;	0/0	Audit CNI/IMS data
INIT:CNI,LVL1;	1/1B	CCS transient calls lost
INIT:CNI,LVL2;	2/3	WITHOUT D2: CCS transient calls lost WITH D2: CCS call processing lost
INIT:CNI,LVL3;	3/3	CCS call processing lost
INIT:CNI,LVL4;	4/4	CCS call processing lost

Table 9.2-5 Worst Case Attributes of Communication Module Processor (CMP) Initializations

CMP INITIALIZATION TYPE	WORST CASE ATTRIBUTE
CMP single-process purge (SPP)	Single call lost.
CMP directed audit (DA)	Multiple calls lost.
CMP selective initialization (SI)	New service requests for SM/SM-2000s suspended, all stable calls saved.
CMP full initialization (FI) (with and without pump)	New service requests for SM/SM-2000s suspended, all stable calls saved.

Table 9.2-6 Worst Case Attributes of Switching Module/Switching Module-2000 (SM/SM-2000) Initializations

SM/SM-2000 INITIALIZATION TYPE	WORST CASE ATTRIBUTE
SM/SM-2000 single-process purge (SPP)	Single call lost.
SM/SM-2000 directed audit (DA)	Multiple calls lost.
SM/SM-2000 selective initialization (SI) (with and without pump)	New service requests for SM/SM-2000 suspended, all stable calls saved.
SM/SM-2000 full initialization (FI) (with and without pump)	New service requests for SM/SM-2000 suspended, all stable calls lost.



LEGEND:

ECD - EQUIPMENT CONFIGURATION DATA
INITs - INITIALIZATIONS
ODD - OFFICE DEPENDENT DATA
PAS - PROTECTED APPLICATION SEGMENT
RCVY - RECOVERY

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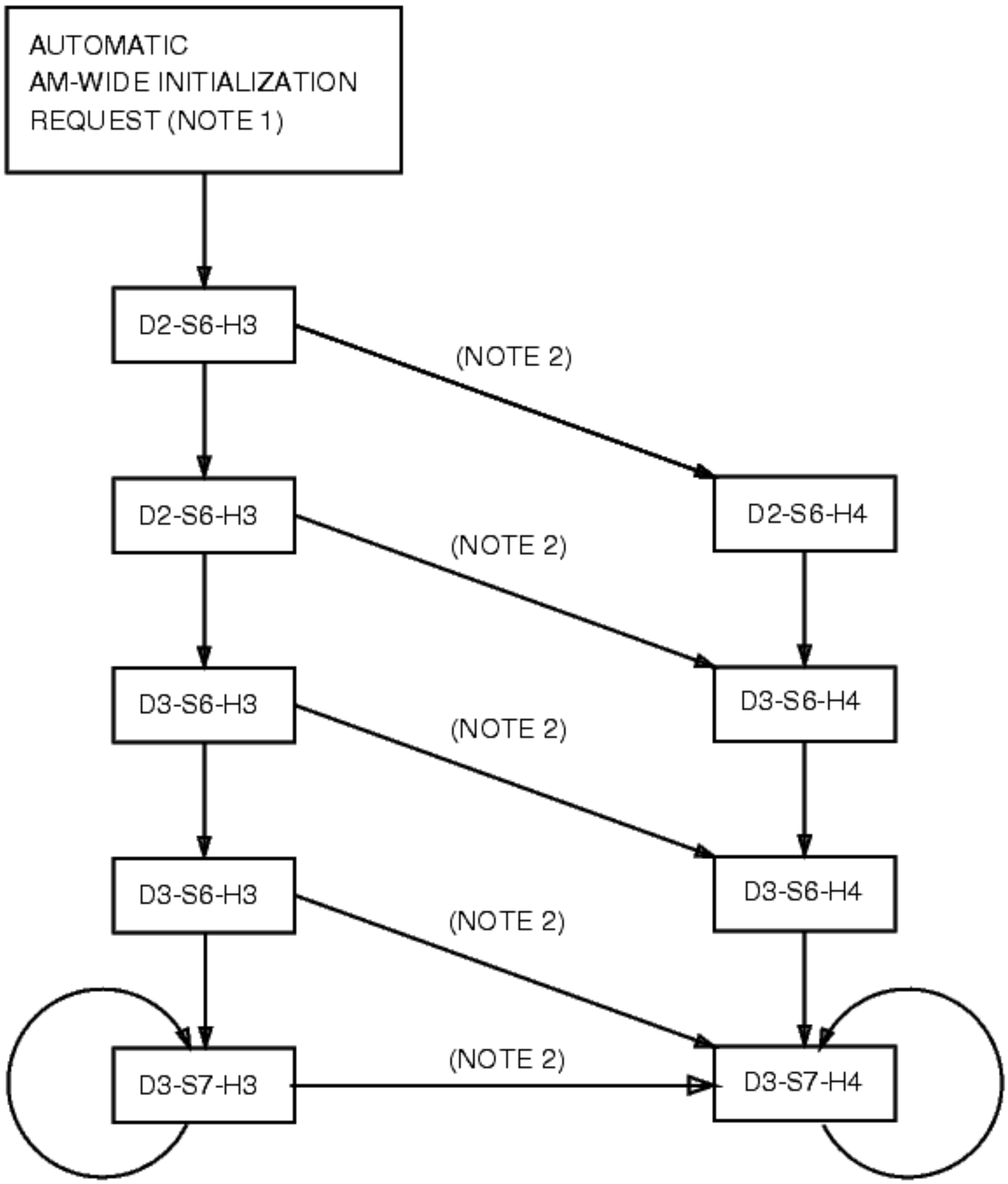
Figure 9.2-1 Components of UNIX Registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited. X/Open Company Limited RTR System Initializations



Notes:

1. The first AM-wide initialization is D2,S6,H2 (escalating to D3,S7,H2) unless the CM hardware is suspect.
2. Duplex ONTC/TMS failure or lost track of active ONTC.

LEGEND:

ONTC - OFFICE NETWORK AND TIMING COMPLEX
AM - ADMINISTRATIVE MODULE
CM - COMMUNICATION MODULE

Figure 9.2-2 AM-Wide Initialization Levels and Escalation Strategy

9.3 SYSTEM RECOVERY INITIALIZATION LEVELS

9.3.1 GENERAL

There are no distinct levels defined for system initializations, and they can only be invoked manually. System initializations consist of combinations of the initializations described in Sections 9.2 , 9.2.2 , and 9.2.3 . A worst case system initialization would consist of a system stable clear (with or without pump). The worst case attributes of a system stable clear are shown as follows:

- All new service requests are suspended.
- All stable calls are lost.
- The system status indicator on the MCC terminal indicates an off-normal state and is not guaranteed to change to normal as part of the recovery. This is true because any circuit which is out of service forces the system indicator to off-normal. Initializations do not require all circuits to be "in service" in all processors. However, the maintenance personnel can determine the status of the system by looking at the indicators on the display pages for the individual processors. A deferred mechanism is used to recover the system. The order of recovery for all of the processors in the system is described in Section 9.3.2.6 . The time for complete system recovery depends on the number of processors, the peripherals attached to the SM/SM-2000s in the system, the number of RSMs in the system, and whether or not the broadcast mechanism is used.

  During the time it takes to recover the complete system, various levels of call processing are available. During the AM initialization, the CM is initialized with the CNI (if equipped). This action can tear down all stable calls. After the CM is initialized, the CNI has been restored, and one CMP is made active and a limited amount of call processing is available. At this point, the recovery actions are moved to the SM/SM-2000s. The broadcast pump option can be requested. With this option, all the SM/SM-2000s transition to the pump state, and call processing is lost. The broadcast option allows for a fast reload of all the SM/SM-2000s. If the broadcast pump option is not requested, then the SM/SM-2000s transition to the pump state a few SM/SM-2000s at a time. The nonbroadcast option allows some of the SM/SM-2000s to continue processing calls while other SM/SM-2000s pump and initialize. This allows the system to perform call processing on the SM/SM-2000s which are not being recovered at this time and do not need an initialization to run. The system eventually sequences through all of the SM/SM-2000s. Call processing availability during the system recovery period varies depending on some of the following items:

  — Is the SM/SM-2000 being recovered as a routing SM/SM-2000?

  — Which pump option (broadcast or nonbroadcast) is being used?

  — How complex is the call processing feature and the resources needed to accomplish it?

  — Is the SM/SM-2000 being recovered as a host SM/SM-2000 for one or more remote SM/SM-2000s?

  When the system is completely initialized and no peripheral circuits are faulty, the system status indicator on the MCC terminal is set to normal.

9.3.2 INITIALIZATIONS

9.3.2.1 CRAFT INTERFACE RECOVERY

Craft interface recovery feature (CIRF) provides the capability to recover the craft interfaces from craft lockout without affecting the call processing. This procedure kills *UNIX*® system processes including program-update processes; therefore, it should be used with great care.

NOTE: IT IS STRONGLY RECOMMENDED NOT TO USE THIS PROCEDURE WHILE SOFTWARE UPDATE IS IN PROGRESS because this procedure may put a software update application in a state which cannot be recovered by any means.

There are three levels of craft initialization as referenced in Table 9.3-1 , which can be performed:

(a) Level 1 terminates and restarts all craft processes.

(b) Level 2 terminates and restarts all the killable nonessential user and supervisor process controllers.

(c) Level 3 terminates and restarts all killable, nonessential, and essential user and supervisor processes and initializes I/O drivers.

Each of the craft interface recovery levels performs some portion of the following four phases:

(1) The sure kill phase, which terminates processes described by each of the levels.

(2) The I/O driver phase, which runs selected audits and restores I/O drivers.

(3) The ULARP phase, which starts ULARP.

(4) The process creation phase, which creates processes described by each of the levels.

The status and information about the result of the craft recovery is shown on the EAI page in the form of the 7400 and 7500 PRMs. These PRMs are defined in detail in 235-600-601, *Processor Recovery Messages*.

9.3.2.2 AM MANUAL INITIALIZATIONS

The automatic initializations previously discussed normally recover the *5ESS*®-2000 switch from faults that degrade call handling capacity. However, when the automatic recovery levels fail to recover the AM, maintenance personnel must recover the AM manually. Manual recovery is initiated by utilizing the emergency action interface (EAI) video display page. The commands and parameters available on the EAI page are defined in Table 9.3-2 , Table 9.2-1 , and Table 9.2-2 . The available AM manual initializations in increasing order of severity are shown in Table 9.3-3 .

NOTE: The following should be considered before any planned initialization.

The office ***may*** want to perform a manual AMA tape writing or teleprocessing session per local practices. In all cases, local telephone company practices should control whether or not this step is performed. In certain cases, this may not be practical.

If the teleprocessing session is being performed at a nonstandard time, then it is necessary to contact personnel at the Host Office Collector (HOC) and request a manual poll.

Manually recovering from critical AM failures requires maintenance personnel to request one of the initializations shown in Table 9.3-3 . In addition to the initializations shown, special system characteristics can be invoked with a high-level initialization. They are hardware and software check inhibits, AM and CM hardware forces, minimum mode initialization (min mode), minimum configuration, and communication module (CM) isolation.

When hardware checks are inhibited, some hardware error sources are prevented from reporting errors. In addition, the system does not attempt to recover automatically from some types of hardware faults. The system may be able to cycle with hardware checks inhibited, but critical functionality (such as call processing) may not be available. Hardware checks can be inhibited by entering command 34 on the EAI page before an initialization. This command inhibits AM hardware checks. The CM hardware checks are inhibited independently via an EAI page application parameter (see Table 9.2-1).

Software check inhibits prevent system integrity software from taking automatic recovery actions. This may allow the system to cycle despite problems that would normally result in escalation to higher levels of recovery (such as an essential process initialization problem or a duplex hardware failure). Critical functionality may not be available. This mode is useful for investigating a processor recovery message (PRM) which would normally be lost if an escalation was allowed to occur. This technique should NOT be used to get the system to cycle in the face of duplex hardware failures or an ``all SM/SM-2000s isolated'' condition. In that case, the use of min mode is recommended. Software checks can be inhibited by entering command 36 on the EAI page before an initialization is requested.

When a hardware force is applied to a duplex unit, one unit of the pair is forced active. The other unit of the pair is forced unavailable, which prevents the unit from being placed in service, even to avoid a duplex failure. The AM and CM hardware forces are independent of each other.

The AM hardware forces may be applied to a control unit (CU) and/or disk unit. These forces are applied by entering commands on the EAI page, and remain in effect until cleared via another command. See Table 9.3-2 for the commands.

The CM hardware forces may be applied to an entire message switch (MSGS) and/or an office network and timing complex (ONTC). The hardware/software comprising the MSGS and ONTC varies depending on whether the switch is equiped with a communication module model 1 (CM1) or a communication module model 2 (CM2).

For CM1, the MSGS consists of the message switch control unit (MSCU), foundation peripheral controller (FPC), pump peripheral controller (PPC), communication module processor (CMP), and module message processors (MMPs). The ONTC is comprised of an ONTC common (ONTCCOM) and dual link interface (DLI). The ONTCCOM consists of the network clock (NC), time multiplexed switch (TMS), link interface (LI), and message interface (MI).

For CM2, the MSGS consists of the MSCU, FPC, PPC, CMP, MMPs, and quad link gateway processors (QGPs) (optional units). The ONTC is comprised of an ONTCCOM, network link interface (NLI) and/or dual link interface (DLI). The ONTCCOM consists of the NC, TMS, dual-message interface (DMI), quad link interface (QLI) and/or quad link interface 2 (QLI2), and the quad link packet switch (QLPS) (optional units).

The LI and MI for CM1 that interface to the MSGS are equivalent to the DMI for CM2. The LIs that interface to the switch modules (SM/SM-2000s) for CM1 are equivalent to QLIs or QLI2s for CM2. The QLI2s and the QLPS are required to support the SM-2000s.

The CM hardware forces are initiated, changed, or removed by entering application parameters on the EAI page. The CM forces remain in effect during all levels of AM and CM initialization except a *UNIX*® RTR system level D4.

Min mode is a maintenance state intended to provide a stable environment for performing maintenance recovery actions in the AM and CM complex (including the CMP). The operating environment is established by suspending all call processing and reducing the level of fault recovery escalations. This provides the real time needed to perform essential maintenance activities. One use of min mode is to diagnose and recover from critical CM duplex failures. Min mode can only be entered or exited manually, and this is done by entering an application parameter together with a high-level initialization (D3/D4) from the EAI page. A min mode initialization preserves the basic characteristics of the S6/H3, S6/H4, or S7/H4 initializations with the following exceptions:

(a) Hardware checks are manually inhibited, implying that hardware errors are ignored during the initialization. Communication module initialization is attempted only once, even if a critical hardware unit is duplex failed. If the initialization is successful, hardware interrupts are left inhibited. Units failing initialization are left out of service.

(b) Software checks are manually inhibited, implying that the initialization has one chance to complete, with no escalations allowed. This allows the maintenance personnel to gather information which could be lost when rolling in initializations.

(c) During the hardware initialization phase, an attempt is made to initialize a maximal complement of AM peripheral hardware (within the constraints of the software and hardware levels invoked). This is done even if detected duplex failures ordinarily terminate a hardware initialization phase. For example, the detection of a duplex foundation peripheral controller (FPC) failure normally causes the hardware initialization phase to terminate immediately. In min mode, an attempt is still made to initialize all module message processors (MMP) and pump peripheral controllers (PPC), even though it makes no sense to do so during a normal initialization. In this case, no attempt is made to initialize the ONTCs, as an active FPC is required.

Minimum configuration is an AM maintenance state intended for use in resolving *UNIX*® RTR system/3B20D/3B21D problems. It can only be invoked by entering command 32 on the EAI page and then manually requesting a high-level initialization. To exit the minimum configuration mode of operation, enter command 33 on the EAI page before requesting a high-level initialization. When minimum configuration is invoked in the AM, only *UNIX*® RTR system hardware and software processes are initialized.

Manual CM isolation is a maintenance state that is intended for use in recovering from critical AM failures. When in this state, the MSCUs operate in stand-alone mode, and no AM/CM interaction is allowed. Any AM recovery action or initialization may be invoked without impacting the CM or SM/SM-2000s, thereby enabling the continuation of call processing that does not require AM resources [such as the common network interface (CNI) ring]. It is not an appropriate technique for recovering from critical CM duplex failures. Minimum mode (or more specific recovery actions) should be used in this case.

The CM isolation is available in CM2 offices only. It is entered via an application parameter specified on the EAI page. If CM isolation is to be preserved over a D4 initialization, the entry parameter must be respecified. CM isolation can be exited without an AM/CM initialization (and no impact on non-CCS call processing), by entering an input message or application parameter once the AM has recovered.

9.3.2.3 CNI/IMS MANUAL INITIALIZATIONS

Autonomous recovery actions in the CNI/IMS system are closely tied to each other and the AM. The recovery actions performed in the CNI almost always triggers a recovery action in the IMS, but the reverse is not true. A similar situation exists for the AM and CNI/IMS system. The AM *UNIX*® RTR system levels always trigger recovery actions in the CNI/IMS, but the reverse only happens as a result of escalations. If autonomous recovery actions fail to recover the CNI/IMS, the maintenance personnel must recover it manually. Manual recovery actions can be initiated through input messages on the MCC and by AM manual recovery commands on the EAI page. The available CNI/IMS initializations are shown in Table 9.2-4 in increasing order of severity.

If manual recovery is needed in a failing CNI/IMS system, the maintenance personnel must request one of the initialization levels shown in Table 9.2-4 . The CNI/IMS provides a special application parameter which can change the internal autonomous recovery actions of the CNI/IMS. It should be noted, however, that *UNIX*® RTR system recovery actions still affect the CNI/IMS. The maintenance personnel can change the autonomous recovery levels of the CNI in the following ways:

(a) The CNI min mode is applied by entering an application parameter and is accompanied by a *UNIX*® RTR system level initialization of the AM or by an input message, which affects CNI/IMS only. The mode provides the ability to prevent the AM from being affected by CNI failures; some CNI/IMS audits are prevented, and CCS call processing is inhibited.

(b) Software checks cannot be applied to the CNI/IMS system directly, but software checks in the AM do affect the CNI. When the AM software checks are applied, the CNI is again prevented from causing AM initializations due to escalation of recovery levels. When AM software check inhibits are applied, CCS call processing is not inhibited.

(c) Forces cannot be applied directly to the CNI/IMS system.

Before using the special application parameters and pokes available for the CNI/IMS system, the maintenance personnel should consider the impacts on CCS call processing, the AM, and the effects on the rest of the system. Since the AM and the CNI/IMS are coupled, actions on one can propagate to the other.

9.3.2.4 CMP MANUAL INITIALIZATIONS

Autonomous recovery actions in the communication module processor normally recovers the CMP from faults which degrade its performance levels. However, when autonomous recovery actions fail to recover the CMP, the maintenance personnel must recover the CMP manually. Manual recovery actions can be initiated both through input commands on MCC Display Pages 1850 for the primary CMP and in 1851 for the mate CMP and input messages. The available CMP initializations are shown in Table 9.1-1 in increasing order of severity.

When manual recovery is needed in a failing CMP, the maintenance personnel need to request one of the initialization levels shown in Table 9.1-1 . The CMP like the SM/SM-2000 provides a set of commands which enable the maintenance personnel to enter and exit special maintenance modes in the processor. These modes are similar to the maintenance modes which can be invoked in the AM. However, unlike the AM, high-level initializations are never needed to implement them. The maintenance modes provided for the CMP are software checks and hardware checks. These modes can be activated or deactivated on the MCC Display Page 185x for each CMP. The maintenance modes allow the maintenance personnel to change the autonomous recovery levels in the following ways:

(a) Software checks provide the ability to inhibit escalations of software initializations and put a limit on assert error thresholds, preventing asserts from escalating past an SPP. When maintenance personnel inhibit software checks, some of the CMPs natural autonomous recovery is blocked. This may be necessary if the automatic recovery actions do not stop repeated initialization attempts.

(b) Hardware checks provide the ability to block or ignore all hardware error reports. This prevents initializations due to most hardware interrupts. When hardware checks are inhibited in the CMP, the sanity timer is also inhibited. Unlike the SM/SM-2000, the sanity timer cannot be directly inhibited in the CMP.

(c) Forces cannot be applied directly to the CMP, but forces which are applied to the message switch control unit (MSCU) also apply to the CMP.

(d) Minimum mode cannot be applied directly to the CMP, but min mode which is applied in the AM also applies to the CMP. This maintenance mode turns off all call processing.

Certain considerations should influence the maintenance personnel before using the maintenance modes mentioned previously. Since these commands change the autonomous recovery actions of the CMP, the CMP can be prevented from reporting or recovering from service affecting errors. When the CMPs are in duplex failure, the SM/SM-2000s remain in stand-alone mode until one of the CMPs is recovered.

9.3.2.5 SM/SM-2000 MANUAL INITIALIZATIONS

Autonomous recovery actions in the SM/SM-2000 normally recover the SM/SM-2000 from faults which degrade call handling capacity. However, when autonomous recovery actions fail to recover the SM/SM-2000, maintenance personnel must recover the SM/SM-2000 manually. Manual recovery actions can be initiated both through input commands on the specific MCC Display Page 1800,x (where x is the SM/SM-2000 number; refer to 235-105-110, *System Maintenance Requirements and Tools*) or by input messages on the MCC. The available SM/SM-2000 initializations are shown in Table 9.3-4 in increasing order of severity.

If the SM/SM-2000 is still processing calls, it may be necessary to perform an off-line pump. Verify the SM/SM-2000 text and ODD files on disk. This verification check should be performed prior to any SM/SM-2000 Manual Initialization that is accompanied by a pump. Refer to Procedure 6.5 to perform an off-line pump of the SM/SM-2000.

When manual recovery is needed in a failing SM/SM-2000, the maintenance personnel need to request one of the initialization levels shown in Table 9.3-4 . The SM/SM-2000 also provides the maintenance personnel the ability to activate or deactivate special maintenance modes. These modes are similar to the maintenance modes which can be invoked in the AM. Like the AM, the SM/SM-2000 must perform a high-level initialization to implement min mode. However, unlike the AM, the rest of the maintenance modes can be implemented without a high-level initialization. The special maintenance modes are software checks, hardware checks, forces, min mode, isolation, and sanity timer inhibit. All of these maintenance modes can be activated or deactivated on the MCC Page 1800,x for each specific SM/SM-2000. The special parameters allow the maintenance personnel to change the autonomous recovery levels of the SM/SM-2000 in the following ways:

(a) Software checks provide the ability to inhibit escalations of software initializations and put a limit on assert error thresholds, preventing asserts from escalating past an SPP. When maintenance personnel inhibit software checks, some of the SM/SM-2000s natural autonomous recovery is blocked. One condition when this is useful is: An SM/SM-2000 under heavy call load, rolling in asserts which do not seriously degrade call processing. A software check may be necessary if the automatic recovery actions do not stop repeated initialization attempts.

(b) Hardware checks provide the ability to block or ignore all hardware error reports. This prevents initializations that are due to most hardware interrupts. Indirectly, hardware problems can still cause initializations due to the corruption of areas of application text.

(c) The application of forces on the SM/SM-2000 can be performed by use of input commands or by physically powering down specific units. Manual forces implemented by input manual commands can be performed even when normal communications between the AM and the SM/SM-2000 are down. These commands use the central processor intervention (CPI) paths. However, the CPI path is one way only and does not give any indication of the status of the command. To determine the status of these commands, normal communications must be reestablished.

(d) The SM/SM-2000 min mode performs a full initialization on the specified SM/SM-2000 while inhibiting software checks, hardware checks, and scheduled audits. While an SM/SM-2000 is in min mode, attempts to automatically restore circuits removed due to faults in that SM/SM-2000 are overridden, and the circuits remain out of service. When this mode is established, no call processing exists in this SM/SM-2000.

(e) The isolation command provides the ability to isolate the SM/SM-2000 from the system. Call processing in this SM/SM-2000 is then limited to only intramodule calls, provided this SM/SM-2000 has stand-alone routing.

(f) The inhibiting of the sanity timer in the SM/SM-2000 prevents that SM/SM-2000 from performing autonomous recovery actions for sanity timer errors.

Certain considerations should influence the maintenance personnel before using the maintenance modes previously mentioned. Since these commands change the autonomous recovery of the SM/SM-2000, the SM/SM-2000 can be prevented from reporting or recovering from service-affecting errors. If the SM/SM-2000 being put into these states is a host SM/SM-2000, communications can be lost to the remote SMs (RSMs) which are connected to it.

9.3.2.6 SYSTEM MANUAL INITIALIZATIONS

System initializations include the AM-CM complex, CNI, CMP, and the SM/SM-2000s. Autonomous recovery actions normally recover the system from faults which degrade performance levels. While manual system initialization is provided, due to the decoupled nature of the *5ESS*®-2000 switch, this level is generally not required and is not recommended. However, when autonomous recovery actions fail to recover the system, maintenance personnel must recover the system manually. The system-wide initialization levels have the most severe impact on the switch based on the amount of possible downtime. Table 9.3-5 shows the available system initializations in the increasing order of severity.

System-wide initializations follow a known order of recovery. The AM is the first processor to be initialized, since the AM is needed to control the initializations of the other processors. The active (primary) CMPs are initialized before the SM/SM-2000s are started. The SM/SM-2000s are initialized in a sequential order according to a list of types. This list has the order of host (HSM), local (LSM), optically remote (ORM), two-mile remote (TRM), and remote SM (RSM). This pattern is followed until all of the SM/SM-2000s are initialized. When all SM\SM-2000s are initialized, then the STBY (mate) CMP is initialized.

The order of system-wide initializations can be changed by using manual input commands. One command which can change the order is the isolation of several SM/SM-2000s. The entire initialization process can take several hours and is greatly dependent on the number of SM/SM-2000s and SM/SM-2000 peripherals in the system.

The broadcast pump option can be used to substantially improve the SM/SM-2000 initialization time by reducing the pump time.

NOTE: Call processing is lost during this time.

Only HSMs, LSMs, ORMs, and TRMs are broadcast pumped. The RSMs are sequentially pumped. The broadcast pump option reduces the pump time by pumping the SM-2000 image to all SM-2000s simultaneously and the common portions of the SM image to SMs of the same configuration (basic, standard, or loaded) simultaneously.

The order of broadcast pump for the SM/SM-2000s is determined by the SM/SM-2000 configuration (that is, all SM-2000s pump first, loaded SMs second, standard SMs third, and basic SMs last). The RSMs are pumped sequentially after all non-RSMs have been broadcast pumped.

9.3.3 TYPICAL RECOVERY SCENARIOS

9.3.3.1 GENERAL

This section describes *typical* scenarios for the following:

- AM recovery
- CNI/IMS recovery
- CMP recovery
- SM/SM-2000 recovery
- System-wide recovery.

9.3.3.2 AM RECOVERY SCENARIO

When the AM undergoes an initialization in order to recover from a detected fault, the initialization progress is indicated by the processor recovery messages (PRM) printed at the receive-only printer (ROP) and displayed on the EAI page. A PRM informs the maintenance personnel about an event which has previously occurred. A general breakdown of a *5ESS*®-2000 switch application PRM is shown in the 235-600-601, *Processor Recovery Messages*. Normally, the AM recovers itself automatically by following the autonomous initialization sequence shown in Figure 9.3-1 .

During a typical high-level AM initialization (D2+S6+H2 or higher), all the application kernel processes that run under *UNIX*® RTR system are sequenced by AIM through various states of initializations. The possible states of initializations are as follows:

- Creation of all kernel processes is sequenced by AIM.

- Software initialization is performed based on the S level of the *UNIX*® RTR system initialization.
- Hardware initialization is performed based on the H level of the *UNIX*® RTR system initialization.
- Communication link initialization is performed if necessary.
- Fault recovery is enabled to take action on faults.
- Essential jobs are released and become operational.

Only the switch maintenance kernel process is sequenced through every state; all others are sequenced through a subset of the states. If the AM is successful in initializing, then it sequences through these states as shown in Figure 9.3-1 . Initialization failures are indicated by PRMs, whose fifth hexadecimal digit is C through F. Section 9.3.4 , AM Recovery Failures, deals with recognizing AM initialization failures.

9.3.3.3 CNI/IMS RECOVERY SCENARIO

When the CNI/IMS system undergoes an initialization in order to recover from a detected fault, the initialization progress is indicated by PRMs, output messages, and indicators on MCC Display Page 118. The PRMs inform the maintenance personnel that the action specified by the PRM has been accomplished. These PRMs can be printed from either the CNI or by common channel signaling (CCS). Section 9.3.5 , CNI/IMS Recovery Failures, deals with recognizing CNI/IMS initialization failures. Output messages are printed at the ROP which indicate the state of the CNI/IMS system. Status information is also available on the MCC Display Page 118, but provides high-level information only (for example, OOS, INIT, DGR, or ACTIVE).

NOTE: The recovery procedures for the CNI are located in the 235-190-120, — Common Channel Signaling Service Features. These procedures should be used when the AM is in a stable state. If the CNI forces the AM to roll in initializations due to escalations, the fault needs to be isolated until the AM is stable. Then the maintenance personnel should recover the CNI using the procedures in 235-190-120.

9.3.3.4 CMP RECOVERY SCENARIO

When a CMP undergoes an initialization in order to recover from detected faults, the progress of the initialization is indicated by CMP progress markers. The CMP progress markers are shown on the MCC Pages 1850 and 1851. The progress markers indicate what step of the initialization is about to be performed which provides the maintenance personnel information about the progress of the initialization. Table 9.3-6 defines the possible CMP progress markers. The markers show the advancement of the recovery action and give information about the level of pump being performed, what is being initialized (for example, base level loop, static memory, or system processes), when major functionalities are allowed to run (for example, fault recovery, and call processing), and when the initialization is completed.

9.3.3.5 SM/SM-2000 RECOVERY SCENARIO

When an SM/SM-2000 undergoes an initialization in order to recover from detected faults, the progress of the initialization is indicated by SM/SM-2000 progress markers. The SM/SM-2000 progress markers can be observed on any SM/SM-2000-related MCC Display Page (for example, 1190,X, 1010, 1800, and 141), while an initializing SM/SM-2000 is progressing through the different initialization states. The progress markers indicate what action of the initialization is about to be performed which provides the maintenance personnel information about the progress of the initialization. Tables 9.3-7 and 9.3-8 define the possible SM/SM-2000 progress markers. The markers show the advancement of the recovery action, provide information about the level of pump being performed, what is being initialized (for example, base level loop, static memory, or system processes), when major functionalities are allowed to run (for example, fault recovery, call processing, or peripheral resynchronization), and when the initialization is completed.

9.3.3.6 SYSTEM RECOVERY SCENARIO

A system initialization in the *5ESS*®-2000 switch is a combination of the AM, CM, CNI/IMS system, all SM/SM-2000s, and the CMPs. The events applicable to these individual units are also applicable during system-wide initialization. Therefore, the information in this section pertaining to the individual module initializations can be combined in the case of a system initialization. The PRMs of the CNI/IMS system and the AM-CM complex are intermixed.

NOTE: When the SM/SM-2000s and CMPs are going through initialization, it is not possible to observe the progress of the initialization until the human-machine interface (MCC page displays) has been restored.

9.3.4 AM RECOVERY FAILURES

The automatic or manual initialization progress is indicated to maintenance personnel by the PRMs that are printed on the ROP and displayed on the EAI page. A complete guide of a *5ESS*®-2000 switch application PRM can be found in 235-600-601, *Processor Recovery Messages*. The PRMs indicate such things as initialization progress, inhibit status, assert failures, process manager failures, and switch maintenance actions.

When the AM fails to recover from initializations, maintenance personnel must determine at what point to manually intervene and recover the AM. Manual intervention should not be attempted until it has been determined the AM cannot recover itself automatically. The maintenance personnel must determine what has caused the failure by noting the history of events occurring prior to the failure and performing analysis of all failing PRMs. Failing PRMs provide information about the *UNIX*® RTR system, *5ESS*®-2000 switch applications (hardware and software), and CNI/IMS interfaces to the AM.

(a) The *UNIX*® RTR system PRMs provide information concerning the *UNIX*® RTR operating system of the AM. This class of messages cover functionalities such as little boot, disk driver process, input and output process driver, and system integrity monitor. There are several units which are considered critical units, but only one type is described here. A duplex failure of the disk drives puts the system in the disk independent mode of operation (DIOP).

    Only the EAI page, the MCC Page 123,125 disk file system access (DFSA), and the switching control center (SCC) terminal pokes are operational in DIOP. Other 1XX pages (where XX is 00-99) may be available, but the status may be incorrect and command pokes do not function. The DIOP state must be cleared before other maintenance recovery activities are initiated.

(b) The *5ESS*®-2000 switch application PRMs provide information concerning AM application software and critical CM hardware units. This class of messages covers major functionalities such as application integrity monitor (AIM), initialization control (ICON), CM hardware units like the FPC and the ONTC, and initialization fault recovery strategy (IFRS).

(c) The CNI/IMS PRMs are a special form of *5ESS*®-2000 switch application PRMs which provide information about the AM and its interface to a CNI/IMS system. This class of messages covers controlling processes such as CNIINIT and RINGMON, and all CNI Ring hardware such as the DLN(s).

The failure PRM which indicates the failure source (hardware or software) can be recognized by observing the fifth and sixth hexadecimal digits. The PRMs whose fifth digit is C through F indicate failure, and those who fifth and sixth digits are in the range FO through FF indicate fatal failures.

When a critical failure is encountered, maintenance personnel must determine at what point to manually intervene and recover the system. An AM automatic initialization escalation counter is represented by the letters "ii" in the PRM "EEbc 40de fgii jjjj hh hh hh." If the escalation counter indicates the value 09 or higher, it is unlikely the AM can recover itself automatically, and manual recovery actions should be attempted.

Once it has been determined that the AM cannot recover from the critical failure, the information obtained from the PRMs can help the maintenance personnel determine what recovery actions are to be performed. The special maintenance modes and parameters discussed in Section 9.3.2.2 , AM Manual Initializations, may be needed as part of the recovery steps. Figure 9.3-2 provides an AM recovery diagram showing the recommended recovery steps. Detailed step-by-step procedures are available in Section 2 , DIOP, Dead Start and Tape Load.

9.3.5 CNI/IMS RECOVERY FAILURES

The CNI/IMS autonomous or manual initialization progress is indicated to the maintenance personnel by the PRMs that are printed on the ROP and displayed on the EAI page. The PRMs indicate such things as initialization progress, inhibit status, and process manager failures. The failure of the CNI/IMS system to initialize eventually forces the AM to take automatic recovery actions. Once this level has been reached, the recovery procedures follows the normal recovery sequence of the AM. The recovery levels can be modified with manual actions from the craft as described in previous sections.

NOTE: The recovery procedures for the CNI are located in the 235-190-120, *Common Channel Signaling Service Features.* These procedures should be used when the AM is in a stable state. If the CNI forces the AM to roll in initializations due to escalations, the fault needs to be isolated until the AM is stable. Then the maintenance personnel should recover the CNI using the procedures in 235-190-120.

9.3.6 CMP RECOVERY FAILURES

The CMP autonomous or manual initialization progress is indicated to the maintenance personnel by the CMP progress markers (Table 9.3-6) and the CMP trigger messages. The progress markers can be observed on MCC Display Pages 1850 and 1851 as a CMP initialization advances through the different initialization states. The reason for the CMP initialization is indicated by a trigger message that is printed on the ROP and shown on MCC Display Pages 1850 and 1851. The possible CMP phase triggers are shown in Table 9.3-9 with a brief definition for the trigger.

When a CMP undergoes an initialization, maintenance personnel must observe the CMP progress markers and trigger messages to determine if the CMP is successfully recovering automatically. When the initialization is progressing as it should, numerical values associated with the progress markers should be incrementing to higher values. A problem with an initialization would be indicated by the progress markers reaching a certain stage and returning to an earlier stage of the initialization.

When a CMP is undergoing repeated (rolling) initializations, maintenance personnel must determine when manual intervention is required. This is indicated by the trigger messages printed at the ROP. Maintenance personnel should observe what phase trigger (Table 9.3-9) is requesting the initialization and the previous state indicated in the trigger messages. This information may be helpful in analyzing the initialization failure before attempting a manual initialization. Figure 9.3-3 provides a CMP recovery diagram.

When the CMPs are in duplex failure and autonomous recovery levels fail to restore a CMP to service, this situation eventually forces the AM to take automatic recovery actions. Once this level has been reached, the recovery procedures follow the normal recovery sequence of the AM. The recovery levels can be modified with manual actions from the craft as described in previous sections.

9.3.7 SM/SM-2000 RECOVERY FAILURES

The SM/SM-2000 automatic or manual initialization progress is indicated to maintenance personnel by the SM/SM-2000 progress markers (Tables 9.3-7 and 9.3-8) and the SM/SM-2000 trigger messages. The progress markers can be observed on an SM/SM-2000-related MCC Display Page (for example, 1190, 1010, 1800, and 141) as an SM/SM-2000 initialization is progressing through the different initialization states. The reason for the SM/SM-2000 initialization is indicated by a trigger message that is printed on the ROP and shown on the MCC Display Page 1800,x. An example of a trigger message (REPT:SM:HWLVL) may be found in the 235-600-700/750, *Input/Output Message Manuals*. Table 9.3-10 defines the SM/SM-2000 initialization triggers.

When an SM/SM-2000 undergoes an initialization, maintenance personnel must observe the SM/SM-2000 progress markers and trigger messages to determine if the SM/SM-2000 is recovering automatically. When the initialization is progressing as it should, the numerical values associated with the progress markers (Table 9.3-7) should be incrementing to higher values. A problem with an initialization would be indicated by the progress markers reaching a certain stage and returning to an earlier stage of the initialization.

When an SM/SM-2000 is undergoing repeated (rolling) initializations, maintenance personnel must determine when manual intervention is required. This is indicated by the trigger messages printed at the ROP. When the hardware level counter (HWLVL=) of the trigger message is indicating a value less than 14, the SM/SM-2000 may still recover itself automatically. However, when the trigger messages repeatedly indicate a value of 14, it is unlikely the SM/SM-2000 can recover itself automatically. Maintenance personnel should observe what phase trigger (Table 9.3-10) is requesting the initialization and the previous state indicated in the trigger messages. This information may be helpful in analyzing the initialization failure before attempting a manual initialization. Figure 9.3-4 provides an SM/SM-2000 recovery diagram.

9.3.8 SYSTEM RECOVERY FAILURES

System recovery is a combination of the AM, CNI/IMS, CMP, and SM/SM-2000 recovery procedures. This is due to the decoupled approach of system recovery in the *5ESS*®-2000 switch. During a system initialization, the AM may initialize properly while an SM/SM-2000 may be rolling in initializations. In this case, the recovery procedures applying to an SM/SM-2000 would apply. If the AM fails to initialize properly, the AM recovery procedures should be attempted. Therefore, system recovery requires analyzing the state of the AM, CMP, and the SM/SM-2000s when determining which processor, if any, is not initializing successfully.

9.3.9 RECENT CHANGE RECOVERY

9.3.9.1 AUTOMATIC RECOVERY

The *5ESS*®-2000 switch provides the ability to save the recent changes (RC) and customer-originated recent changes (CORC) that have been applied to the office dependent data (ODD) but have not yet been backed up (saved) on the system disk. This is accomplished by the RC logging operation which records the RCs and CORCs into a log file as they are input to the ODD. The RCs are not reapplied during processor initializations unless a boot of the ODD occurs. When a high-level initialization (D3 or D4) occurs, a boot of the ODD takes place, and the RCs and CORCs are rolled forward (that is, they are reapplied) from the log files as part of the initialization.

9.3.9.2 RC LOGGING OPERATION

For each RC applied to the ODD, a copy is logged in a partition named ``/log'' or ``/smlog'' on the disk. Each RC applied to the system is logged sequentially in their logical order. Also, RCs applying to the AM, CMP, and individual SM/SM-2000s are logged separately so they can be reapplied to the system separately.

9.3.9.3 RC ROLL FORWARD

The function of RC roll forward is to reapply RCs and CORCs from the log files to a processor (AM, CMP, or SM/SM-2000). The roll forward operation can occur during and after an initialization. In the AM, the ODD is reloaded into the PAS automatically whenever *UNIX*® RTR system initialization levels (D3 and D4) are performed. The ODD is not automatically reloaded into the PAS on D2 initializations unless an RC backout is specified. Call processing and RC roll forward is restarted when system processes are released. Until recent change roll forward has completed, discrepancies can occur in call processing. For the SM/SM-2000 and CMP, a roll forward request is always processed after an initialization. For the AM, a roll forward request is processed either during an initialization or after an initialization. If the system backs out RCs automatically, the roll forward operation begins during the initialization. When maintenance personnel request a manual boot, a roll forward can be requested during the initialization, after the initialization, or not at all. The input message, **EXC:ODDRCVY**, is available for manually controlling the roll forward process as described in 235-600-700, *Input Message Manual*.

If a roll forward fails on one or more RCs in the AM, the RC BACKOUT indicator on the system inhibits page (110) remains lighted. This condition remains until the inconsistency causing the roll forward to fail has been cleared. Failure of the roll forward is indicated by a C7vv PRM. When the roll forward fails in an SM/SM-2000 or CMP, an output message prints on the ROP that indicates the roll forward has been aborted. The SM/SM-2000 inhibit and recovery control page (1800,x - where x is the SM/SM-2000 number), RC BKOUT indicator remains lighted until a successful roll forward recovery has taken place. The CMP inhibit and recovery control pages (1850 for the primary CMP and 1851 for the mate CMP) also have their RC BKOUT indicator lighted until a successful roll forward recovery completes. In all processors, recent change and ODD backup activities are inhibited until the processor's corresponding RC BKOUT indicator is no longer lighted.

Should an automatic roll forward ever abort, a manual roll forward should immediately be attempted using the **EXC:ODDRCVY** input command. After all manual attempts have also failed to clear the RC BKOUT status light, seek technical assistance.

9.3.9.4 RC BACKOUT

CAUTION: Manual backout of RCs and CORCs in selected processor(s) may introduce data inconsistencies between processor(s) which could have adverse effects on call processing and recent change operations. This decision should ONLY be made by qualified technical personnel.

The function of RC backout is to allow the RCs and CORCs applied to the system since the last backup to be removed from a processor(s). Normally, when a processor undergoes a high-level initialization involving a boot or pump of its ODD (AM, SM/SM-2000, and the CMP), recently applied RCs and CORCs are reapplied to the ODD by RC roll forward. The RC backout capability does not provide the ability to remove the latest RCs and CORCs, but provides the maintenance personnel the ability to inhibit recent change roll forward in the next high-level initialization. A manual backout request can be made by entering a **SET:BACKOUT** input message at the MCC. Refer to 235-600-700, *Input Message Manual*, for information about the required input message. The RC backout may be necessary if it is suspected that an RC update to a processor(s) is linked to a performance problem of that processor.

Should an automatic and repeated manual roll forward attempts fail, the **EXC:RCDECODE** input command can be used to decode the appropriate log file (see the input manual page in 235-600-700, *Input Message Manual*, for more information). The office data base editor (ODBE) or the **DUMP:UT** input command can be used to read the value of the Glrcstart global parameter. The value of Glrcstart is the position in the log file of an RC transaction that the roll forward process cannot successfully apply to the ODD. By using the SKIPRC parameter on the manual **EXC:ODDRCVY** input command, the manual roll forward skips the transaction pointed to by Glrcstart and continue applying the rest of the transactions in the log file.

CAUTION: The decision to use the SKIPRC parameter in the EXC:ODDRCVY input command should ONLY be made by qualified technical personnel. Not applying (skipping) an RC transaction in selected processor(s) may introduce data inconsistencies between processor(s) which could have adverse effects on call processing and recent change operations.

Following automatic and manual roll forward failures, seek technical assistance before any potentially risky recovery measures are taken.

Table 9.3-1 Craft Interface Recovery Parameters

COMMAND [a]	DESCRIPTION	CRAFT INIT START
1	Craft initialization recovery level 1. Level 1 terminates and restarts all craft processes and also restarts MTTY controllers.	15
2	Craft initialization recovery level 2. Level 2 terminates and restarts all killable nonessential user and supervisor processes and also restarts all MTTY and	15

	TTY controllers.	
3	Craft initialization recovery level 3. Level 3 terminates and restarts all killable essential and nonessential user and supervisor processes, and also reboots the input/output processors (IOP).	15
Notes:		
a. Command 42 must be entered first to allow the setting of a parameter.		

Table 9.3-2 Emergency Action Interface Maintenance EAI Pokes and Commands

COMMAND	DESCRIPTION	*UNIX*® RTR SYSTEM LEVEL
10	Inhibits automatic processor recovery switch capability. Forces CU-0 to be the on-line processor and CU-1 to be the off-line processor. May result in recovery action if CU-0 is not on-line at time of force.	N/A
11	Same as 10 except that CU-1 is forced on-line, and CU-0 is forced off-line.	N/A
12	Same as 10 except the currently active processor is forced on-line, and the other is forced off-line.	N/A
13	Removes on-line and off-line forces and allows automatic processor recovery action to determine the on-line and off-line control unit (CU).	N/A
14	Clears all of the following which may be in effect: forces on- or off-line, sets on primary or secondary disk, and timer inhibits.	N/A
15	Is used together with the application parameters (1, 2, or 3) to produce three different levels of craft initializations.	N/A
20	Inhibits automatic processor recovery disk unit selection and forces both processors to access their primary disk units on a boot.	52-54
21	Removes force on primary disk unit select.	52-54
22	Same as 20 except forces the processors to access their secondary disk units.	52-54
23	Removes force on secondary disk unit select.	52-54
24	Inhibits the sanity timer from expiring and initiating automatic recovery action.	N/A
25	Removes the sanity timer inhibit.	N/A
26	Releases any trapped failure processor recovery messages (PRM) and causes the next failure PRM to be displayed in reverse video and to remain displayed until released.	N/A
27	Releases any trapped failure PRMs and allows further PRMs to be displayed.	N/A
28 **a**	Dumps to the display and prints the contents of the buffer in the active CU containing nonfatal error PRMs generated during the most recent processor recovery.	N/A
30 **b**	Forces the processor to initialize from the backup root file system.	53 and up
31 **b**	Allows the processor to initialize from the primary root file system.	53 and up
32 **b**	Forces the processor to initialize only the *UNIX*® RTR operating system. The applications software is not initialized. Only used in minimum configuration.	53 and up
33 **b**	Allows the processor to initialize both the *UNIX*® RTR operating system and application software, while in normal operating mode.	53 and up
34 **b**	Inhibits AM hardware checks from initiating automatic recovery action.	51 and up
35 **b**	Allows AM hardware checks to initiate automatic recovery action.	51 and up
36 **b**	Inhibits AM software checks from initiating automatic recovery action.	51 and up
37 **b**	Allows AM software checks to initiate automatic recovery action.	51 and up
38 **b**	Inhibits error interrupts.	51 and up
39 **b**	Allows error interrupts.	51 and up
40 **b**	Inhibits use of cache memory.	51 and up
41 **b**	Allows use of cache memory.	51 and up
42 **b**	Allows the setting of a parameter which is made available to application software.	50 and up
43 **b**	Clears the application parameter.	N/A
50 **c**	Passes application parameter to AIM.	N/A
51 **c**	Forces initialization of the *UNIX*® RTR operating system (level 1 initialization).	N/A
52 **c**	Forces bootstrap and reloads the *UNIX*® RTR operating system from disk (level 2 initialization).	N/A

53 c	Same as 52 plus reloads equipment configuration data (level 3 initialization) and ODD.	N/A
54 c	Same as 53 plus clears the memory (level 4 initialization).	N/A
55 c d	Loads selected disk from tape unit 0.	N/A
56 c d	Loads selected disk from tape unit 1.	N/A

Notes:

a. Command 28 is not supported in the current *UNIX*® RTR operating system.

b. Commands 30 through 43 are sent to the 3B20/3B21 computer the next time commands 50 through 56 are executed.

c. Commands 50 through 56, in addition to the description given, cause the current next state information to be sent to the processor.

d. Commands 55 and 56, require a CU to be forced on-line (command 10, 11, or 12) and a disk unit to be selected (command 20 or 22).

Table 9.3-3 Administrative Module (AM) Initializations in Order of Severity

INITIALIZATION TYPE	MANUAL ACTION	INITIALIZATION LEVELS	DETAILED EXPLANATION
AM single-process purge	INIT AM SPP, SMKP,PID=X! **a**	(S2)	—
	INIT AM SPP, OKP,PID=X! **a**	(S2)	
AM directed audit	NONE	(S3)	—
AM full-process initialization	INIT AM SMKP,FPI! **a**	(S5)	—
AM selective	52! or 53!	—	AM only initialization with no attempt to initialize CM hardware or communication links given that they pass integrity check. If they do not pass the tests, a full CM initialization will be attempted.
	52! or 53!	—	Full CM hardware and communication link initialization, with no attempt to restore OOS hardware to service, and stable calls will be preserved.
	42!4!53! or 53! **b**	D3 + S6 + H3	Full CM hardware and communication link initialization, with no attempt to restore OOS hardware to service, and stable calls will be preserved.
	42!5!53! **b**	—	Full CM hardware and communication link initialization, with an attempt to restore OOS hardware to service, and stable calls will be preserved.
AM full initialization	42!6!53! **b**	D3 + S6 + H4	Full CM hardware and communication link initialization, with no attempt to restore OOS hardware to service, and stable calls will be terminated.
	42!7!53 **b**	D3 + S7 + H4	Full CM hardware and communication link initialization, with an attempt to restore OOS hardware to service, and stable calls will be

	42!7!54 or 54! b	D4 + S7 + H4	terminated. Full CM hardware and communication link initialization, with an attempt to restore OOS hardware to service, remove hardware forces and min mode, and stable calls will be terminated.

Notes:

a. Refer to detailed procedures in this manual using this initialization command.

b. These commands are entered from the EAI display page.

Table 9.3-4 Switching Module/Switching Module-2000 (SM/SM-2000) Initializations in Order of Severity

INITIALIZATION TYPE	MCC COMMAND	MCC PAGE (1800,X) COMMAND (POKE)
Single-process purge (SPP)	INIT:SM=X,SPP,PID=Y! Y is the process number.	—
Selective initialization	INIT:SM=X,SI!	920
Selective initialization with pump	INIT:SM=X,SI,Z Z is (PUMP, BPUMP, NPUMP).	921
Full initialization	INIT:SM=X,FI!	922
Full initialization with pump	INIT:SM=X,FI,Z Z is (PUMP, BPUMP, NPUMP).	923
Full initialization with broadcast pump	INIT:SM=[A&&B],FI,BCST A is start of SM/SM-2000 range B is end of SM/SM-2000 range	N/A
Full initialization with broadcast pump and clearing of power-up variables	INIT:SM=[A&&B],PWRUP A is start of SM/SM-2000 range B is end of SM/SM-2000 range	N/A

Table 9.3-5 System Initializations in Order of Severity

INITIALIZATION TYPE	MANUAL ACTION	INITIALIZATION LEVELS	DETAILED EXPLANATION
System initialization without SM/SM-2000 pump	42!8!53 followed within 30 minutes by 42!8!50	D3 + S7 + H4 + M7	System wide initialization involving a full CM hardware and communication link initialization, with an attempt to restore OOS hardware to service, stable calls will be terminated, and all SM/SM-2000s will undergo a stable clear.
	42!8!54 followed within 30 minutes by 42!8!50	D4 + S7 + H4 + M7	System wide initialization involving a full CM hardware and communication link initialization, with an attempt to restore OOS hardware to service, removing hardware forces and min mode, stable calls will be terminated, and all SM/SM-2000s will undergo a stable clear.
System initialization with SM/SM-2000 pump	42!9!53 followed within 30 minutes by 42!9!50	D3 + S7 + H4 + M8	System wide initialization involving a full CM hardware and communication link initialization, with an attempt to restore OOS hardware to service, stable calls will be terminated, and all SM/SM-2000s will undergo a full pump/stable clear. Offices equipped with CNI should note that the ring will be pumped when parameter 9 is specified.
System initialization with SM/SM-2000 pump (Contd)	42!9!54 followed within 30	D4 + S7 + H4 + M8	System wide initialization involving a full CM hardware and communication link

	minutes by 42!9!50		initialization, with an attempt to restore OOS hardware to service, removing hardware forces and min mode, stable calls will be terminated, and all SM/SM-2000s will undergo full pump/stable clear. Offices equipped with CNI should note that the ring will be pumped when parameter 9 is specified.
System initialization with broadcast SM/SM-2000 pump	42!9!54 followed by a broadcast pump command from Table 9.3-4	D4 + S7 + H4 + M8	System wide initialization involving a full CM hardware and communication link initialization, with an attempt to restore OOS hardware to service, removing hardware forces and min mode, stable calls will be terminated, and all SM/SM-2000s will undergo full pump/stable clear using the broadcast pump mechanism. Offices equipped with CNI should note that the ring will be pumped when parameter 9 is specified.

Table 9.3-6 Definition of CMP Progress Markers

INITIALIZATION STATE	PROGRESS MARKER	DEFINITION
Purging initialization	13HWINIT 16BLLOOP 22COMM POSTINIT [a] OVERLOAD [a] NORMAL [a]	Hardware Initialization Initialization base level loop Establishing level 3 protocol Post Initialization safe period Processor needs time to handle messages CMP is back to normal
Selective initialization	13HWINIT 16BLLOOP 19DYNMEM 22COMM 25STATMEM 31SIBGN 37SIFICOM 40SIAUD 43TRANOS 44POSTCT 46SYSPROC 49UNPEST [a] 52PEST [a] 58INITFIN POSTINIT OVERLOAD NORMAL	Hardware Initialization Initialization base level loop Zeroing of Dynamic Memory Establishing level 3 protocol Static Memory Initialization Selective Initialization Begin Common Initialization Selective Audits Initialization running segmented under OSDS Post Initialization Control Full System Process Initialization Allow Interrupts Inhibit Interrupts Initialization Finished Post Initialization safe period Processor needs time to handle messages CMP is back to normal
Full initialization	01PUMPHLD [b] 04LPMPFUL [b] 07BPMPP [b] 13HWINIT 16BLLOOP 19DYNMEM 22COMM 25STATMEM 28FIBGN 37SIFICOM 43TRANOS 44POSTCT 46SYSPROC 49UNPEST [a]	Pump hold Little Boot Full Pump Big Boot Partial Pump Hardware Initialization Initialization base level loop Zeroing of Dynamic Memory Establishing level 3 protocol Static Memory Initialization Full Initialization Begin Common Initialization Initialization running segmented under OSDS Post Initialization Control Full System Process Initialization Allow Interrupts

	52PEST [a]	Inhibit Interrupts
	58INITFIN	Initialization Finished
	POSTINIT	Post Initialization safe period
	OVERLOAD	Processor needs time to handle messages
	NORMAL	CMP is back to normal
Full initialization with pump	01PUMPHLD [b]	Pump hold
	04LPMPFUL [b]	Little Boot Full Pump
	10BPMPFUL [b]	Big Boot Full Pump
	13HWINIT	Hardware Initialization
	16BLLOOP	Initialization base level loop
	19DYNMEM	Zeroing of Dynamic Memory
	22COMM	Establishing level 3 protocol
	25STATMEM	Static Memory Initialization
	28FIBGN	Full Initialization Begin
	34FISICOM	Common Initialization
	43TRANOS	Initialization running segmented under OSDS
	44POSTCT	Post Initialization Control
	46SYSPROC	Full System Process Initialization
	49UNPEST [a]	Allow Interrupts
	52PEST [a]	Inhibit Interrupts
	58INITFIN	Initialization Finished
	POSTINIT	Post Initialization safe period
	OVERLOAD	Processor needs time to handle messages
	NORMAL	CMP is back to normal

Notes:

a. Only one of these progress markers are printed.

b. These are the pump progress markers.

Table 9.3-7 Definition of SM/SM-2000 Progress Markers

INITIALIZATION STATE	PROGRESS MARKER	DEFINITION
Selective initialization [a]	CLINK	Establishing level 3 communication
	SUBUNIT	Critical hardware initialization
	MHINIT	SM-2000 operational image initialization of MH0
	ZEROMEM	Zeroing of dynamic memory
	FILLMEM	Static memory initialization
	MH1N2OP	SM-2000 pump and initialization of MH1 and MH2
	SIOSDS	Selective operating system initialization
	SIPC	Selective peripheral control initialization
	SIFICOM	Common data initialization
	SIAUDIT	Selective initialization audits
	SICKTHW	Selective circuit initialization
	PORTHW	Port initialization
	SYSPROC	System process initialization
	SYSDONE	System process initialization complete
	UNPEST	Allow interrupts
	PEST	Inhibit interrupts
	DATASYNC	Synchronize data with other processors
	SCANON	Turn analog port scanning on
	PRIORST	Priority restore of PRI facilities
	TMCRST	Restore of IDCU TMC ports
	ISDNRST	Restore ISDN lines
	EOCRST	Restore of IDCU EOC ports
	CPESYNC	Synchronize ISDN CPEs
	POSTINIT	Post Initialization safe period
	NORMAL	SM/SM-2000 is running normally
Full initialization [a]	CLINK	Establishing level 3 communication
	ROLLFWD	Recent change roll forward
	SUBUNIT	Critical hardware initialization
	MHINIT	SM-2000 operational image initialization of MH0
	ZEROMEM	Zeroing of dynamic memory
	FILLMEM	Static memory initialization
	MH1N2OP	SM-2000 pump and initialization of MH1 and MH2

	FIOSDS	Full operating system initialization
	FIDBM	Full data base initialization
	FIFCRTA	Full feature and routing initialization
	FISICOM	Common data initialization
	FIPC	Full peripheral control initialization
	FIADM	Full measurement administration initialization
	FITM	Full terminal maintenance initialization
	FICKTHW	Full circuit initialization
	PORTHW	Port initialization
	SYSPROC	System process initialization
	SYSDONE	System process initialization complete
	UNPEST	Allow interrupts
	PEST	Inhibit interrupts
	DATASYNC	Synchronize data with other processors
	SCANON	Turn analog port scanning on
	PRIORST	Priority restore of PRI facilites
	TMCRST	Restore of IDCU TMC ports
	ISDNRST	Restore ISDN lines
	EOCRST	Restore of IDCU EOC ports
	CPESYNC	Synchronize ISDN CPEs
	POSTINIT	Post Initialization safe period
	NORMAL	SM/SM-2000 is running normally
	QMAN ISOL	Manually isolated from QLPS networks
	QLPS ISOL	Isolated from QLPS networks due to OOS MH QPIPEs
	QPIPE OOS	SM-2000 has lost one MH QPIPE
	QLNK LOST	QLPS connectivity has been lost
	CLNK LOST	No CLNK conn. to AM
	QLNK OFFN	Lost one/more QLNKs/ISMQLNKs

Notes:

a. Optional normal or backup pump occurs at this point. Broadcast pump can also occur at this point if manually requested or due to power up.

Table 9.3-8 Definition of SM/SM-2000 Progress Markers for SM/SM-2000 Pump Part of Initialization

INITIALIZATION STATE	PROGRESS MARKER	DEFINITION
Little boot pump	LCLINK	Little Boot pump - establishing level 3 communication protocol
	LPMPHL	Little boot pump - full pump hold
	LPMPFUL	Little boot pump - full pump
	LPMPP1	Little boot pump - 1st partial pump
	LPMPP2	Little boot pump - 2nd partial pump
	LPMPP3	Little boot pump - 3rd partial pump
Normal pump	NPMPFHL	Normal pump - full pump hold
	NPMPFUL	Normal pump - full pump
	NPMPCHL	Normal pump - critical info hold
	NPMPCRI	Normal pump - critical info pump
	NPMPCK1	Normal pump - 1st hashsum check
	NPMPHL1	Normal pump - 1st partial pump hold
	NPMPP1	Normal pump - 1st partial pump
	NPMPCK2	Normal pump - 2nd hashsum check
	NPMPHL2	Normal pump - 2nd partial pump hold
	NPMPP2	Normal pump - 2nd partial pump
	NPMPCK3	Normal pump - 3rd hashsum check
	NPMPHL3	Normal pump - 3rd partial pump hold
	NPMPP3	Normal pump - 3rd partial pump
	NPMPCK4	Normal pump - 4th hashsum check
Backup pump	BPMPFHL	Backup pump - full pump hold
	BPMPFUL	Backup pump - full pump
	BPMPCHL	Backup pump - critical info hold
	BPMPCRI	Backup pump - critical info pump
	BPMPCK1	Backup pump - 1st hashsum check
	BPMPPHL	Backup pump - partial pump hold
	BPMPP1	Backup pump - 1st partial pump
	BPMPCK2	Backup pump - 2nd hashsum check
	BPMPP2	Backup pump - 2nd partial pump
	BPMPCK3	Backup pump - 3rd hashsum check
	BPMPP3	Backup pump - 3rd partial pump
	BPMPCK4	Backup pump - 4th hashsum check
	BPMPP4	Backup pump - 4th partial pump
	BPMPCK5	Backup pump - 5th hashsum check

	BPMPP5 BPMPCK6	Backup pump - 5th partial pump Backup pump - 6th hashsum check
Broadcast pump	NPMPFUL BCPHLD2 BCPODD NPMPCK1	Broadcast pump of text Broadcast pump hold for ODD pump Broadcast pump of ODD 1st hashsum check (If the hashsum check fails, then the progress markers will continue with partial pumps as shown under the "Normal pump" section of this table.)

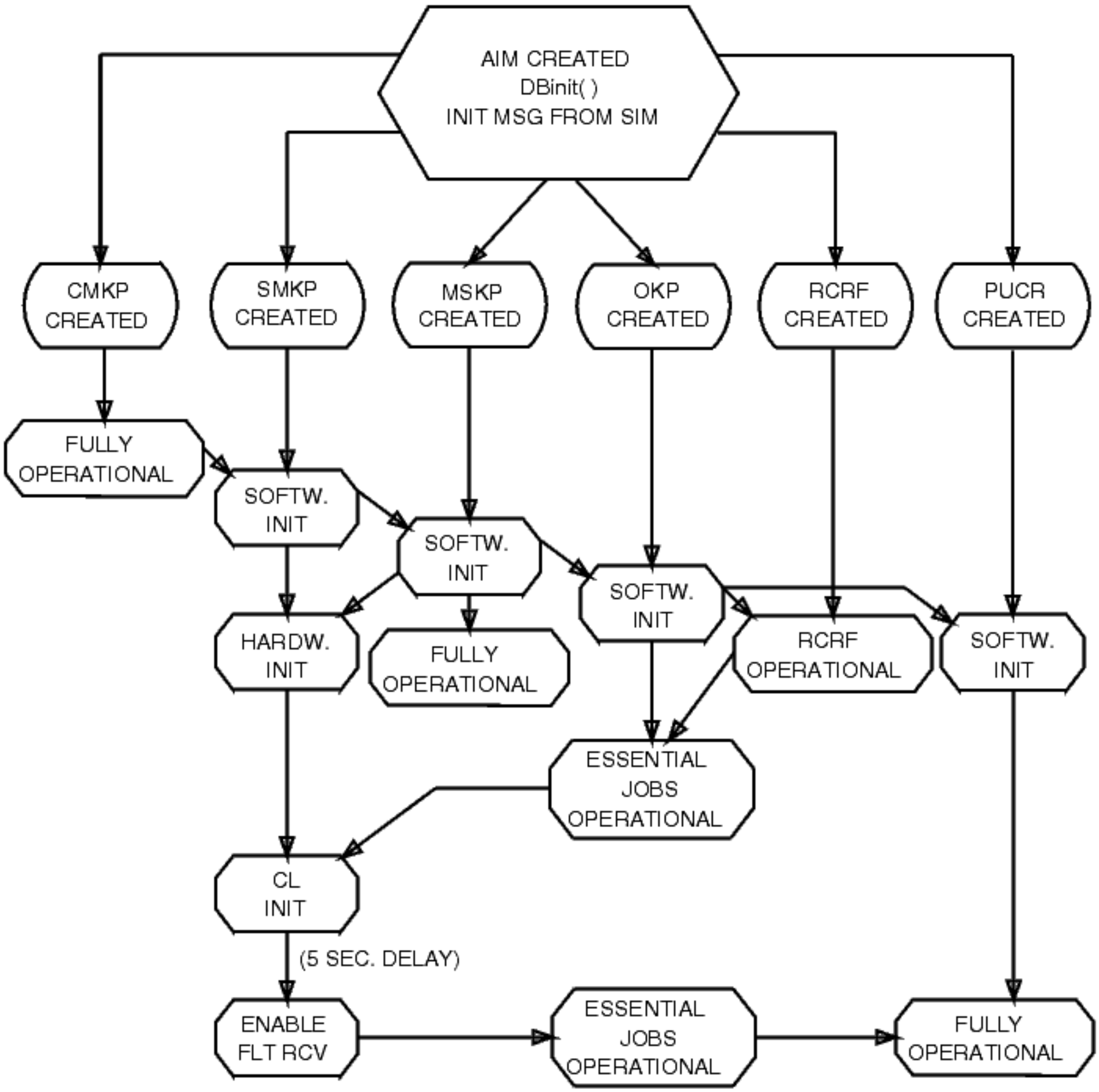
Table 9.3-9 CMP Initialization Phase Triggers

PHASE TRIGGER	DEFINITION
POWER UP	Powerup initialization
AM-REQ	AM Requests Initialization
MANUAL REQUEST	Manual requested initialization
SW-REQ	Switch request
NEG-PROG	Negative progress detected during initialization
NO-PROGRESS	Initialization was not making progress
EX-SPP	Escalation due to excessive single-process purges
EX-DIR-AUD	Escalation due to excessive Directed Audits
EX-ERR-100	Excessive errors of all types totaling 100
PROG-LOOP	Integrity Monitor background process was locked out for an excessive amount of time
LOCK-OUT	Call processing lockout
MCB-EXHST	Recovery due to OSDS message control block exhaustion
PCB-EXHST	Recovery due to OSDS process control block exhaustion
SCB-EXHST	Recovery due to OSDS stack control block exhaustion
TCB-EXHST	Recovery due to OSDS timer control block exhaustion
MSGH-REL	Request to raise the error lead as a result of CMP MSGH excessive RPI errors
AP REL	Request to raise the error lead as a result of a CMP AP error
SFTSW FAIL	Soft Switch failure
FR-SELINIT	SMIM requested Selective Initialization
ASRT-SI	Assert requested Selective Initialization
EX-AUD-SPP	Excessive Audit requested single-process purge
EX-DCF-SPP	Excessive Assert requested single-process purge
EX-FR-SPP	Excessive SMIM requested single-process purge
ASRT-C SPP	Assert C requested deferred single-process purge
RSRC SHORT	Resource shortage error during an initialization
PURGE-FAIL	Purging initialization failure
HPQ-REL	High-priority queue error

Table 9.3-10 SM/SM-2000 Initialization Phase Triggers

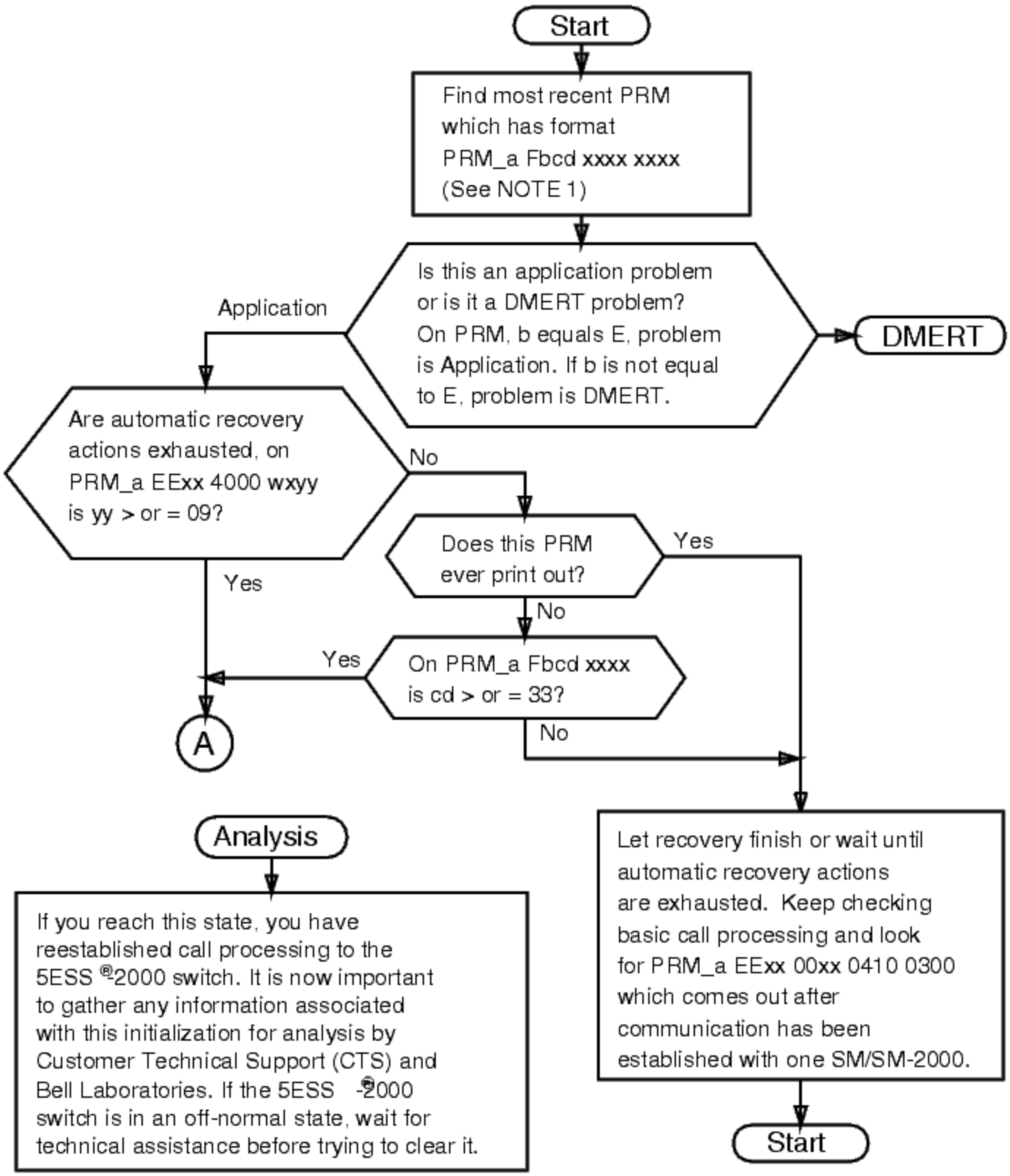
PHASE TRIGGER	DEFINITION
PROG LOOP	Program loop
INTJ FAIL	Interject failure
EX RESETS	Excessive resets
EX INTRPTS	Excessive interrupts
EX SPP	Excessive single-process purge
EX RPI	Excessive return to point of interrupt
EX DCF	Excessive asserts
EX DMD AUD	Excessive demand audits
MANUAL REQ	Manual request initialization
PUMP FAIL	Pump failure
RCVY RSRC	Recovery due to resources exhaustion
SANT TIMER	Sanity timer
POWER UP	Power up
PI RCVY	PI subunit failed
SW RCVY ER	Software recovery error
PUMP REQ	Pump request
NO PROGRES	Initialization was not making progress
PUMP COMM	Pump communication failure
PUMP SYNC	Pump synchronization failure
NESTED RCVY	Nested recovery attempted
DPLX FAIL	Critical peripheral units duplex failed
NO CP FUNC	No call processing functionality
RETROFIT	Software release retrofit
EX ERR 50	Excessive errors of all types totaling 50
EX ERR 75	Excessive errors of all types totaling 75
EX ERR 100	Excessive errors of all types totaling 100
EX ERR SPP	Excessive errors leading to a single process purge

EX ERR SW	Excessive errors leading to a processor switch
EXERR INIT	Excessive errors leading to a selective or full init
MCB EXHST	Recovery due to OSDS message control block exhaustion
PCB EXHST	Recovery due to OSDS process control block exhaustion
SCB EXHST	Recovery due to OSDS stack control block exhaustion
TCB EXHST	Recovery due to OSDS timer control block exhaustion
PKB EXHST	Recovery due to packet buffer data block exhaustion
RTCN FAIL	Excessive 32-bit counter recoveries
INVLD STK	Recovery due to invalid stack type
CIAUD FAIL	MCTSI switch due to CI error
PREEMPTION	Pump of processor preempted
MH0INT	SM-2000 Message Handler 0 initialization failures
MH1INT	SM-2000 Message Handler 1 initialization failures
MH2INT	SM-2000 Message Handler 2 initialization failures
MH0IST	SM-2000 MH 0 interprocessor sanity timer
MH1IST	SM-2000 MH 1 interprocessor sanity timer
MH2IST	SM-2000 MH 2 interprocessor sanity timer
MH0OSR	SM-2000 MH 0 excessive OSRs
MH1OSR	SM-2000 MH 1 excessive OSRs
MH2OSR	SM-2000 MH 2 excessive OSRs
MH0CER	SM-2000 MH 0 excessive comm errors
MH1CER	SM-2000 MH 1 excessive comm errors
MH2CER	SM-2000 MH 2 excessive comm errors
MH PLNK ER	SM-2000 MH1/MH2 P link error during DNU-S init



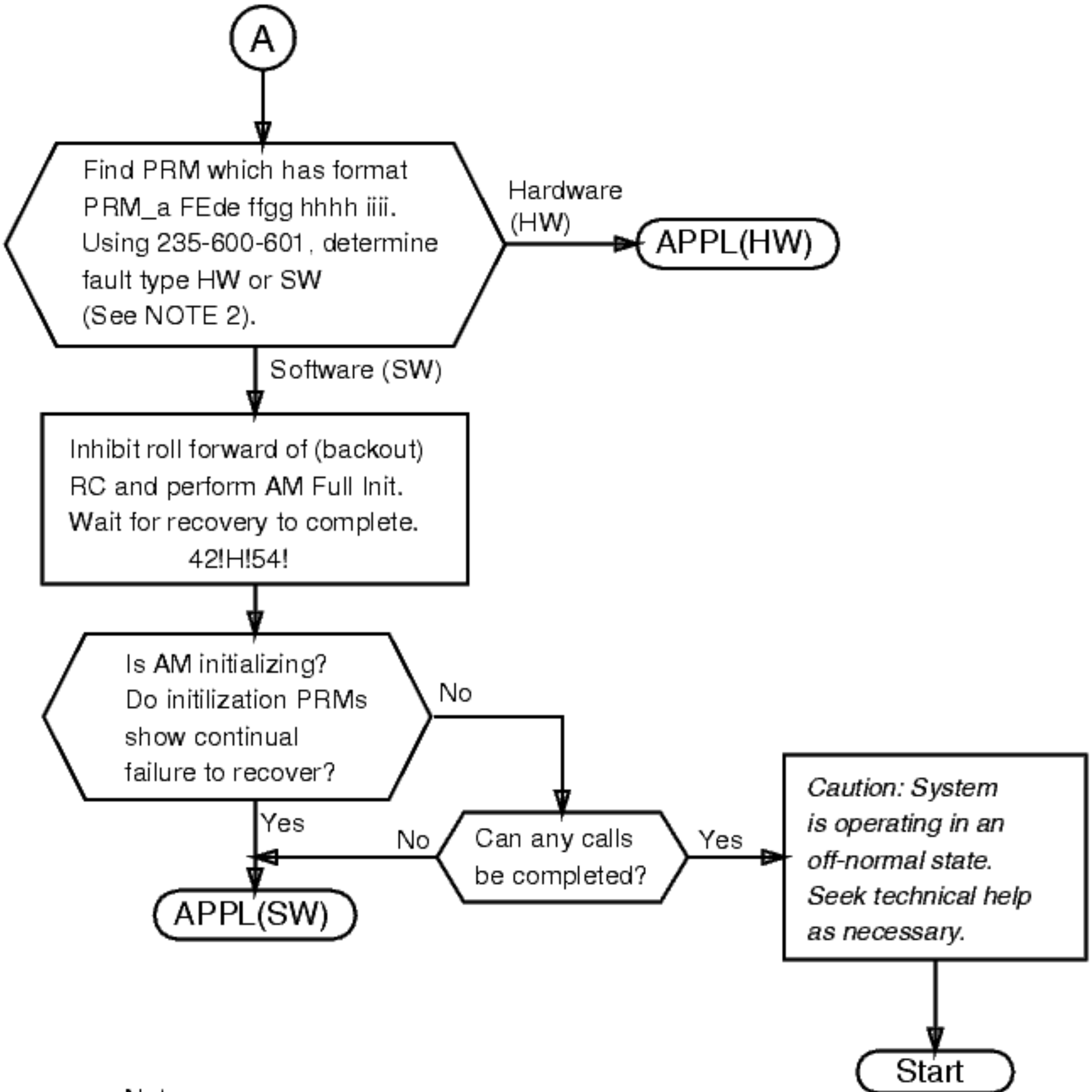
AIM - APPLICATION INTEGRITY MONITOR
FLT RCV - FAULT RECOVERY
INIT - INITIALIZATION
CL - COMMUNICATION LINK
CMKP - COMMUNICATION KERNEL PROCESS
MSKP - MESSAGE SWITCH KERNEL PROCESS
OKP - OPERATIONAL KERNEL PROCESS
RCRF - RECENT CHANGE ROLL FORWARD
PUCR - PUMP CONTROL
SMKP - SWITCH MAINTENANCE KERNEL PROCESS

Figure 9.3-1 Typical Initialization Sequence (D2-S6-H3)



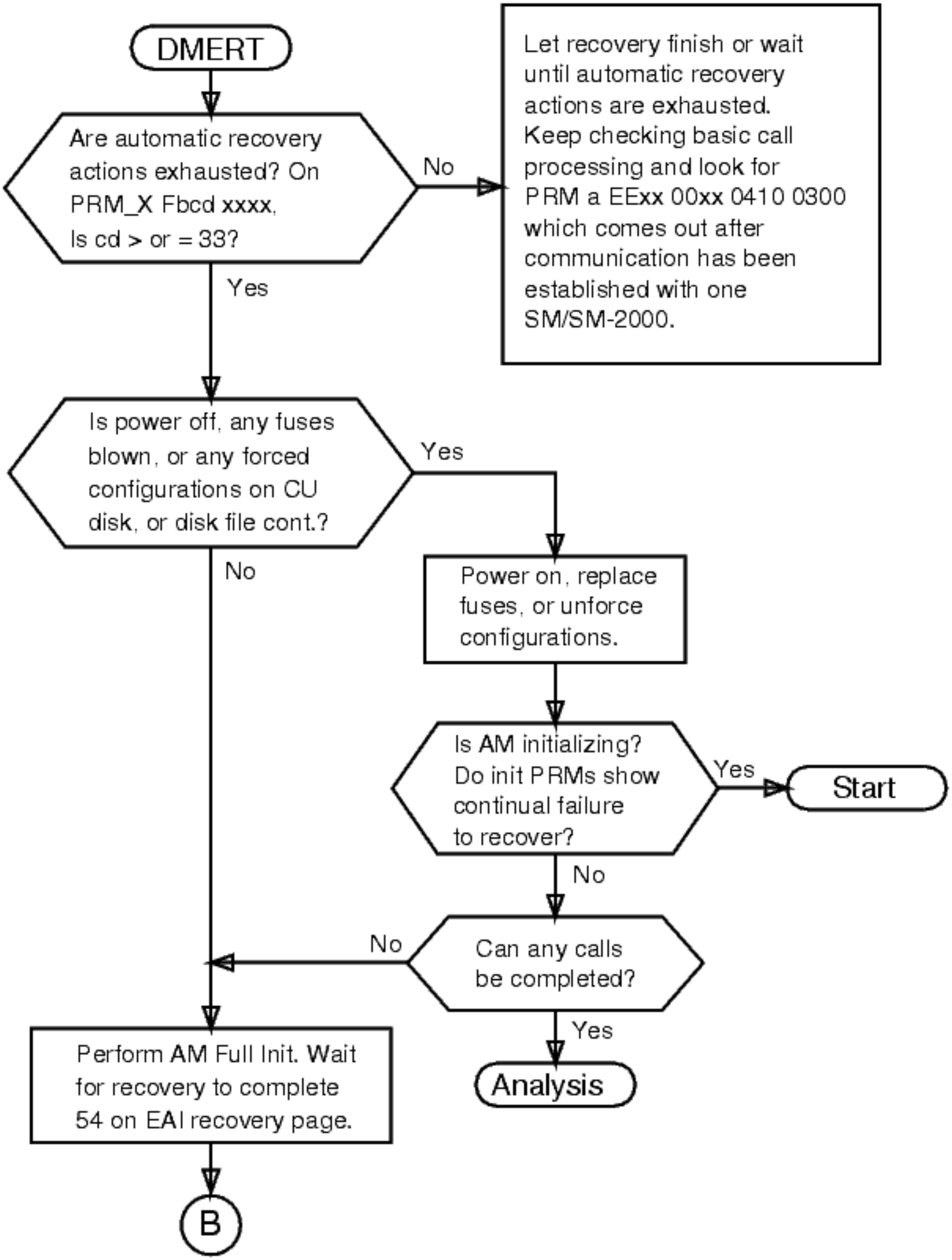
Note:

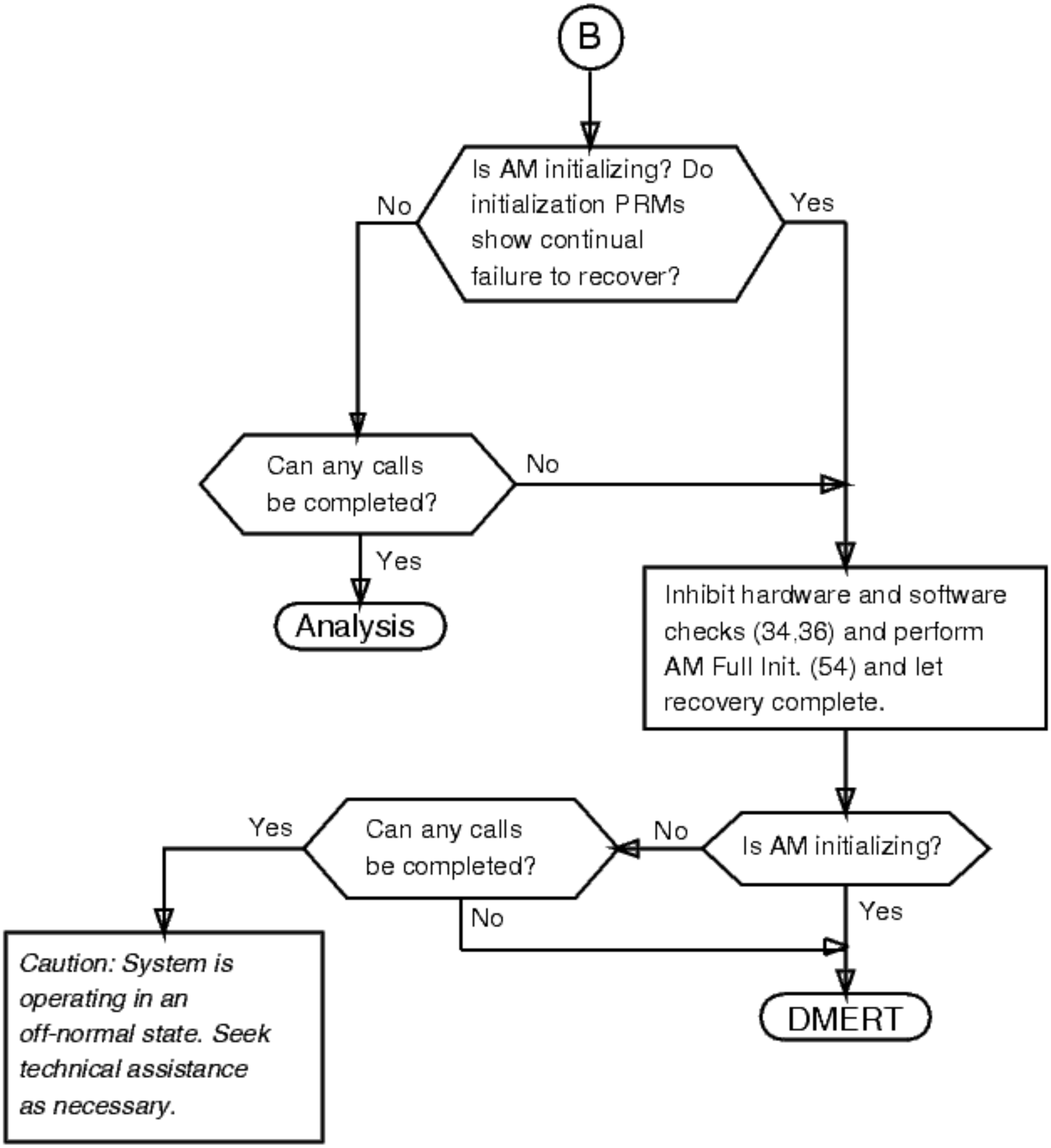
1. If no PRMs are coming out on ROP or MCC, check fuses, power, and operation of IOPs. Seek technical help as needed.

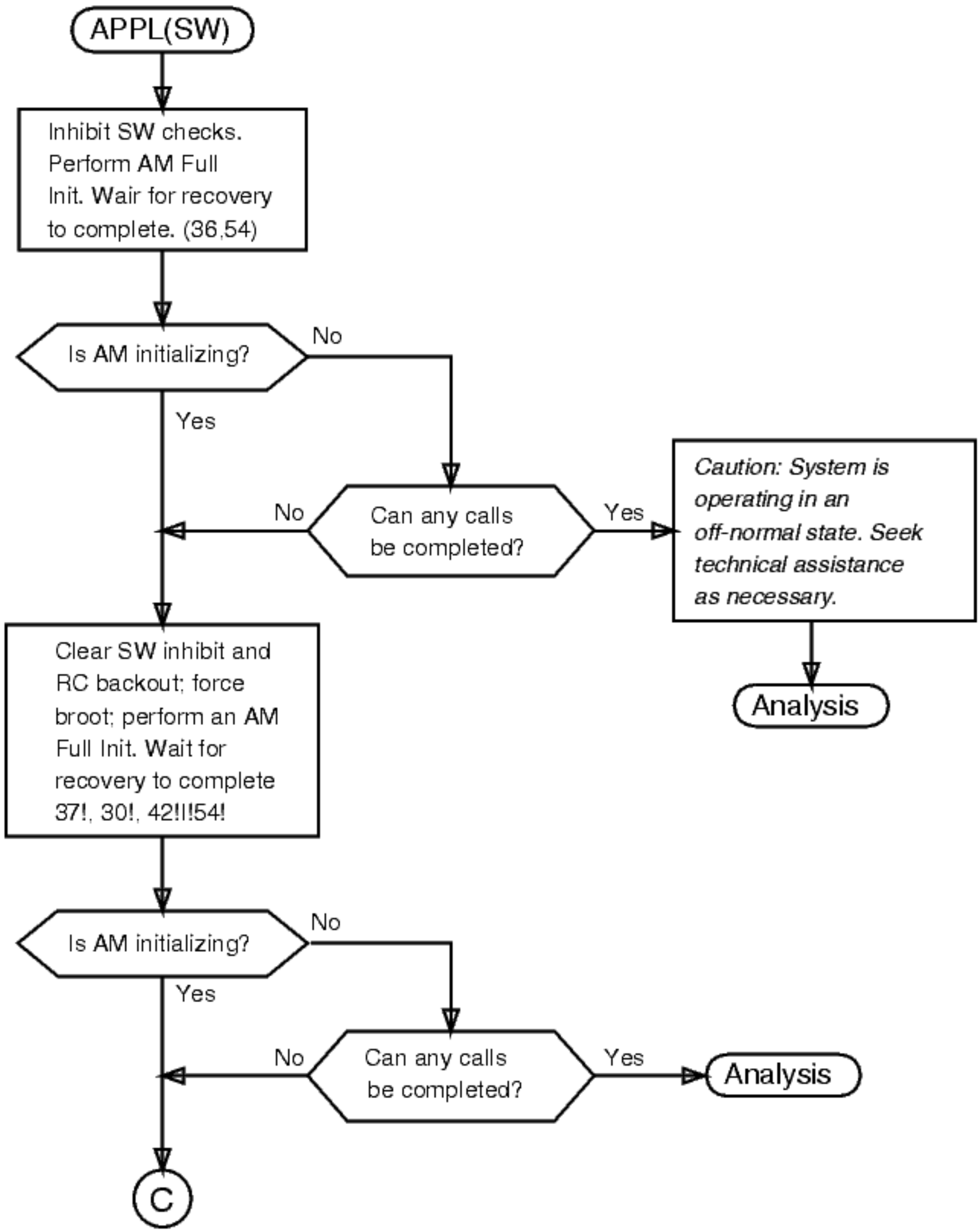


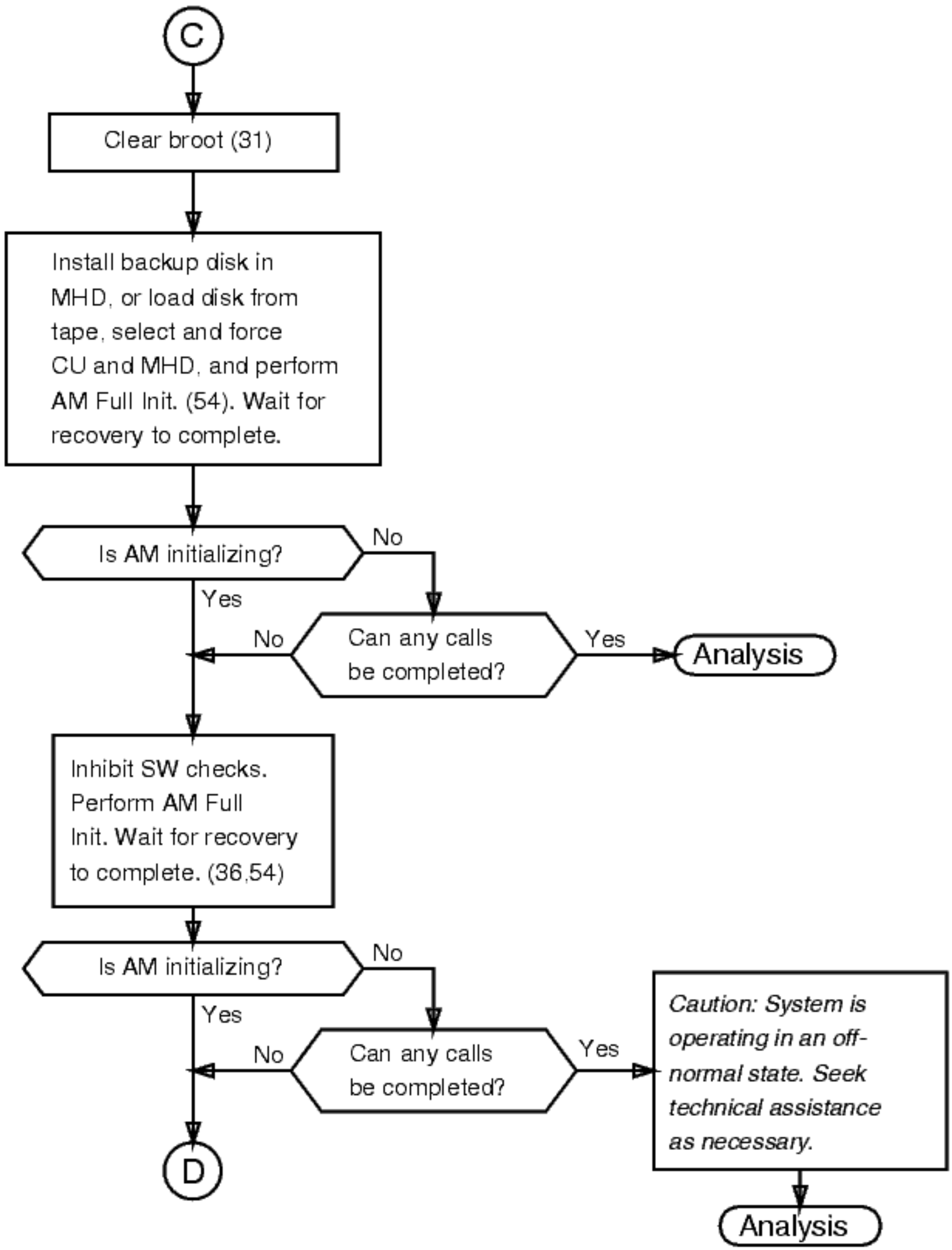
Note:

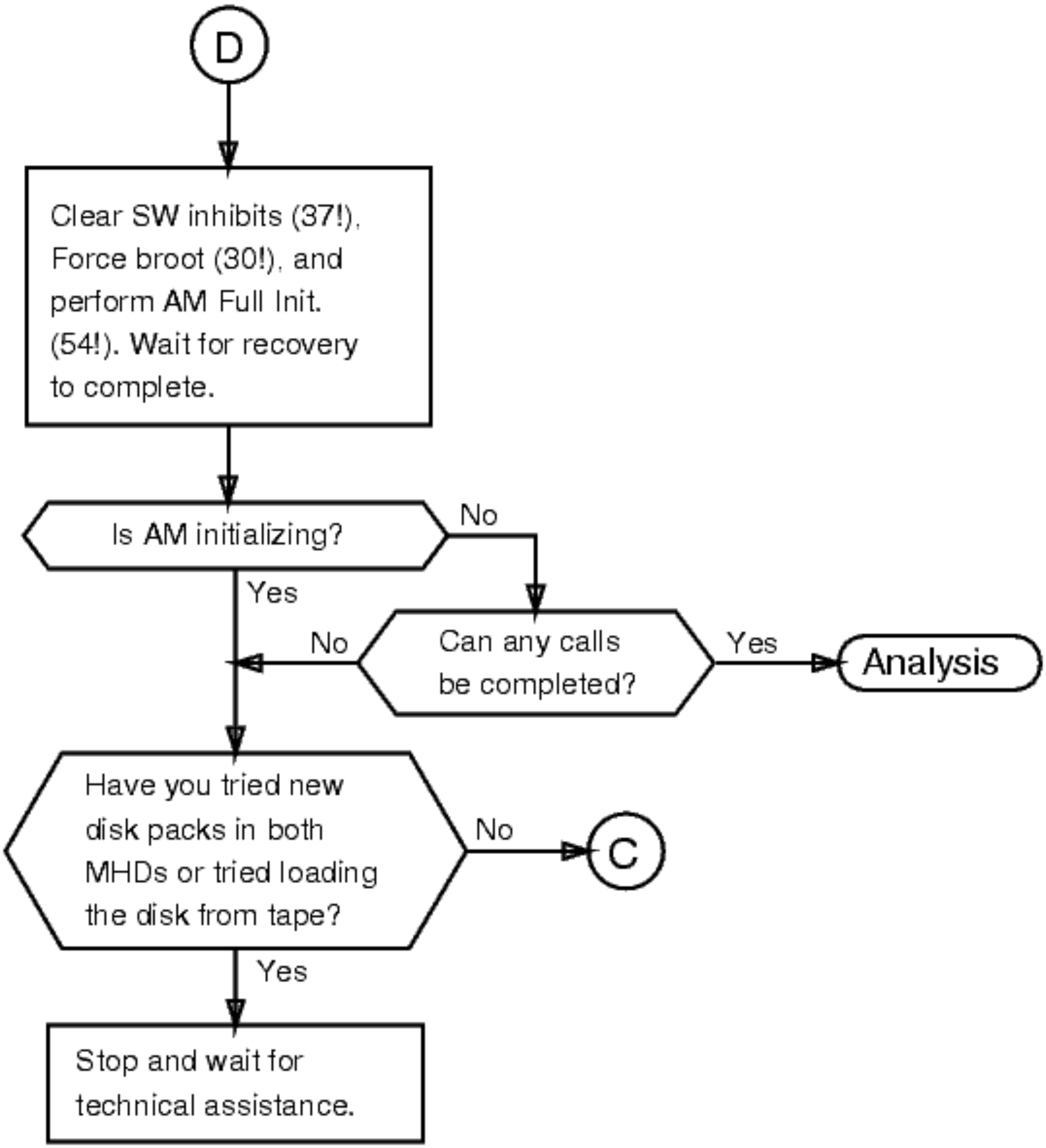
2. For application hardware procedures, refer to the 235-105-220, *Corrective Maintenance Procedures,* manual.

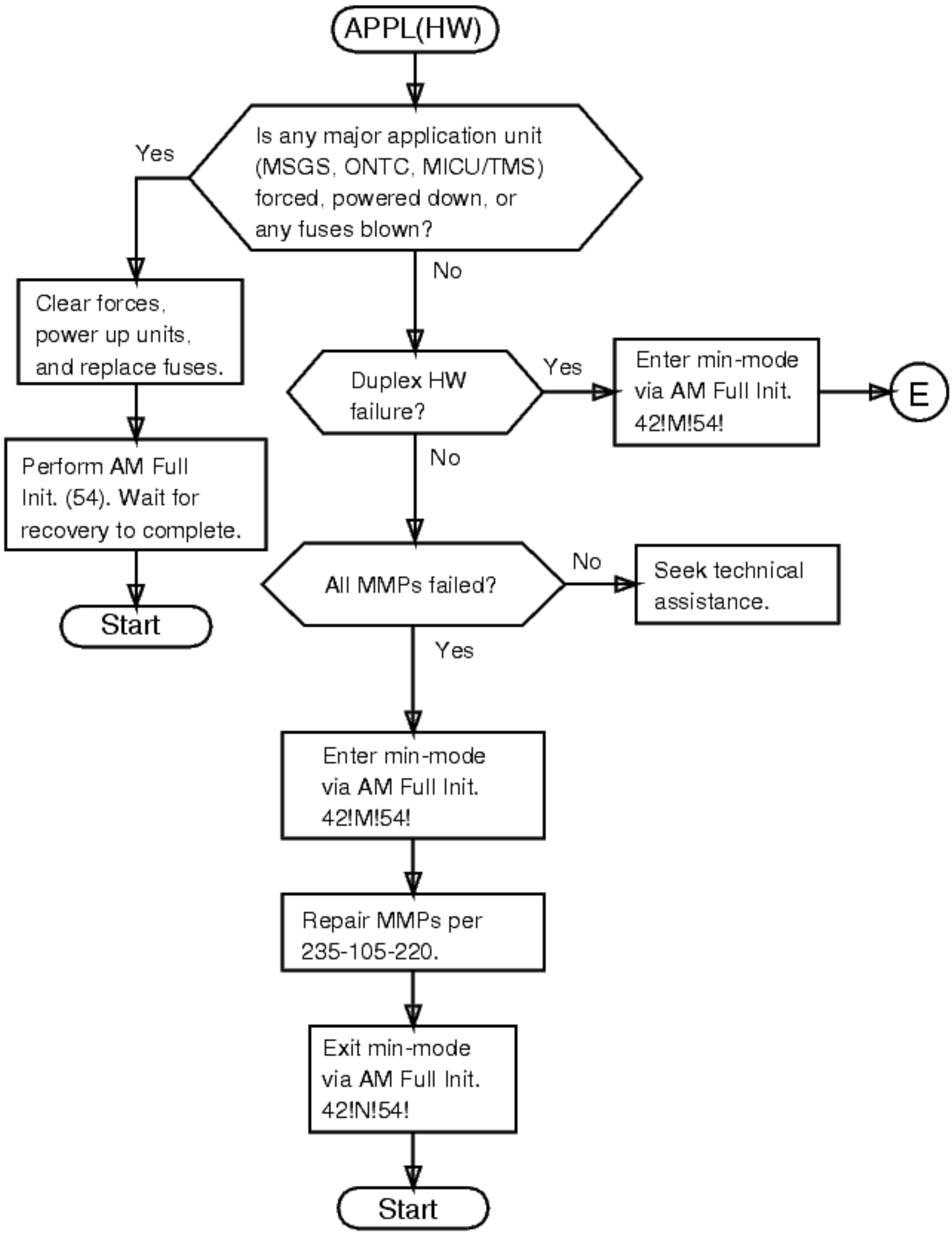

DMERT
Are automatic recovery actions exhausted? On PRM_X Fbcd xxxx, Is cd > or = 33?
No
Let recovery finish or wait until automatic recovery actions are exhausted. Keep checking basic call processing and look for PRM a EExx 00xx 0410 0300 which comes out after communication has been established with one SM/SM-2000.
Yes
Is power off, any fuses blown, or any forced configurations on CU disk, or disk file cont.?
Yes
Power on, replace fuses, or unforce configurations.
No
Is AM initializing? Do init PRMs show continual failure to recover?
Yes
Start
No
Can any calls be completed?
No
Yes
Analysis
Perform AM Full Init. Wait for recovery to complete 54 on EAI recovery page.
B

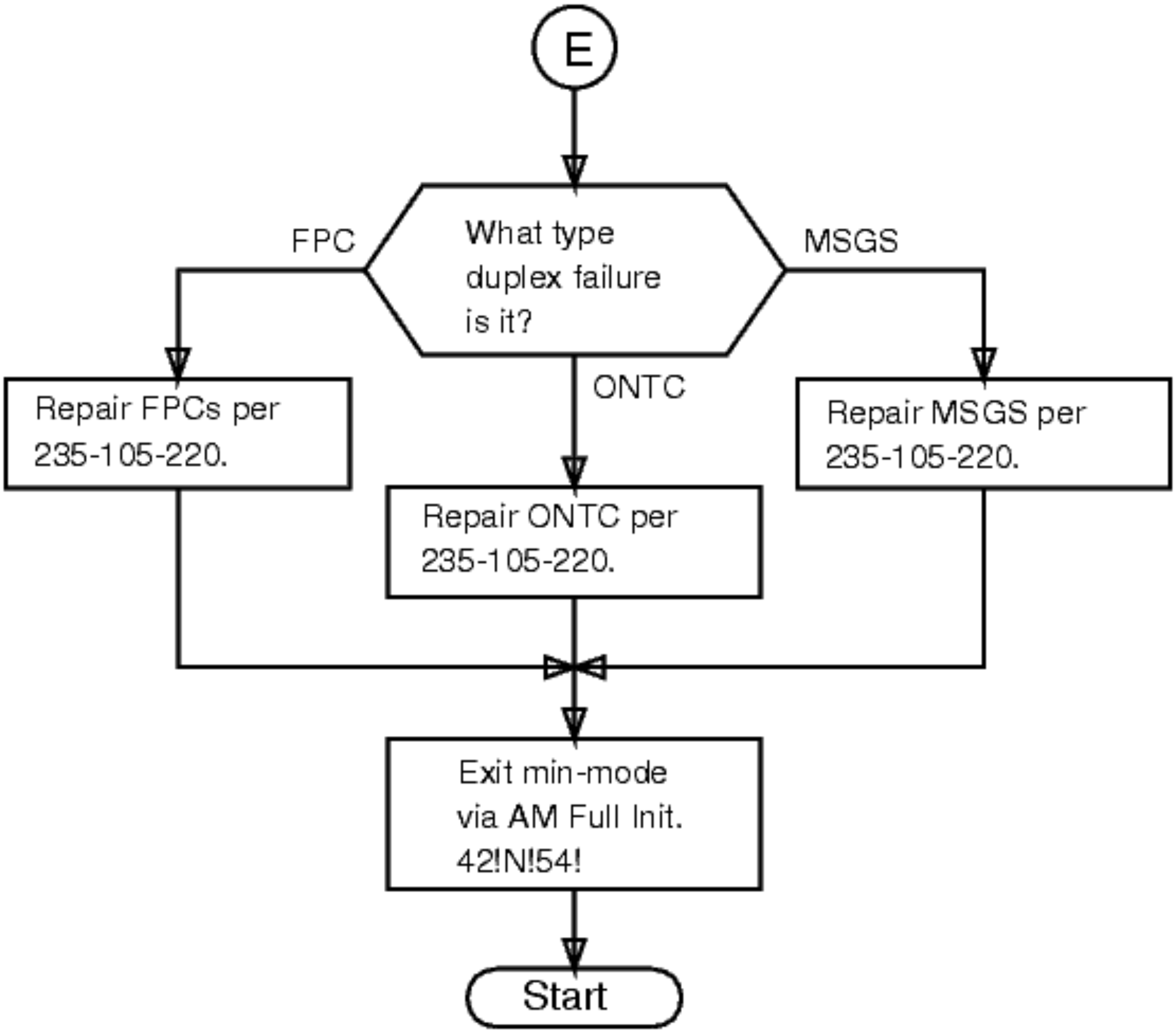

B
Is AM initializing? Do initialization PRMs show continual failure to recover?
No
Yes
Can any calls be completed?
No
Yes
Analysis
Inhibit hardware and software checks (34,36) and perform AM Full Init. (54) and let recovery complete.
Is AM initializing?
No
Yes
Can any calls be completed?
Yes
No
Caution: System is operating in an off-normal state. Seek technical assistance as necessary.
DMERT


APPL(SW)
Inhibit SW checks. Perform AM Full Init. Wair for recovery to complete. (36,54)
Is AM initializing?
No
Yes
Can any calls be completed?
No
Yes
Caution: System is operating in an off-normal state. Seek technical assistance as necessary.
Analysis
Clear SW inhibit and RC backout; force broot; perform an AM Full Init. Wait for recovery to complete 37!, 30!, 42!!!54!
Is AM initializing?
No
Yes
Can any calls be completed?
No
Yes
Analysis
C


C
Clear broot (31)
Install backup disk in MHD, or load disk from tape, select and force CU and MHD, and perform AM Full Init. (54). Wait for recovery to complete.
Is AM initializing?
No
Yes
Can any calls be completed?
No
Yes
Analysis
Inhibit SW checks. Perform AM Full Init. Wait for recovery to complete. (36,54)
Is AM initializing?
No
Yes
Can any calls be completed?
No
Yes
Caution: System is operating in an off-normal state. Seek technical assistance as necessary.
Analysis
D


D
Clear SW inhibits (37!), Force broot (30!), and perform AM Full Init. (54!). Wait for recovery to complete.
Is AM initializing?
No
Yes
Can any calls be completed?
No
Yes
Analysis
Have you tried new disk packs in both MHDs or tried loading the disk from tape?
No
C
Yes
Stop and wait for technical assistance.


APPL(HW)
Is any major application unit (MSGS, ONTC, MICU/TMS) forced, powered down, or any fuses blown?
Yes
No
Clear forces, power up units, and replace fuses.
Perform AM Full Init. (54). Wait for recovery to complete.
Start
Duplex HW failure?
Yes
Enter min-mode via AM Full Init. 42!M!54!
E
No
All MMPs failed?
No
Seek technical assistance.
Yes
Enter min-mode via AM Full Init. 42!M!54!
Repair MMPs per 235-105-220.
Exit min-mode via AM Full Init. 42!N!54!
Start


E
What type duplex failure is it?
FPC
MSGS
ONTC
Repair FPCs per 235-105-220.
Repair ONTC per 235-105-220.
Repair MSGS per 235-105-220.
Exit min-mode via AM Full Init. 42!N!54!
Start

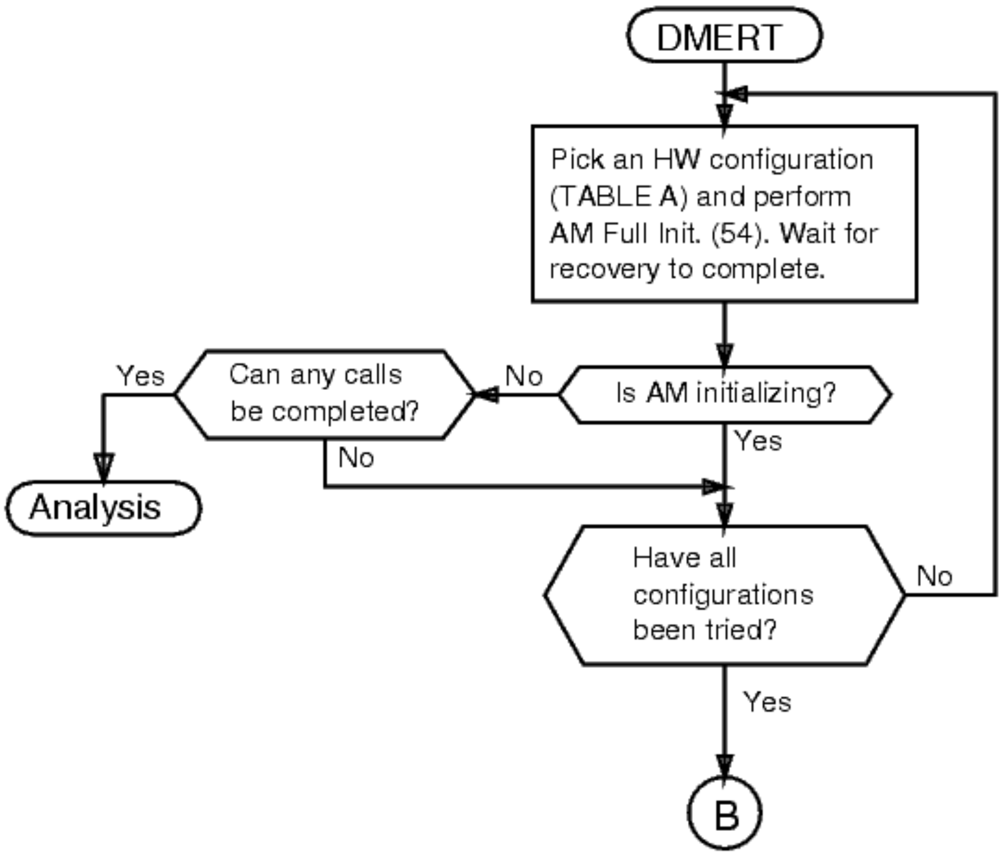


TABLE A CONFIGURATION OPTIONS FOR 3B20D/3B21D COMPUTER		
NO	CONFIGURATION	ENTER THE FOLLOWING EAI COMMANDS
1	CU0 PRI-DISK (MHD 0)*	10 and 20
2	CU0 SEC-DISK (MHD 1)	10 and 22
3	CU1 PRI-DISK (MHD 1)	11 and 20
4	CU1 SEC-DISK (MHD 0)	11 and 22
5	CU1 BACKUP ROOT	11 and 30
6	CU0 BACKUP ROOT [2]	10 and 30

* The first four combinations should have been attempted through DMERT initialization level 3.

[2] Other configuration options include the previous six options with Inhibits.

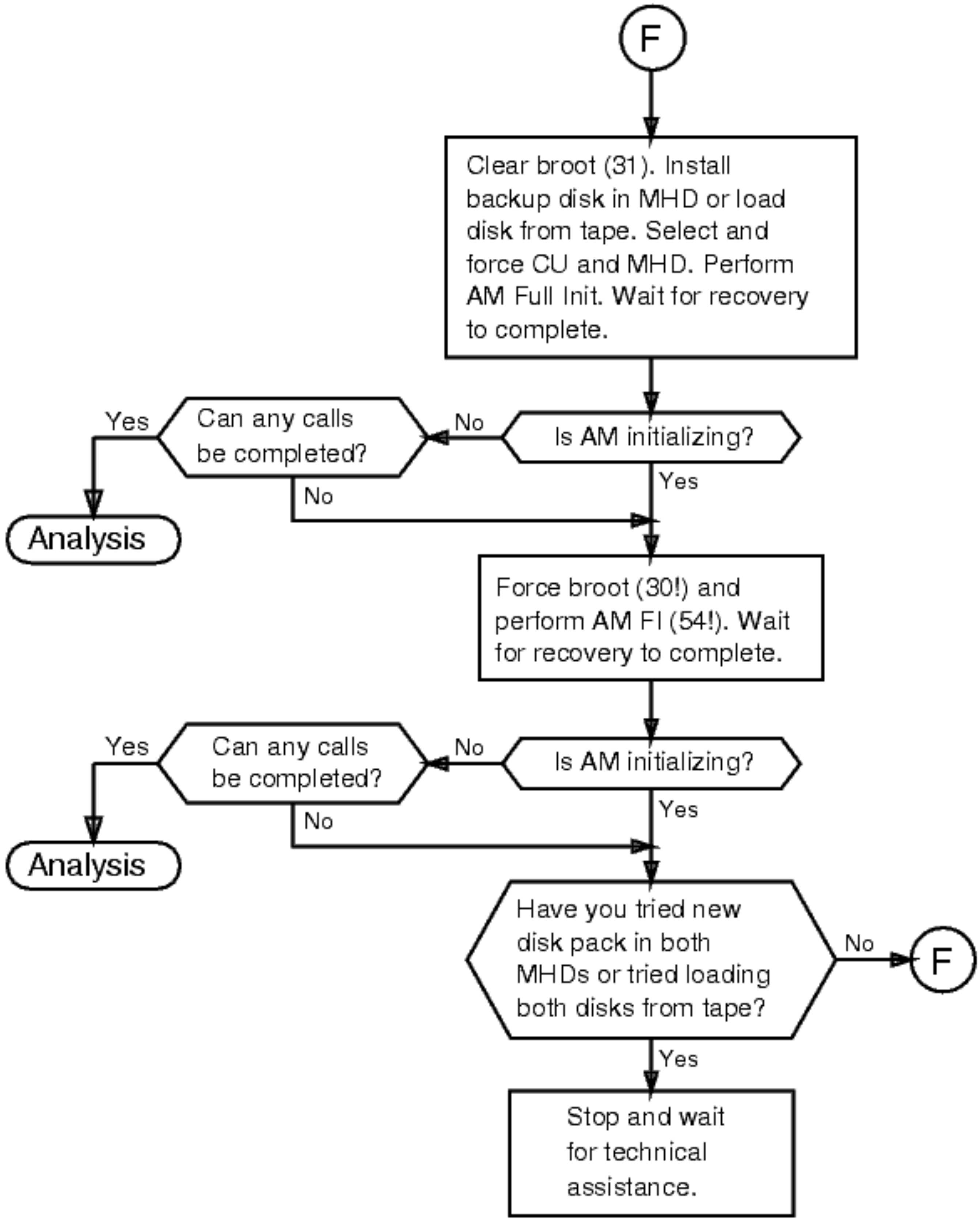
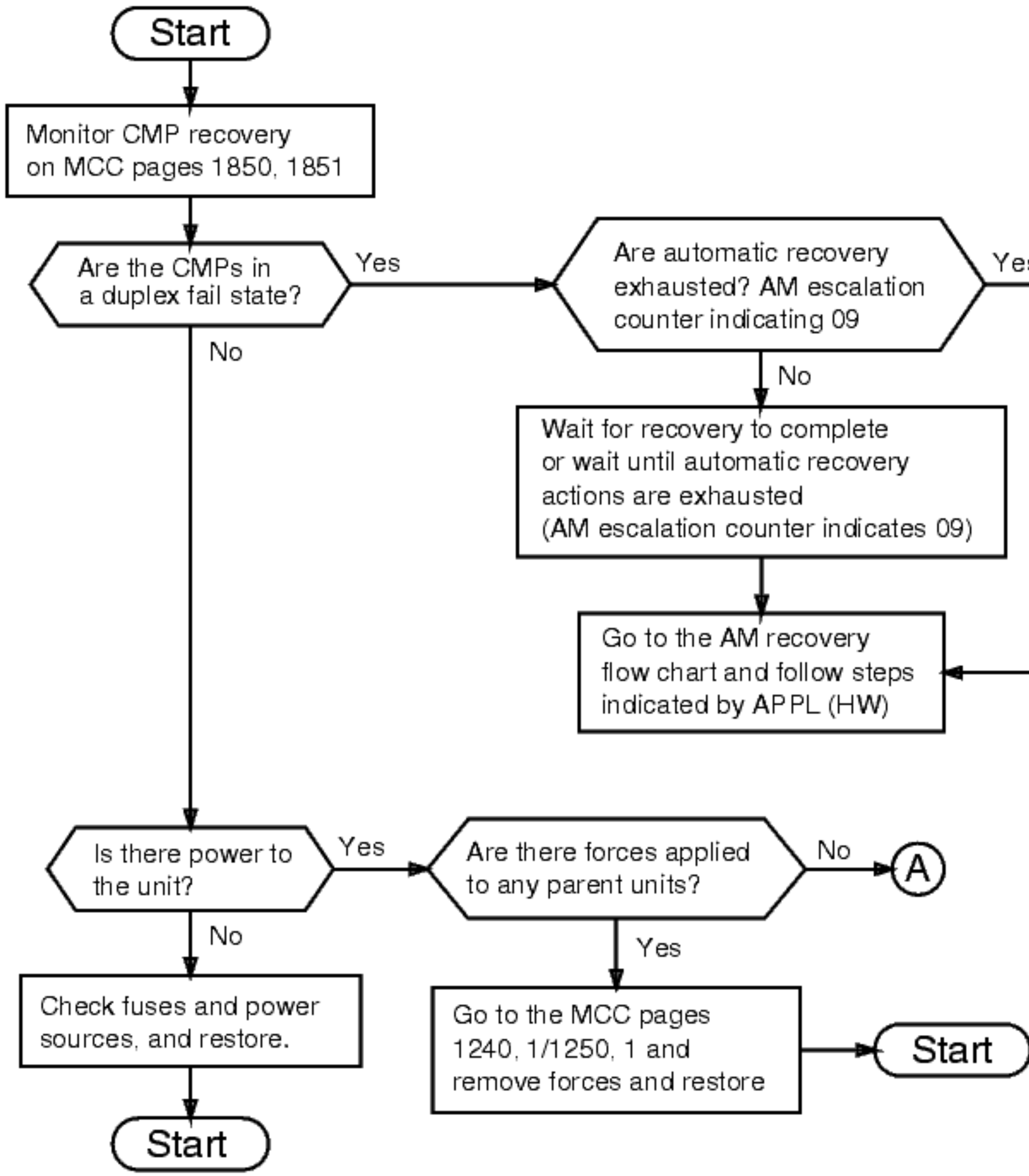

F
Clear broot (31). Install backup disk in MHD or load disk from tape. Select and force CU and MHD. Perform AM Full Init. Wait for recovery to complete.
Is AM initializing?
No
Can any calls be completed?
Yes
Analysis
No
Yes
Force broot (30!) and perform AM FI (54!). Wait for recovery to complete.
Is AM initializing?
No
Can any calls be completed?
Yes
Analysis
No
Yes
Have you tried new disk pack in both MHDs or tried loading both disks from tape?
No
F
Yes
Stop and wait for technical assistance.

Figure 9.3-2 AM Recovery Diagram



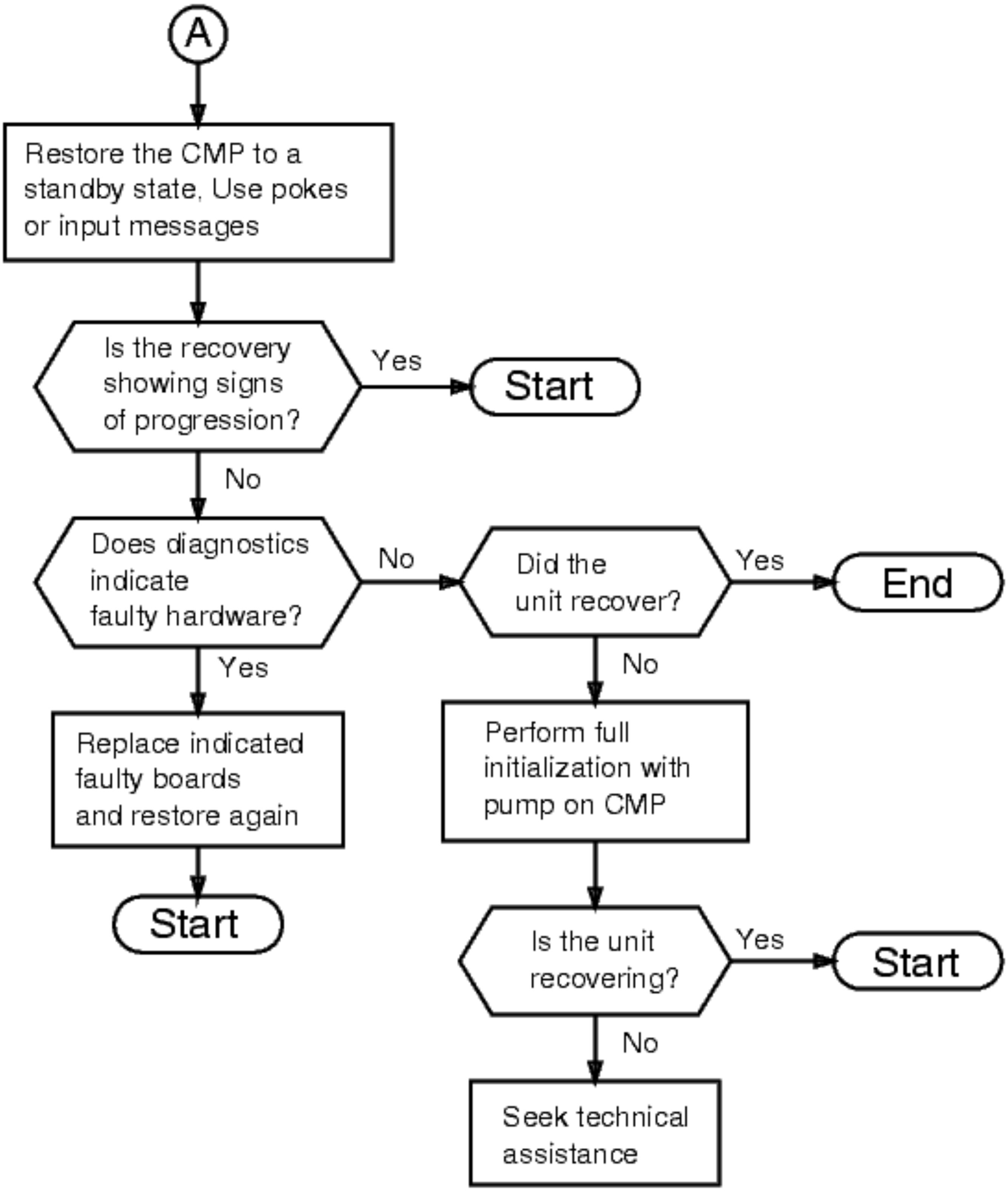
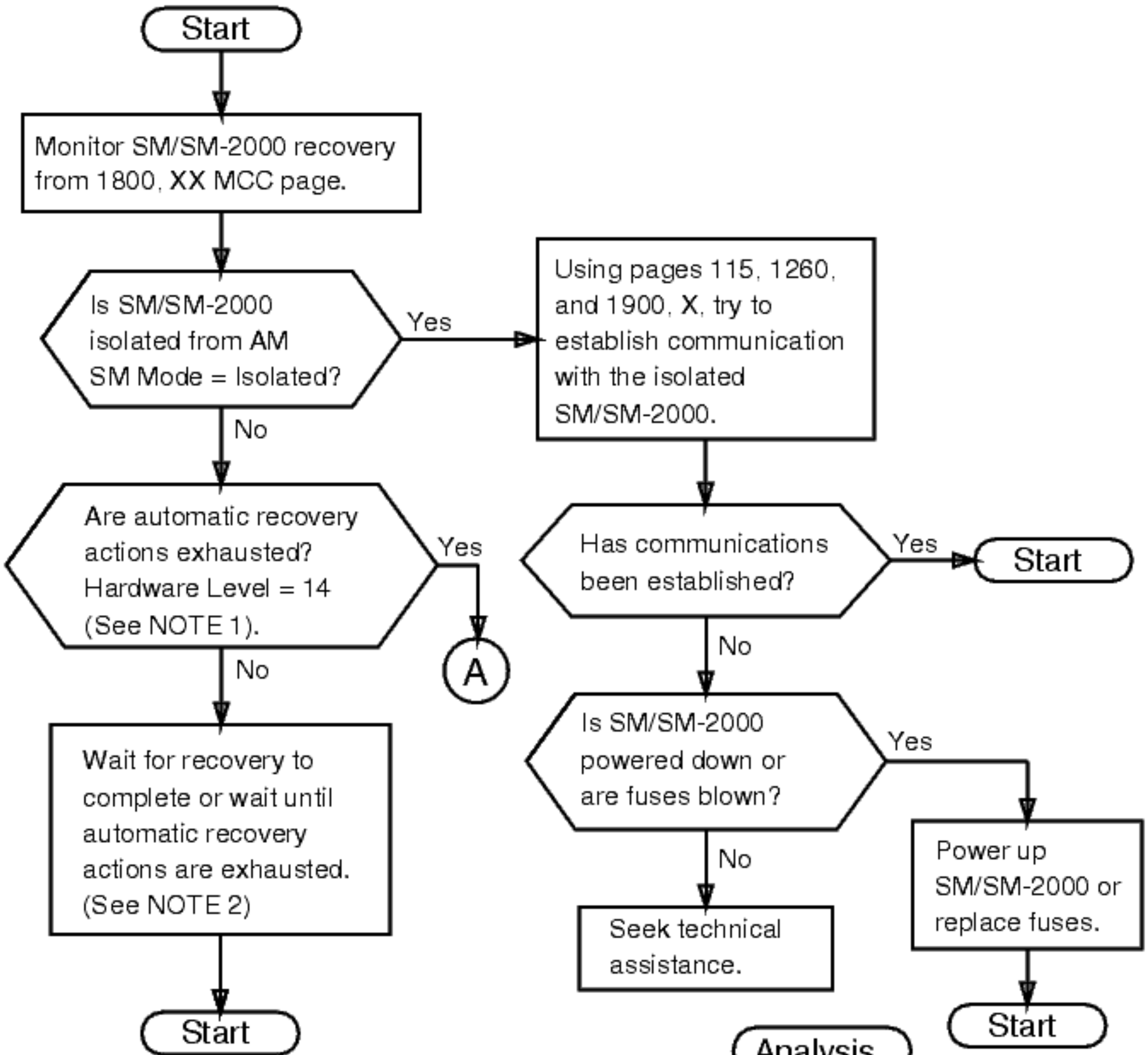
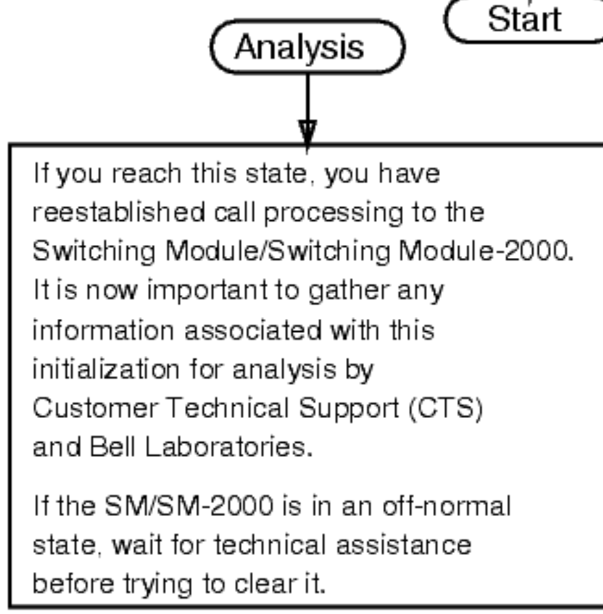


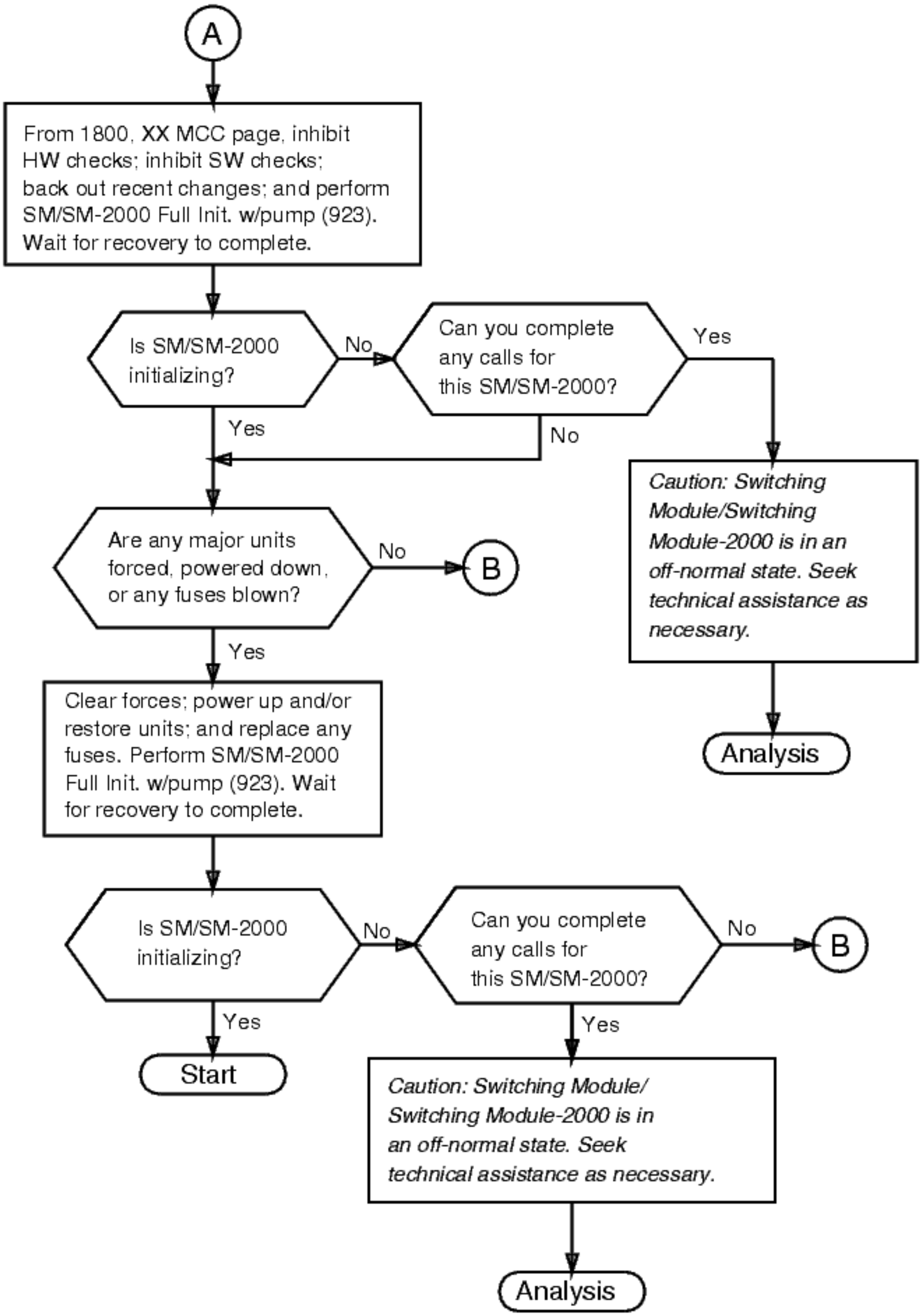
Figure 9.3-3 CMP Recovery Diagram





Notes:

1. Hardware level (HWLVL) shows up on SM/SM-2000 stimulus message (REPT IM HWLVL).
2. If SM/SM-2000 recovery indication shows that SM/SM-2000 is stuck at one progress mark (progress counter value directly below progress marker is not advancing) and no other SM/SM-2000s are initializing, then seek technical assistance before proceeding.


A
From 1800, XX MCC page, inhibit HW checks; inhibit SW checks; back out recent changes; and perform SM/SM-2000 Full Init. w/pump (923). Wait for recovery to complete.
Is SM/SM-2000 initializing?
No
Can you complete any calls for this SM/SM-2000?
Yes
No
Yes
Caution: Switching Module/Switching Module-2000 is in an off-normal state. Seek technical assistance as necessary.
Analysis
Are any major units forced, powered down, or any fuses blown?
No
B
Yes
Clear forces; power up and/or restore units; and replace any fuses. Perform SM/SM-2000 Full Init. w/pump (923). Wait for recovery to complete.
Is SM/SM-2000 initializing?
No
Can you complete any calls for this SM/SM-2000?
No
B
Yes
Start
Yes
Caution: Switching Module/ Switching Module-2000 is in an off-normal state. Seek technical assistance as necessary.
Analysis

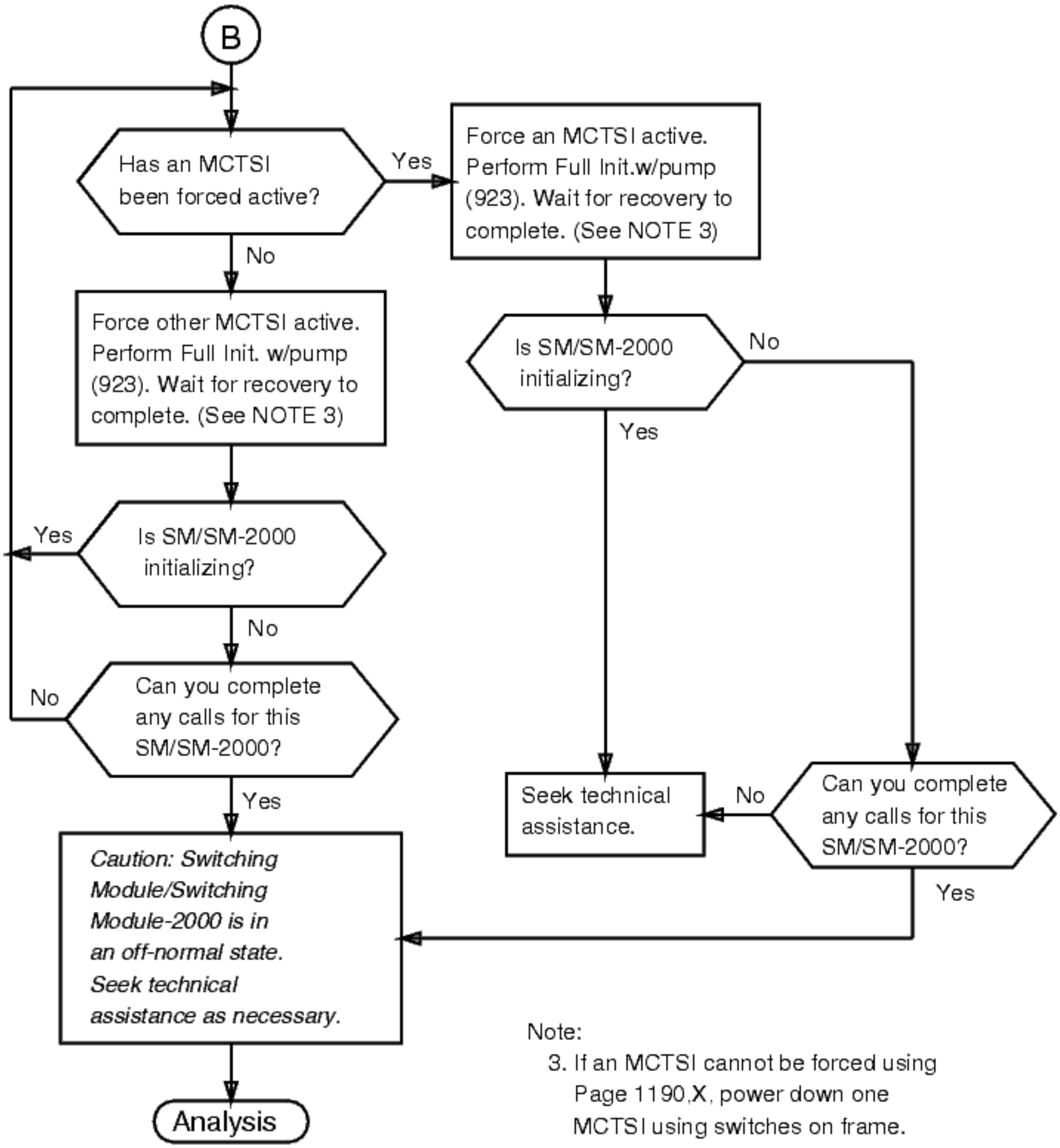


Figure 9.3-4 SM/SM-2000 Recovery Diagram

GLOSSARY

The following is a list of abbreviations, acronyms, and terms found in this manual.

ABER

Acceptable Bit Error Rate

ACCED
Access Editor

ACP
Alarm Control Process

ACNR
Automatic Critical Node Recovery

ACSR
Automatic Customer Station Rearrangement

ACT
Active Grid State

ADP
Automatic Diagnostics Process

AIM
Application Integrity Monitor

AIS
Alarm Indication Signal

AIU
Access Interface Unit

ALCB
Access Link Control Block

ALE
Automatic Line Evaluation

ALIT
Automatic Line Insulation TestingA preventive maintenance tool that uses the MMSU and checks for foreign Electromagnetic Fields and leakage in the insulation of wire, cable sheath, and cable terminals.

AM
Administrative ModuleA module in the *5ESS*®-2000 switch - The "global" processor of the *5ESS*®-2000 switch; it connects to external Operations Support Systems (OSS) interfaces, human machine interface, bulk data storage, and directs system maintenance.

AMA
Automatic Message AccountingTelephone Industry Standard for collecting billing data - The automatic accumulation of call data such as calling number, called number, date, time, and duration. In the *5ESS*®-2000, disks are used to store the information pertinent to local and toll calls for billing purposes.

AMADL
Automatic Message Accounting Data Link

AMARC
Automatic Message Accounting Recording CenterA centralized system that receives a record of all billing; and from switching systems, creates the charging records for the operating company.

AMATPS
Automatic Message Accounting Teleprocessing SystemA software feature that generates single-entry billing data in standard format and forwards this data by data link to either an AMARC or to local AMA tape.

ANALOG
A continuous sine wave which varies with the amplitude and frequency of the sound.

APPLVL
Application Initialization Level Counter

APR
Automatic Power Recovery

APT
Automatic Progression Testing

ARR
Automatic Ring Recovery

ATP
All Tests Passed

ATTS
Automatic Trunk Test Scheduler

AUTISSING
Automatic Time-Slot Switching

BI
Batch Insert

BLKSZ
Block Size

BOLO
Back Out Last Official

BORSCHT
Battery feed, Over-voltage protection, Ringing (power), Supervision (coder-decoder), Hybrid, and Test Access. Those functions are perform by Line Unit or ISLU.

BR
Batch Review

BRI
Basic Rate Interface

BST
Basic Services Terminal

BUD
Backup Update Data Base

BWM
Broadcast Warning Message

See Software Update.

C&D
Control and Display

C/D
Control and Display

A circuit pack in Duplex Units that controls power to the subunit.

CA
Call Appearance

CAICOM
Call Appearance ICOM

CAMA
Centralized Automatic Message Accounting

A feature that permits a *5ESS*®-2000 switch exchange to collect and store toll information and message unit billing on calls originated by local exchanges.

CAROT
Centralized Automatic Reporting on Trunks

A computerized system that automatically accesses and tests trunks for a maximum of 14 offices simultaneously. In the *5ESS*®-2000 switch, orders are received by the AM over a data link, tests are performed by TTF, results are returned to CAROT.

CATP
Conditional All Tests Passed

CCP
Common Control Processor

CCS
Common Channel Signaling

CDX
Compact Digital Exchange

CFGSTAT
Configuration Status

CGA
Carrier Group Alarm

CH
Channel

CHAN
Channel

Circuits in LU or ISLU that perform the Code-Decode of the BORSCHT functions for a subscriber.

CI
Control Interface

A circuit pack in the SM MCTSI that provides a standard interface for all PICBs.

CKT
Circuit

CLNK
Communication Link (C-link)

A time slot riding over the DLI-NCT-TMS-MI (SM), NLI-NCT2-TMS-MI (SM-2000); provides a virtual path from each SM/SM-2000 to its assigned MMPs via switched Control Time Slots.

CLR
Clear

CM
Communication Module

Hardware that provides the interface between the administrative module and the switching module(s).

CMCU
Communication Module Control Unit

The CMCU provides the interface between the MMPs and TMSUs, and houses the TMS controller. The CMCU also houses the DMI which terminates the message interface buses (MIBs) from the MMPs. It also contains the metallic interface to the TMSU, the NCLK, and the TMS clock.

CMP
Communication Module Processor

A unit in the CMPU shelf, in the CM. The CMP handles recent change, global resource allocation, and the call processing functions that are efficiently done on a centralized basis.

CMPU
Communication Module Peripheral Unit

A shelf in the CU that contains the CMP and the QGP. Each interfaces with the Message Switch Control Unit (MSCU) via an Input/Output Microprocessor Interface (IOMI) Bus.

CN
Change Notice

CNI
Common Network Interface

Nodes that provide data links to connect the 5ESS-2000 switch to the Common Channel Signaling Network.

CNIDBOC
Common Network Interface Data Base Operation Consolidator

Used to verify and make changes to CNI information in the data base.

CNR
Critical Node Recovery

CNTL
Control

COER
Central Office Equipment Reports

COMDAC
Common Data and Control Circuit

A circuit pack in each LU3 service group that samples data from each of the Channel Circuits and distributes this data into a serial stream to PIDBs, distributes data (in the opposite direction) from the PIDBs to the Channel Circuits, and distributes control data from the PICBs to the Channel Circuits, HLSCs, access network, and concentrators.

CONCEN
Concentrator

CONT
Controller

A generic term to define a piece of hardware that has a hierarchy over another hardware unit or sub-unit.

CORC
Customer-Originated Recent Change

CP
Central Processor

CPE
Customer Premises Equipment

CPU
Central Processor Unit

The CPU is a 32-bit microprogrammed processor that provides high-speed control functions required by the AM. The unit provides the primary control for operating the equipment that directs calls through the central office and aids in detecting and analyzing any faulty equipment involved in the task. Also see CU.

CRC
Cyclic Redundancy Check

CRT
Cathode Ray Tube

Hardware in a Visual Display Unit (VDU) or Video Display Terminal (VDT) that displays data entered via an operator or received from a computer.

CSCANS
Customer Service Computer Access Network System

CSD
Circuit Switched Data

CSOP
Craft Spooler Output Process

CSU
Cache Store Unit

CSV

Circuit Switched Voice

CTS
Control Time SlotSee CLNK.

CTS
Customer Technical Support

Organization that provides trouble clearing support for the *5ESS*®-2000 switch.

CTTU
Centralized Trunk Test Unit

An operations system that provides centralized trunk maintenance through a data link on the switch.

CU
Channel Unit

CU
Control Unit

Circuit packs in the AM (3B21D); executes programs when requests are received from either the SMs or peripheral devices. The CU is also responsible for system operation and maintenance, as well as for processing administrative data. See AM.

CUD
Current Update Data Base

DA
Direct Audit

DACS
Digital Access Cross Connect System

DAP
Display Administration Process

A process used to control graphic displays on maintenance personnel CRT terminals. It accepts requests from other processes through messages, changes the internal representation of the displayed pages, and displays these representations on the terminals.

DAS/C
Directory Assistance System/Computer

DAT
Digital Audio Tape

A circuit pack in the AM. It supports the same functions as the SCSI 9-Track Tape Drives in the CSPGC; the DAT can coexist with the SCSI 9-Track Tape Drives or replace them entirely.

DBM
Data Base Manager

DCLU
Digital Carrier Line Unit

An SM peripheral unit. Provides the system interface lines from *SLC*® carrier remote terminals. Terminates SLC carrier systems in the *5ESS®*-2000 switch.

DCLU2
Digital Carrier Line Unit Model 2

The unit that provides the system interface of digital lines from remote terminals.

DCMS
Design Change Management System

DCS
Digital Cross Connect System

DCTU
Directly Connected Test Unit

An SM peripheral unit. A test circuit with access to every LU and TU via the MSU, provides metallic voltage and resistance tests which require access to lines and trunks. The DCTU supports MLT2 automatic and TLWS manual for line and trunk test.

DCTUCOM
DCTU Common Control

DEN
Digital Equipment Number

A port on a DFI in a DLTU - A 7-digit number used in translation to identify the location of a DFI channel.

DFC
Disk File Controller

Duplicated units in the AM provides connection to AM peripherals with SCSI interfaces, including the MHDs, DAT, or the optional 9-track tape drive.

DFI
Digital Facility Interface

A circuit pack in DLTU that terminates a single 24-channel DS0 (DFI) or two 24 channel DS0s (DFI2 in DLTU2).

DFI2
Digital Facility Interface - Model 2

DFIH
Digital Facility Interface Host

DFIR
Digital Facility Interface Remote

DFSA
Disk File System Access

DGN
Diagnostic or Diagnose

DGR
Degraded Grid State

DGRF
Degraded Forced

DI
Data Interface

A circuit pack in the MCTSI that terminates PIDBs from the peripheral units.

DIGITAL
A signal consisting of high (on or 1) and low (off or 0) bits that represent the amplitude and frequency of the sound.

DIOP
Disk Independent Operation

DLC
Digital Loop Carrier

DLI
Dual Link Interface

A circuit pack in the MCTSI that connects the NCT links from the MCTSI to the TMS and provides a two-way interface between a switching module and the communication module.

DLM
Disk Limp Mode

DLN
Direct Link Node

DLTU
Digital Line and Trunk Unit

An SM peripheral unit. The DLTU provides direct interface between the T1-carrier and the *5ESS*®-2000 switch and is devoted to two distinct functions; interoffice trunking and remote switching module to host umbilicals. Model 1 can contain 10 DFIs. Model 2 can contain 10 DFI2s.

DLTU2
Digital Line and Trunk Unit - Model 2

DLTUH
DLTU Host

DLTUR
DLTU Remote

DMA
Direct Memory Access

An element of 3B21 CU that performs the memory transfers (to or from peripherals or within memory itself) and relieves the CU of the task.

DMERT
Duplex Multiple Environment Real-Time Operating System

The operating system of the 3B21D.

DMI

Dual Message Interface

A circuit pack in the CMCU shelf that provides the interface for control information between the Message Switch and the Time Multiplexed Switch (TMS). ***Note:*** The DMI is called MI on the MCC 15 page.

DMQ

Diagnostic Message Queue

DN

Directory Number

A telephone number based on a numbering plan.

DNU-S

Digital Networking Unit - SONET

An SM peripheral unit. A high-capacity digital trunk interface using SONET.

DNUSCC

Digital Networking Unit - SONET Common Control

DNUSCD

Digital Networking Unit - SONET Common Data

DOC

Dynamic Overload Control

A generic software system that responds to switching congestion by dynamically regulating the traffic to levels that can be handled most efficiently.

DS1

Digital Signal 1

DS2

Digital Signal 2

DS3

Digital Signal 3

DSC

Digital Service Circuit

A circuit pack in the MCTU and DSU2 shelf (SM) or DSU3 shelf (SM-2000) that receives and generates PCM for tone signaling, conferencing, recorded announcement, and AC testing.

DSIG

Direct Signaling

DSL

Digital Subscriber Line

A digital subscriber loop connected to the 5ESS-2000 switch by an ISLU or a RISLU.

DSLG

Digital Subscriber Lines Group

DSN
Defense Services Network

DSU
Digital Service Unit

DSU2
Digital Service Unit - Model 2

DSU3
Digital Service Unit - Model 3

DTA
Dial-Through Announcement

DUC
Dual Access Utility Circuit

EA
Emergency Action

The functions for manual recovery during periods of system emergency.

EADAS
Engineering and Administrative Data Acquisition System

A centralized collection system which collects *5ESS*®-2000 switch traffic data and sends it to Central Office Equipment Reports (COER).

EAI
Emergency Action Interface

The interface that connects the MTTY to the AM CU for certain emergency maintenance functions.

EAN
Equipment Access Network

A circuit pack in the DCTU that interconnects the Precision Measuring Units and the test access port.

ECD
Equipment Configuration Data

ECD
Equipment Configuration Data Base

A 3B21D/3B20D data base representing equipment/hardware for the AM or 3B21D/3B20D.

ECD/SG
Equipment Configuration Data/System Generation

EIS
External Information System

EKTS
Electric Key Telephone Service

ELI

Electrical Line Interface

ELS
Electronics Loop Segregation

EOC
Embedded Operations Channels

ERL
Echo-Return Loss

ESAC
Electronic Switching Assistance Center

ESM
External Sanity Monitor

ESP
Essential Service Protection

ETL
Equipment Test List

A suggested preventive maintenance schedule with suggested intervals.

FABRIC BOARD
A circuit pack in the TMSU that performs the time multiplexed space switching of the data time slots received over the NCT links from the SMs.

FABRIC EXERCISE
A test run on the cross-points of SMLU half grid boards. It can be done for routine or demand tests.

FAC
Facility

FEX
Feature Execution

FI
Facility Interface

FIDB
Facility Interface Data Bus

A data bus in an RSM that transmits 32 Time Slots (TS) from the Digital Line Trunk Unit (DLTU) to the Facilities Interface Unit in an RSM.

FIU
Facility Interface Unit

A unit in the RSMs that connects the RSM DLIs to the RDFIs in the RSM DLTU.

FMGR
File Manager

FPC
Foundation Peripheral Controller

A circuit pack in the MSGS MSCU to provide CMP interface to the TMS for control message.

FPI
Full Process Initialization

FSDB
File System Debugger

FTS
Field Test Set

GDSF
Global Digital Service Functions

An SM-2000 peripheral unit - A circuit pack in the DSU3 for conference and/or TTF circuits.

GDSU
Global Digital Service Unit

An SM peripheral that performs conferencing and TTF circuits.

GDSUCOM
GDSU Common Control

GDX
Gated Diode Crosspoint

Element of the LU - Electronic devices that can withstand very high voltages (approximately 500 volts) and can pass current in either direction.

GDXACC
Gated Diode Crosspoint Access

Element of the LU that receives orders to close or open crosspoints in order to connect/disconnect the following to the customers analog line: forward or reverse battery, any of the HLSCs, metallic test bus test access, and linerization circuit for line testing.

GDXC
Gated Diode Crosspoint Compensator

GDXCON
Gated Diode Crosspoint Control

GPDF
Global Power Distribution Frame

GRASP
Generic Access Package

HDFI
Host Digital Facilities Interface

A circuit pack in the HSM DLTU that terminates a DS1 umbilical link from an RSM.

HLSC
High-Level Service Circuit

A circuit pack in the LU. Provides the BORT (battery feed, over-voltage protection, ringing-power, and test access) functions of BORSCHT.

HOBIC
Hotel Billing Information Center

HOBICR
HOBIC Record-Quote Data Link

HOBICV
HOBIC Voice-Quote Data Link

HOBIS
Hotel Billing Information System

HSM
Host Switching Module

A switching module in the host office that terminates umbilical links from an RSM.

Hz
Hertz (Unit of Frequency)

I/O
Input/Output

ICOM
Intercom

IDCU
Integrated Digital Carrier Unit

An SM peripheral unit. Provides an integrated interface for *SLC*® carrier remote terminals.

IDCU COM
IDCU Common Board

IDS
Interprocessor Data Synchronization

IDUMP
Interactive Dump Utility

IFAC
IDCU Facility

ILEN
IDCU Line Equipment Number

IM
Input Messages Manual

IM
Interface Module

IMS
Interprocess Message Switch

INIT
Initialization

IOMI
Input/Output Microprocessor Interface

IOP
Input/Output Processor

A peripheral unit in the AM which connects the CU to the peripheral devices.

ISDN
Integrated Services Digital Network

Marketed service that provides end-to-end connectivity, and supports a wide range of services, including voice and data, accessed by users through a set of standard multipurpose user-network interfaces.

ISLU
Integrated Services Line Unit

An SM peripheral unit. Interfaces ISDN and analog (ISLU) or ISDN only (ISLU2) lines to the switch.

ISLU2
Integrated Services Line Unit - Model 2

ISLUCC
ISLU Common Controller

ISLUCD
ISLU Common Data

ISLULC
ISLU Line Card

ISLULGC
ISLU Line Group Controller

ISLUMAN
ISLU Metallic Access Network

ISLURG
ISLU Ringing Generator

ISM
Integrated Services Module

ISTF
Integrated Services Test Function

A circuit pack in the DSU2 or DSU3 that provides digital testing for DSLs and Digital Trunks.

LASS
Local Area Signaling Service

LC
Line Card

LCCB
Logical Channel Control Block

LCEN
Line Card Equipment Number

LCN
Line Card Number

LDFT
Load Disk From Tape

LDSF
Local Digital Service Function

Circuit packs in the SM-2000 DSU3. Provides UTGs and UTDs. The hardware name is DSC.

LDSU
Local Digital Service Unit

Circuit packs in the SM MCTU. The hardware name is DSC.

LDSUCOM
LDSU Common Control

LED
Light-Emitting Diode

LEN
Line Equipment Number

An eight-digit number used in translations to identify a port in an LU so that it may be accessed.

LG
Line Group

LGC
Line Group Controller

LI
Link Interface

The circuit used to terminate Network Control and Timing (NCT) links in the Dual Link Interface (DLI).

LIM
Local Interface Module

LLA
Low-Level Access

LN
Link Node

LNGRP
Line Group

LSI

Loop Side Interface

LSM
Local Switching Module

An SM that serves local lines, trunks, and ISDN users.

LTP
Line Trunk Peripheral

An SM growth cabinet.

LU
Line Unit

An SM peripheral unit. An analog subscriber line interface that supports individual, party, coin, non-coin, loop start, coin loop start, ground start, Private Branch Exchange-Central Office (PBX-CO) out-dial, and range extended lines. An LU Model 2 capacity is up to 512 lines, while Model 3 is up to 640 lines.

LU2
Line Unit - Model 2

LU3
Line Unit - Model 3

LUCHAN
Line Unit Channel Circuit

MA
Metallic Access

MAB
Metallic Access Bus

MCC
Master Control Center

Primary Human Machine Interface in the *5ESS*®-2000 switch that consist of a video display terminal with keyboard (MTTY), ROP, and a key telephone set.

MCRT
Maintenance Cathode Ray Terminal

MCTSI
Module Controller and Time Slot Interchanger

Duplex control and switching unit in each SM/SM-2000. Model MCTU2 or MCTU3 in each SM. Model SMPU4 and TSIU4 in each SM-2000. Switches peripheral to network and peripheral to peripheral time slots. It also provides overall control of the peripheral units in each SM.

MCTU
Module Controller and Time Slot Interchange Unit

The switching module hardware unit that provides the control and time division switching functions, local digital service, and Dual Link Interface connection for each Switching Module. See MCTSI.

MCTU2

Module Controller and Time Slot Interchange Unit - Model 2

MCTU3
Module Controller and Time Slot Interchange Unit - Model 3

MDF
Main Distributing Frame

Provides a connection point between the *5ESS*®-2000 switching system and loop cable pairs.

MDII
Machine Detected Interoffice Irregularity

MEM
Member

MF
Multifrequency

MFFU
Module Fuse Filter Unit

MHD
Moving Head Disk

Unit of the DFC in the AM. A high-speed, random-access digital data storage device.

MI
Message Interface

A circuit pack of the CMCU in the ONTC. Manages transmission of control data between the TMS and the MSGS.

MI/NC
Message Interface/Network Clock

MIB
Message Interface Bus

MICU
Message Interface Control Unit

MINMODE
Minimum Configuration Mode

MLHG
Multiline Hunt Group

MLT
Mechanized Loop Testing System

Provides standard metallic testing such as resistance, capacitance, and voltage.

MLT2
Mechanized Loop Testing System Generation 2

An external operations system for testing customer lines. Interface via data link directs the DCTU for routine and demand loop testing via a data link.

MML
Man-Machine Language

MMP
Module Message Processor

Circuit packs in the MSGS that switches control messages between the SM/SM-2000 processors and between SM and the AM.

MMRSM
Multimodule Remote Switching Module

One to four RSMs connected to a host exchange and to each other by DS1 facilities. See RSM.

MMSU
Modular Metallic Service UnitSee MSU.

MOOS
Manual Out of Service

MP
Module Processor

The processing element in any module; that is, the switching module processoor (SMP) and the module message processor (MMP).

MSC
Message Switch Controller

A subunit in the MSCU; Model 1 packs include DDSBS, BIC, PIC, controller, and IOMIs.

MSCU
Message Switch Control Unit

Shelf in the CM MSGS that connects the MMP, AM, and ONTC. MSCU contains MSC, FPC, and PPC. The interface between the administrative module (AM) and the MMPs.

MSGCLS
Message Class

MSGS
Message Switch

Unit of the CM which processes control messages and provides AM access to the TMS and SMs.

MSGS2
Message Switch - Model 2

MSPU
Message Switch Peripheral Unit

Shelf in the CM MSGS contains module message processor circuit packs.

MSU
Master Scanner Unit

MSU
Message Signal Unit

MSU
Metallic Service Unit

Peripheral unit in the switching module that provides metallic access for scan, distribution, line test, and compensation functions for use with or between SMs and to external test facilities.

MSUCOM
MSU Common Controller

MT
Magnetic Tape

MTIB
Metallic Test Interface Bus

A circuit pack and backplane bus in the MMSU. Provides a path between the lower and upper shelves of each service group; provides ports which are used to connect SG 0 with SG 1.

MTIBAC
Metallic Test Interface Bus Access

MTTY
Maintenance Teletypewriter

Part of the MCC terminal used by the technician as primary interface with the *5ESS*®-2000 switch.

MTTYC
Maintenance Teletypewriter Controller

NC
Network Clock

NCLK
Network Clock

The digital reference clock for the 5ESS-2000 switch network whose source is the National Bureau of Standards clock in Hillsboro, Missouri.

NCT
Network Control and Timing Link

The internal fiber optic links in the switch that connect the SMs with the CM to provide time slot paths for network connections, carry control messages to the modules, and distribute timing to the module.

NCT2
Network Control and Timing Link 2

The internal fiber optic links in the switch that connect the SM-2000 with the CM to provide time slot paths for network connections, carry control messages (time slots) to the modules, and distribute timing to the module. Later version of NCT that has more capacity.

NEN
Networking Equipment Number

NLI
Network Link Interface

NM
Network Management

NO2SES
No. 2 Service Evaluation System

OAP
OSPS Administrative Processor

ODA
Office Data Assembler

The software system through which the initial office data base is built. The system allows both the switch owner and line engineer to enter data through a dial-up access after a new office has been registered. Also used for system updates in existing offices.

ODBE
Office Data Base Editor

A software tool that is used to verify and make changes to the ODD data base.

ODD
Office-Dependent Data Base

The *5ESS*®-2000 switch data base (software subsystem) that contains Line, Trunk, and Routing information; but unique to each *5ESS*®-2000 switch office.

OFFN
Off Normal

OM
Output Messages Manual

ONTC
Office Network Timing Complex

Complex of the CM; provides space switching and system timing function between SMs and control message path between SMs and MSGs.

ONTCCOM
Office Network Timing Complex Common

OOD
Out of Date

OOS
Out-of-Service

Condition used for units that have been removed from service (either manually or automatically) and are no longer available for use by the system.

OOSF
Out-of-Service Family of Equipment

OOSP
Out-of-Service Power

OOST
Out-of-Service Transient

OPD
Outpulse Digits

OPD
Over-current Protection Device

OPT
Operator Position Terminal

ORM
Optically Integrated Remote Switching Module

An ORM is an SM that is remoted from the *5ESS*®-2000 switch through DS3 transmission facilities.

OS
Operating Systems

External computer systems that provide the routine operations needed to maintain and engineer the telephone network.

OSC
Operator Service Center

OSDS
Operating System for Distributed Switching

The *5ESS*®-2000 switch operating system that supports the application software in both the AM and SM. The OSDS consists of FC, PC, and RTA.

OSPS
Operator Services Position System

Software feature of the *5ESS*®-2000 switch. Allows an operator to provide book calls, place collect calls, or bill calls to a credit card.

OSPSDA
OSPS Directory Assistance

OSPSRC
OSPS Recent Change

OSPSTA
OSPS Toll and Assistance

OSS
Operations Support Systems

Other mechanized (computerized) support systems attached to the *5ESS*®-2000 switch through the Input/Output Processor that support the system through data collection and analysis. See OS.

OTC
Operating Telephone Company

OTF
Operational Test Failure

PAS
Protected Application Segment

PC
Peripheral Controller

The OSDS software subsystem. Manages and controls the SM peripherals hardware. See OSDS.

PCFD
Power Control Fuse Distribution

PCM
Pulse Code Modulation

Various protocol techniques for encoding analog signals.

PCN
Product Change Notice

PCT
Peripheral Control and Timing

PDB
Packet Data Bus

PDBTS
PDB Time Slot

PDF
Power Distribution Frame

PECC
Product Engineering Control Center

The previous name of the organization that is currently Customer Technical Support (CTS).

PER
Protocol Error Records

PFR
Peripheral Fault Recovery

PGTC
Pair Gain Test Controller

PH
Protocol Handler

PHDB
Protocol Handler Data Bus

PIC
Peripheral Interface Controller

A circuit pack in the MSCU. The PIC is the main processing element of the MSCU; it services the MMPs, CMP, QGP, FPC, and PPC. It connects to the AM and MSGS to move control messages.

PICB
Peripheral Interface Control Bus

Duplex bus between SM peripherals and the MCTSI in each SM carries control messages between the MCTU2 or 3 (SM) or SMPU4 (SM-2000) and the peripheral units.

PID
Process Identification

PIDB
Peripheral Interface Data Bus

Duplex bus between SM peripheral and the MCTSI in each SM; carries customer data between the TSIU4 (SM-2000) or MCTU2 or MCTU3 (SM) and peripheral units in each SM.

PKT
Packet

PLS
Protection Line Switch

PMU
Precision Measurement Unit

Subunit of the SM DCTU. Performs the voltage and resistance test measurements.

PN
Private Network

POKE COMMAND
Numeric input format entered at the MCC when in the command mode.

PPC
Pump Peripheral Controller

A circuit pack in the CM MSGS MSCU. Used for the rapid re-initialization (normal pump) of the SM(s).

PPDB
Primary Power Distribution Bay

PR
Program Record

PRM
Processor Recovery Message

PSM
Position Switching Module

PSS
Programmer Support System

PSU
Packet Switch Unit

PSUCOM
PSU Common Controller

PSUPH
PSU Protocol Handler

PTI
PIDB Time Slot Interchanger

PTS
Peripheral Time Slot

PVC
Permanent Virtual Circuit

PVN
Private Virtual Network

QGL
QLPS - QGP Link

QGP
QLPS Gateway Processor

QLNK
QLPS Link

QLPS
Quad Link Packet Switch

QLPSNW
QLPS Network

QPIPE
QLPS Pipe

QTMSLNKS
QLPS Pseudo TMS Links

RAF
Recorded Announcement Function

A circuit pack in the DSU2 (SM) or DSU3 (SM-2000). Provides recorded announcements and the capability for integrated digit decoding and announcement playback.

RAS
Remote Alarm Section

RC
Recent Change

The *5ESS*®-2000 switch system tool to change or verify ODD data base to reflect changes in customer or system capabilities.

RC/V
Recent Change/Verify

A stand-alone subsystem provided at the *5ESS*®-2000 switch office which provides switch owner personnel with the ability to change or verify the data base using video displays and menu selection.

RCL
Remote Communication Link

RCLK
Remote Clock

Optional unit in an RSM. A stratum three clock unit to support digital trunking in RSM applications, when RSM is in communication lost (COMM LOST) state.

RDFI
Remote Digital Facility Interface

A circuit pack in the RSM DLTU. Connects a DS1 umbilical link to the FIU.

REX
Routine Exercise

RFAC
Remote Facility

RISLU
Remote Integrated Service Line Unit

Peripheral Unit of the SM version of the ISLU that is located at a remote location from the switch. Connected to host SM via DS1 facilities.

RLI
Remote Link Interface

RMAS
Remote Memory Administration System

A computer-controlled facility that interfaces with the switch recent change system to perform automated RC/V and office record activities.

RN
Ring-Node

RNC
Ring-Node Cabinet

ROH
Receiver Off Hook

ROM
Read-Only Memory

Memory whose data content is preset by the manufacturer. Data content in ROM will not change even if power to memory is removed.

ROP
Receive/Read-Only Printer

Unit of the MCC prints output from the switch based on either a manual request, internal routines, or system discovered error events.

ROS
Request Out of Service

ROTL
Remote Office Test Line

A circuit pack in the TTF that originates automatic interoffice trunk transmission test calls under the control of CAROT from a remote location, under manual control in the testing office, or under manual control of a ROTL Control Unit from a remote location.

RPCN
Ring Peripheral Control Node

RSM
Remote Switching Module

Module of the *5ESS*®-2000 switch, remotely located Switching Module that supports all line features, and routes intra-RSM calls. The RSM is connected to host exchange by DS1 facilities. See MMRSM.

RT
Remote Terminal

A generic term denoting the remote vehicle in many pair gain or remote switch systems. Loop terminal between analog loops and DS1 facilities which terminated at the *5ESS*®-2000 on DCLU or IDCU or AIU SM peripherals.

RT
Residential Termination

Sometimes called the point-of-demarcation. The point where a line terminates at a customers endpoint.

RTA
Routing and Terminal Allocation

The OSDS software subsystem that controls the routing of incoming calls and the allocation of termination devices at the hardware independent level. See OSDS.

RTAC
Regional Technical Assistance Center

RTFAC
Remote Terminal Facility

RTR
Real-Time Reliable

Designation of the *UNIX*® Operating System used in the 3B20 and/or 3B21 computers.

RTRS
Real-Time Rating System

RTTU
Remote Trunk Test Unit

RT&M
Remote T&M

SAS
Service Announcement System

A circuit pack in DSU3 (SM-2000). A high-capacity recorded announcement system.

SBUS
SCSI Bus

SCANS
Software Change Administration and Notification System

External computer system that distributes software changes in stored program control programs to the telephone company in the form of software updates, previously called broadcast warning messages (BWMs).

SCB
Stack Control Block

SCC
Switching Control Center

A centralized location where the switching operations of many *ESS*™ electronic switches can be monitored and/or controlled remotely from the central office.

SCCS
Switching Control Center System

External computer system of the SCC.

SCSI
Small Computer System Interface

The AM data bus between CU and DFC, between DFC and MHD and DAT.

SDFI
Subscriber Loop Carrier Digital Facility Interface

A circuit pack in the DCLU that terminates a DS1 facility from the *SLC*® 96 Carrier.

SDL
Synchronous Data Link

SDLC
Synchronous Data Link Controller

Pack in the AM IOP that connects to X.25 facility. A protocol controller that accesses message links by transmitting and receiving OSDS in BX.25 format.

SDLC
Synchronous Data Link Controller

SFI

STSX-1 Facility Interface

SG
Service Group

The maximum set of resources which can be affected by a single hardware fault in a simplex unit.

SI
Selective Initialization

SID
Site Identification Number

SIM
System Integrity Monitor

***SLC*® Carrier**
Marketed product, normally referring to a *SLC*®-96 carrier or a *SLC*®-2000 carrier, this system is a way to economically bring state-of-the-art service to remote customers. Terminates to an IDCU, DCLU, or DNU-S at the *5ESS*®-2000 switching system.

SLEN
Subscriber Loop Carrier Line Equipment Number

SM
Switching Module

Module in the *5ESS*®-2000 switch, consisting of the MCTSI, LDSU, and analog and/or digital peripheral units.

SMP
Switching Module Processor

Subunit of the MCTU2 or MCTU3 (SM) or SMPU4 (SM-2000). Performs most of the real-time intensive call processing and maintenance functions within the SM.

SMPU
Switching Module Processor Unit

The unit that performs call processing functions for lines and trunks terminating on the switching module and maintenance functions for the switching module equipment.

SM-2000
Switching Module-2000

SMD
Storage Module Device

SODD
Static ODD

SONET
Synchronous Optical Network

Facility terminating in a DSU-S, provides a standard optical network with flexibility to accommodate digital signals that currently exist in today's network as well as those planned for the future.

SPD
Secondary Power Distribution

SPID
Service Profile Identifier

SRC
Software Recovery Control

SSA
Summary Status Area

STE
SONET Terminating Equipment

STEFAC
SONET Terminating Equipment Facility

STF
Some Tests Failed

STLWS
Supplementary Trunk and Line Work Station

The AM input/output channel. Performs all MCC functions except EAI.

STS
Synchronous Transport Signal

SU
Software Update

Originally called Broadcast Warning Message (BWM), the Software Update is the maintenance of the system software via overwrites or program changes.

SXS
Step-by-Step

SYSSTAT
System Status

T&M
Talk and Monitor

TAP
Trouble Analysis Procedure

TAU
Test Access Unit

Optional function on the TLWS and STLWS. Provides telephone for communications with other work areas in the office. Provides a TLWS panel to access trunks and lines for maintenance activities.

TCAP
Transaction Capability

TEI

Terminal Endpoint Identifier

TEN

Trunk Equipment Number

Port in the SM TU as an identity of a specific analog trunk port in the TU.

TID

Terminal Identifier

TKGMN

Trunk Group and Member Number

TLWS

Trunk and Line Work Station

Function of the MCC used for test access to lines and trunks and as an interface to circuit administration. See STLWS.

TM

Terminal Maintenance

TMC

Time Slot Management Channel

TMP

Transmission Measurement Plan

TMS

Time Multiplexed Switch

TMSLNK

TMS Link

TMSU

Time Multiplexed Switch Unit

A subunit of the CM ONTC. A space-division switch that provides the physical path for digital signals carrying voice, data, and control information between the switching modules and the administrative module.

TMUX

Transmission Multiplexer

TOPAS

Testing, Operations, Provisioning, and Administration System

TP

Test Position

TRM

Two-Mile Optically Remoted Switching Module

The SM remoted up to two miles from the host switch over an extended NCT link.

TS

Time Slot

A period of time used by each digital sample consisting of 16-bits of data.

TSDBKEY
Time Slot Data Block Key

TSI
Time Slot Interchanger

A circuit pack in the MCTU2 and MCTU3 (SM) or TSIU4 (SM-2000). Takes information to or from the TMS and switches it onto the time slot corresponding to the line or trunk involved in the call. See MCTSI, MCTU, and TSIU.

TSIG
Trunk Signaling

TSIU
Time Slot Interchanger Unit

TTF
Transmission Test Function/Facility

A service circuit that performs all voice-frequency transmission tests. Model 1 sub-unit in the GDSU (SM). Model 2 in DSU2 (SM) or DSU3 (SM-2000).

TTYC
Teletypewriter Controller

TU
Trunk Unit

Peripheral unit in the SM. Provides a terminating point for analog voice frequency trunks such as interoffice trunks.

UC
Utility Circuit

UCB
Unit Control Block

UCONF
Universal Conference Circuit

UID
Utility Identification

UNEQ
Unequipped

UNIQ
Uniqueness Field - OSDS

***UNIX*®-RTR 3B21D Operating System**
Provides a set of software to handle such essential functions as mass data storage on disk drives using the *UNIX*® operating system, the external data link protocol handlers using the X.25 protocol, the program modification and debugging routines, the maintenance personnel interface facilities, and the central processor fault recovery and diagnostic packages.

UNVP
Unavailable Power

UPEDCUD
Current Update Data Base and History File Editor

USPID
User Service Profile Identifier

UTD
Universal Tone Decoder

Element of circuit pack in the LDSU (SM) and LDSF (SM-2000). Decodes dial pulse, touch-tone, and multifrequency signals.

UTG
Universal Tone Generator

Element of circuit pack in the LDSU (SM) and LDSF (SM-2000). Generates most required service tones.

VBS
Voiceband Signaling

VCDX
Very Compact Digital Exchange

VDT
Video Display Terminal

Also referred to as the Visual Display Unit (VDU), provides a means to enter commands and for the switch displays.

VDU
Video Display Unit

VT
Virtual Tributary

WB
Wideband

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